



**SZENT ISTVÁN UNIVERSITY**

**DEVELOPMENT OF RURAL AREAS AND SOCIETIES IN LIBYA**

**THESIS OF PHD DISSERTATION**

**HUDA FATHI SALEM**

GÖDÖLLŐ

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# 1. BACKGROUND OF RESEARCH

It is important to introduce a summary of the contents of this research through its lean on three major axes:

Water and development in Arab Nation.

The agriculture development trends in Libya.

The Great Man-Made River Project.

Starting with the first axis, there was not a coincidence but such choice was a natural response to some historical and subjective elements not being neglected. The use of the term “Arab Nation” was also a response to those elements to contain all those Arab countries, which are distributed on an area of 4,3 million km<sup>2</sup> extending without any natural obstacles from the Atlantic Ocean (west) to the Arabian Gulf (east). In a way that there is not relief separators, which may prevent about 300 million Arabians from moving easily between different Arabian countries specially, if they belong to the same Arabian origins of same religious, cultural and social features in addition to their common economic and secular reality from the time being.

This confirms the unity and complementary nature of this nation in securing all factors needed for a successful development such as natural, social and financial resource, but the economic and political fact is completely opposite, if somebody would like to try summarizing the reasons behind the failure of the Arab economic unity project.

The Dissertation has an aim to describe and analyse the the Man-Made River Project in Libya, which has very considerably role in economic increase of the country. This project has very wide-side influences on the economic and social development, including the agricultural development.

During the research works the monitoring and data collection were coming from different institutions and farms belonging the Man-Made River Project in Libya, and also from international bulletins and experiences at abroad, which gave basis for comparison with Libyan results.

The new results of the research activities were published in different articles in international scientific bulletins and papers of international conferences in books.

## **2. MATERIALS AND METHODS: TRENDS OF THE ARAB WATER MATTER**

The report of the World Bank (Aug. 1990) mentioned that 80 countries which contained 40% of the world population were severely threatened by the lack of water. This matter made negative influences on agriculture, industry and public health. Wars and disputes happened at the beginning of history. Also crisis of this age have a general nature and central attitude in the Arab regions either through the rarity of water, tension or instability, namely Arabs are mainly concerned more than the others by this matter, because they are in the top of the dry areas. Some Arab countries declared a state of dryness asking for humanitarian assistance from the world of which reports says that only 25% of it's population are able to cover their needs of water. The World Health Organization (WHO) said that fresh water did not cover the needs of every person estimated by 1000 m<sup>3</sup> of water per year.

This study is a step on the road to determine the dimensions and influences and consequences of water problem and how to deal with it to find the solution to reduce it severity through a subjective analysis of the environmental and human causes hoping that this will help even a little in spotting some light on this problem which is not a concern of one country or region but the whole world and people. Any attempt to solve this problem will not succeed unless ordinary citizen understand the dimensions and consequences of this problem before researcher, expert and politician.

### *Geography of Arab Nation*

1- The Arab Nation occupies a wide area estimated by 4,3 million km<sup>2</sup> which equals 1/10 of the total earthy area and lies between 17 degrees west to 60 degrees east and from 2 degrees south to 37 degrees north. Their areas start from the Canary Islands to the Arabian Gulf for more than 6000 km and from the Mediterranean and Taros mountains to the Tropical Hills and Indian Ocean for more than 4000 Km.

2- The Arabian Nation faces a various types of climatic regions such as Mediterranean climatic region, Sahara climatic region and the tropical climatic region. The Great Sahara covers 89% of Arabian Nation's area (75% in African countries and 25% in Asian countries).

3- Along the coasts of the Arab nation either the ocean coasts or sea coasts there exist plane area on which rains fall with different quantities in addition to the flooding planes of Nile, Tigris and Euphrates.

4- Forests are limited comparing to the total of the nation, they are available only in 20% of Sudan's area, 18% of Maroc's area and 2% of Tunisian area and some other areas.

5- Mountains lie on the extremities of the Arabian Nation such as the Atlas Mountains on the North West, Kurdistan and Zagros on the North east, Red Sea Mountains and the Mountains of Syria and Lebanon.

6- Most of the rivers of the Arabian Nation flow from neighboring lands such as Nile river which flows from Victoria Lake, Tigris and Euphrates rivers which flow from Turkey, and Senegal river in Mauritania which flows from Fouta Djalon Heights in Guinea, the same for Jordan and Yarmouk river which flows from other non-Arabian Land inside occupied Golan and Harmoun Mountains.

The majority of the world population suffer from the lack of drinking water and other purpose water resources, where 3,5 of 5,5 billions living with less than 50 liters per day, meanwhile the population of the world is expected to 8,3 billions in 2025 and to 10-12 billions in 2050 (Time Mag. 5 Nov. 1995). On the other side many low populated countries have a large quantities of water while many high populated countries suffer from the lack of water.

The fore said factor was negatively reflected on the situation of water in the Arab Nation where since the last decade annual rain quantities reduced specially as most of Arab countries lies out of the world rain region, also the irresponsible environment of man was another factor made the balance of nature upside down leaving the desert crawling on thousands of hectare of agricultural lands and so putting a big pressure of water sources.

It is expected that the development of population in the Arab Nation will lead to a decrease of individual's portion of water by 50% in 2025. The report of the World Bank (1993) declared that the average portion of water will decrease by 80% to go down from 3430 m<sup>3</sup> in 1960 to 667 m<sup>3</sup> in 2025. The conclusion is that water is one of the most important natural wealth's due its rarity and the drying up of it's reserve and the bad use of it.



The water problem in Arab area has common features such as rarity, high cost of investment and the increasing consumption of water to cover the needs of agriculture and industrial projects in addition to that the problem has exceeded the political and regional limits.

#### *Emigration from rural regions to Cities and Random Civilization*

Most of the Arab Nation Countries suffered from this phenomenon which resulted by the deterioration of the environment in that regions, the lack of natural resources and the absence of development programs which can bring up the living levels in villages and increase the productivity of land which became enable to cover the needs of the former and his family.

Another thing, city lights attracted people from village who preferred easier jobs in the city. This immigration towards cities created some crowded cities such as “Cairo” of which population density around 29392 individuals per square kilometer, which equals 52% of the population of Egyptian Cities during 1980-1982. This density reached 12133 per square kilometer in Maroc or 36% of the population of cities of Marocco.

In oil countries people concentrated in cities for example 96% in Kuwait, 71% in Iraq and 70% in Libya, and due to the limited development of productive projects we found that the majority of man power work in services sector. The continuous immigration towards cities will raise the population of those cities to about 80% of the total population, and will lead to:

- 1- Spending of national income on non-productive project which will not support the national income.
- 2- Failure of agricultural development programs.
- 3- Pressure of the food markets due to the transformation from production to consumption.
- 4- Destroying of agricultural lands by the building of cities.
- 5- Flooding in debts due to the import of food.
- 6- The complication of social and environmental problems in the urban areas such as the spreading of tin cities and poverty.

The conclusion here is that there is a strong relationship between the phenomenon of random civilization and both food and water shortage in the Arab nation. This can be avoided by a whole national development based on a wise consumption of the natural resources now and in

the future to create a construction and economic balance between village and city wishing to realize the reversal immigration from city to village.

The agricultural regions are depend on the un-steady small amounts of rain. The reduction of the invested areas as they are not completely planted. The spreading of light agriculture which use limited amounts of fertilizers, chemicals and improved seeds in addition to the use of limited machine technology.

Inequality in the distribution of capabilities and resource and the difference of Arabian economic structures, this is clear from points below:

1.- The difference in agricultural capabilities such as land, water and finance, all oil countries miss these capabilities in opposite to non oil countries which have a great quantity of these capabilities but they miss the financial support.

2.- Obvious contract of agricultural land distribution and the huge amount of unused agricultural lands. (About 80 million hectare or 57% of the agricultural lands).

3.- The difference in human resources as some countries suffer from lack of man power such as oil producing countries with the presence of work opportunities meanwhile other countries suffer from unemployment as in Egypt, and in general there is a strong difference in the size of man power between Arab countries.

The difference in finance capabilities. Countries of man power shortage usually have a high financial capability and vise versa countries of large man power capability have a financial shortage.

### **3. RESULTS OF RESEARCH: AGRICULTURAL DEVELOPMENT TRENDS, FARM INCOMES AND RURAL DEVELOPMENT**

#### *Economic background*

The Libyan Arab Jamahiriya has a total area of about 1,76 million km<sup>2</sup>. About 95% of the country is desert. The cultivable area was estimated at 3,80 million ha, which is only slightly over 2% of the total area. In 1987, the total cultivated area was estimated at 2,28 million ha, or 60% of the cultivable area, of which 1,93 million ha consisted of annual crops and 0,35 million ha consisted of permanent crops. The total population is about 5,4 million (1995), of which 14% is rural. The annual demographic growth rate was 4,1% between 1980-91. The average population density is 3 inhabitants /km<sup>2</sup>, but varies between 50 inhabitants /km<sup>2</sup> in the northern regions of Tripolitania and Cyrenaica to less than 1 inhabitant/km<sup>2</sup> elsewhere. Agriculture contributes less than 5% to GDP, although it provides employment for approximately 13% of the active population.

#### *Developing trends in irrigation system*

Irrigation potential has been estimated at 750.000 ha. However, the development of this potential would have to rely mainly on the use of fossil water. Considering renewable water resources, it is estimated that a maximum of 40.000 ha could be irrigated in the coastal areas. The total water managed area is approximately 470.000 ha, all equipped for full or partial control irrigation. Sprinkler irrigation is practised on almost the entire area, because of the sandy soils prevailing in most areas of Libya. Of the total area of 470 000 ha, only 240 000 ha was actually irrigated according to figures from several years ago.

There are three different categories of farming in the irrigation sub-sector:

- small holders, generally on 1 to 5 ha plots, receive substantial State support for water equipment, energy, and agricultural inputs. This type of farming represents approximately 30 to 40% of the total irrigated area but is mostly concentrated in the traditional development areas, i.e. the Jifarah Plain, the Jabal al Akhdar, and the Murzuq Basin;

- large-scale state farming, mainly located in the southern areas, where new irrigation schemes have been set up based on highly productive deep wells supplying water to blocks divided into small plots and cultivated by small-scale farmers; and

- large-scale state farming, mainly located in the desert areas (usually pivot systems), operated by state technicians and workers.

At present, no water fees are imposed on water users, namely on farmers.

### *The agricultural development strategy*

Development programs were launched to improve the development of agriculture sector and to increase its portion in the total national output and realize the following targets:

(1) Food security by self sufficiency of agricultural and food products and avoid falling in the trap of conformity.

(2) To elevate the level of farmers and financial and natural resources to increase the farmer income and their life level.

(3) To finish the tribal ownership of agricultural lands and re-distribution of production to realize the social equality and justice

(4) The creation of new stable dwelling zones in the new agricultural regions and the establishment agricultural villages to stop emigration from village to city and reduce differences between the population of urban and rural regions.

(5) To realize complement and correlation between agriculture and other sectors specially the transformation industries by the improvement of agricultural raw material base used in industry as the improvement of agricultural production requires the improvement of equipment and other facilities which can be done by the industry sector, and by the increasing of agricultural productivity and incomes, demand will increase on consumable products and available services.

### *The Green Mountain Project (Dzsabal Al-Khadra Project)*

It targeted the plantation of 1.211.099 hectare of land by the construction of 6596 modern farms and each of 25 watered hectare and 80 un-watered hectare especially in the Bedwin regions of the Green Mountain (See Figure 6. in Appendix).

This project aim to:

- 1- Increasing the plant and animal production to reach a self sufficiency of food.
- 2- To stop the movement of internal emigration and encourage settlement and investment.
- 3- To provide a suitable income for farmers not less than the income obtained in urban regions.
- 4- The determination the farm area in each region according to rain quantities, quality of land and land capacity and fixing a specified plantation cycle to reach the necessary production.

The projects of the Green Mountain are one of the complete project as every farm is attached by a modern house equipped with all luxury means, sheep and cow folds, forage stores, machinery, garage, water tanks, new tractor, wheeled tank, 2 cows, 40 sheep, 2000 fruit trees and five bee cells.

The construction cost of each farm in Al-Baida area was 30.000 L.D. and 70.000 L.D in the area of Derna and Marj according to 1973 prices. Each farmer received a completely equipped farm and will start paying 50% of the total cost only after 4 years from delivery for the period of 15 years, but this value is not paid yet. It is important to say that those farms were constructed to suit with the available environmental and climatic conditions of the area.

### *The Great Man-Made River Project*

Libya did not face any financial problem due to the rising prices of oil in 1970's, which was reflected on the unlimited expenditures on the four development plans as follows:

First plan	(1973-1975)	2203 million LD
Second plan	(1976-1980)	8813,2 millions LD
Third plan	(1981-1985)	13167,8 million LD
Fourth plan	(1986-1996)	13000,0 million LD

Then the authority followed some development policies, which focused on the settlement of a national basement to exit from the state of retardation. The policies, which take care of the fair distribution of public expenditure and social justice by focusing on the economic, service and social projects. But it is noticed that it dealt with oil resource in that period as an infinite resource. When oil prices fall down and the society kept the same level of expenditure, the next development plan (1986 – 1996) was less ambitious than the previous ones (13 billion LD was only) and was effected by the reduction of oil prices in the market.

There has also been a marked increase in the quantities of cereals and cereal products imported, from 719.000 tonnes in 1980 to around a million tonnes in 1984 and 1985. The latter being an average of about 250 kilograms per head of population, a very high level of dependence on external supplies. Another estimate of self-sufficiency was made for 1980 in the Social and Economic Development Plan 1981-1985.

The main aims of the agricultural sector, which are as follows:

1/ Grow the output of the agricultural sector, 2/ the intensive methods of development, for example mechanisation, utilisation of fertilisers, 3/ develop the irrigation system, 4/ increase the food self-sufficiency, 5/ establish and increase the role of family farm system, 6/ increase the life standard of farmers.

Additionally to these aims it was important to develop the building of rural roads, create the background of agro-industries, rural housing within the rural development policy.

In the middle of the 1980-s Libya has achieved only 66% self-sufficiency in wheat and barley, and that 60% of meat and 40% of milk consumption covered by the domestic production. The aim of the agricultural plans was to ensure the whole food consumption from the domestic production. The food self-sufficiency should be about 100 %, in order to decrease food and agricultural import.

The Libyan People Congresses have decided to build a very important and considerable project, which was called as „Great Man-Made River” (GMMR) in 1983. Under the first stage of the irrigation and water-supply project South-Korean Companies were contracted to build a man-made river, at a cost of 30300 million US\$, to carry 2 million m<sup>3</sup> of water per day along 2.000 km of pipeline from natural underground reservoirs at Tazerbo and Sarir, in the south-eastern Sahara desert, to Sirte and Benghazi and agricultural projects and towns on the

Mediterranean coast, namely in via Agedabia. The total of 270 wells were being drilled in the Tarzerbo and Sarir areas, with the aim of irrigating approximately 280 000 ha, on which some 37 000 model farms were to be established. This was possibly the largest single contract ever awarded in the Middle East, and its cost had risen to US\$ 4200 million by 1986.

This water will be also used in industry and of course in supplying all Libyan cities by drinking water. This project required the drilling of 960 wells of deepness 450-600 meters covering the area of 8 thousand km<sup>2</sup>. The total annual pumping rate is estimated by 700.000 million m<sup>3</sup> of water, of which about 80% will be used in agricultural purposes based on the plan. The total cost of this project (3 phases) which started in 1993 and will be completed in 2007, amounted of 6,6 billion L.D which equals about 20,6 billion US\$ and it is fair not to evaluate this project before it's completion but we can not hide our pride of this very high level of technology used and the insistence to reach the target.

In 1995 the GMMR Project became central economic, development program in the national budget, of which 1300 million USDollar was to cover the cost of water transmission work, 300 million USDollar was for associated irrigation projects. One South Korean Company provided work for 13.000 people on GMMR works in Libya, including 2.500 working in manufacturing the world's largest pipes with their 4 meters in diameter and 4.000 working in pipe-laying activities. Final completion of phase two of the GMMR Project was scheduled for 1999. In all, the phase-two project specification, as modified in 1993, involved a total 1.287 km of pipeline - of which 85% had been produced and about 70% had been laid till the beginning of 1996 with a daily transmission of water drawn from 484 wells in the Sahara.

According to previous plans, number of these water reservoirs are in south west of Benghazi, to a total capacity of 76 million m<sup>3</sup>, with further reservoirs in the Sirt area sized at 37 million m<sup>3</sup>. Other smaller reservoirs are constructed in Nuwfaliyah, Bishr and for the existing development projects at certain wadis. Upon completion of the Great Man-Made River Project, about 155.000 hectare of fertile land will be cultivated and irrigated by the water from the project. The reclamation and development of some 38.000 hectare south of the Benghazi plain served by the Ajdabiya-Benghazi line, and some 18.000 hectare on the Ajdabiya-Sirt line, has already started, in addition to preparations for irrigation of the existing wadi developments.

If all phases are completed, there will be a total of 4.040 km of pipeline, with a water-carrying capacity of 6 million m<sup>3</sup>/per day. The eventual cost of the GMMR, including agricultural infrastructure, could be as high as US\$ 25000 million. In September 1989 the South Korean Company was also awarded the main contract for the second stage of the GMMR, on which it began preparatory road construction in mid-1990.

Regarding large farms, the short description of the systems comes in the followings:

- With efficient use of water a primary aim of the project, sprinkler systems offer the only viable method of irrigation for field crops on the large areas of sandy soils, in spite of the relatively windy conditions at certain times of the year.
- In order to minimise labour requirements, a fully mechanised system of overhead irrigation is required. As good agricultural land is short on both pipelines, any system selected must as far as possible maximise the use of land, otherwise more marginal land will need to be brought into use at an effective additional development cost of up to US\$ 1.800 per head. It is also likely there would be reduced crop yields from such less favourable soils.

#### *Farm income conditions*

The animal husbandry has considerably developed since the first units of GMMR Project started their operation. The advantageous conditions were created for growth of plant-production, as well. In October 1991 the FAO organised an international scientific conference, of which participants could report that the GMMR in Libya had been very successful:

- in the growth of the agricultural production;
- in increase of food-self sufficiency;
- in decrease of food-import;
- establishment of family farm units, as well.

It is very important that additionally to cost of GMMR Project the central agricultural supports are needed by the agricultural producers, farmers in order that they initiate and continue their agricultural activity. These supports can be as follows:

- for buying agricultural machines, fertilisers, seeds;
- establishment of national sized advisory network to provide information for the farmers;



- promote co-operation between farmers in fields of selling and buying;
- build up the service network of machines.

There are some very important aims, which are as follows:

- to keep the domestic market price of agricultural and food products on low level in interest of domestic weak buying capacity consumers, and in the same time;
- to realise the direct financial support, as direct payment for farmers, as well.

The direct costs and incomes of the various categories of large farms are different, mainly due to differences in cropping patterns and yield estimates. Net incomes range from US\$ 2,25 million (1500 ha at Al Khadra) to US\$ 7,98 million (2000 ha at Al Bab) per farm. When these net incomes are divided by the estimated water use, they indicate the amount that the large farms can contribute towards the cost of irrigation water. Net income per m<sup>3</sup> of water range from US\$ 0,21 in Al Khadra to US\$ 0,56 in Wadi Al Bab. The break-even analysis indicates that costs (direct and overheads) can increase by about 60 percent or incomes fall by the same amount before no margin will remain for GMMRA (Greate Man-Made River Authority) to recover the costs of irrigation water.

The net incomes of small farms is around US\$ 40.000. After allowing for the US\$ 16.820 family allowance, a margin of US\$ 23 000 remains for GMMRA to recover costs from each small farm. This margin is equivalent to US\$ 0,27-0,34 per m<sup>3</sup> of irrigation water.

A break-even analysis indicates that costs (direct and overheads) could roughly double before there would be no margin left for cost recovery. However, if an allowance is made for interest charges paid by the farmer to the Agricultural Bank for long-term, medium-term, and seasonal loans, the margin would be lower. Maximum capital repayment and interest charges would be approximately US\$ 27.000 per small farm assuming all requirements are borrowed. In practice, some farmers will supply their own vehicle (one of the largest cost items) and some of their own farm machinery and equipment.

The quantifiable economic benefits from the project come from three sources:

1. Concerning large farms, the net benefits from crop and livestock production on the large farms have been estimated from the enterprise budgets.
2. Concerning small farms, also the net benefits from crop and livestock production on small farms have been estimated from the enterprise budgets. The LD 5000 per year family allowance has not been deducted because this is a financial charge and the farmers are beneficiaries of the project.
3. Concerning processing, it has been assumed that the milk processing plants and the abattoirs purchase their milk and livestock at prices used in the livestock enterprise budgets. The prices of pasteurised milk and meat are lower than financial prices, reflecting the relatively low landed cost of imports.

### *Rural and urban development*

*Gross Domestic Product.* The high and sharp rise of Libya's gross domestic product over the past three decades has been caused by the dominance of the oil sector, and expansion of construction, utilities and tertiary activity sectors. By 1973 the share of petroleum and mining in the nation's gross domestic product had fell from 54% to 51% while the share of construction (the next largest sector in terms of national product) doubled from 6% to 12%.

In 1973, agriculture and manufacturing, which are the key productive sectors under the title of the planning, accounted for only 3% and 2% respectively of Gross Domestic Product. For political, economic and resource conservation reasons, the oil sector's production is continuing past rates of its growth in the future. That is the reason why investments are required in this sector, which is strongly connected to the others, like housing, agriculture, utilities, transport and manufacturing.

*Income Distribution.* The average income of workers and employees by economic sector was different through the time. In 1973, it was accounted for a third of all worker income and trade and finance for over 40%, reflecting the heavy commercial activity (business activity) in strong relationship with the flow of the capital and consumer goods into the country. Income per worker also changes by economic sector with a height of over 3000 dinars per worker in the petroleum and trade sectors to a low of less than 500 dinars in agriculture and little more than 800 dinars in manufacturing.

These inter-sectorial differences can help to explain why so many Libyan workers have left the primary and secondary sector for jobs in tertiary activities (the area of the services instead of manufacturing or agriculture).

- Primary sector: agriculture;
- Secondary sector: manufacturing, factories, industries;
- Tertiary sector: sector of services (offices, companies, distribution of goods, some special commercial activities, job in a hotel, entertainment, tourism, and so on).

### *Different types of settlement in Libya - and progress*

The types of settlement in Libya are different from other countries, partly because of semi-desert, and Bedouin lifestyle. There are many appearances of settlement, which are as follows:

1. Separate farm - This can be found around Tripoli and the Green Mountain, especially in areas being rich in accordance with the requirements of successful agricultural production. On this farm, the farmer himself used to construct buildings for serving agricultural and animal husbandry purposes. One of disadvantages regarding this type of settlement comes from the buildings, as the valuable places of arable land are occupied by those. The other disadvantage of these mini-farms is the social isolation, which cause the expansiveness of providing services (electricity, water, roads, etc.) Also, this did not meet the requirements of Bedouins.
2. Linear village - This type of village is beside roads play important role in transportation. There are several buildings, mostly for the sake of servicing the transportation and travellers, which take their products from the centre. Also villages satisfy their needs from bigger cities.
3. Settlements connected to agricultural projects - These are important settlements, which were as one of the great inventions of Libyan Revolution. This is new scientific way for the farmers in order to improve their production. These settlements became a successful combination for development of the agriculture and the other economic branches.

All the results can be seen clearly by the decrease of mortality, and the increase of birth. The growth of population also caused for the crowd in the cities.

The increase of the number of the youth under 15 year-old, which was as follows:

- between 1954-1964, it was growing from 38% to 44% of the total inhabitants, meanwhile
- between 1973-1984, this rate was 50,2%.

This fast growth caused a large number of youth in big cities, mostly without specifications, or high standard of educational level. This was the first cause of the large number of unemployment in the cities. The main cause of the fast growth of the population of Libya was the fast urbanisation. From 1973 to 1984 the number of the total inhabitants had been increased by 61,7% in Libya. Regardless Libya became a big country, the area which was available for living from economical view just 5%, from geographical view, only 1%.

#### 4. NEW SCIENTIFIC RESULTS

Between 1987 and 1995, as the Table {5.) shows, the reduction of total agricultural lands was implemented by 3,8 %. This was resulted that the agriculture was depending on a seasonal rain, which formed 81% in 1987 against 19% of the watered agriculture. But the watered agriculture was improved by the technical and technological revolution to reach level of 26% in 1995 form original level of 1987. Finally the importance of presentation of the social types that forms the social structure through its role in the creation of development conditions and causes.

The technical development, which resulted in high share of watered areas by 33 years during the same period, can be described, which is as follows: this water will be also used in industry and of course in supplying all Libyan cities by drinking water. This project required the drilling of 960 well of deepness 450-600 meters covering the area of 8 thousand km<sup>2</sup>. The total annual pumping rate is estimated by 700.000 million m<sup>3</sup> of water, of which about 80% will be used in agricultural purposes based on the plan. The total cost of this project (3 phases) which started in 1993 and will be completed in 2007, amounted of 6,6 billion L.D which equals about 20,6 billion US\$ and it is fair not to evaluate this project before it's completion but we can not hide our pride of this very high level of technology used and the insistence to reach the target.

More than 86% of the water output was planned to use for agricultural development, so that the country will become self-sufficient in agricultural products and achieve economic independence. Production of strategic crops such as wheat, barley, sorghum and sheep fodder will be given priority, so that national production of these crops, beef, mutton, milk and dairy products, all are vital to human life, can be increased while expensive imports have reduced.

This technical movement means the considerable agricultural production. In spite that the all agricultural areas decreased by 3,8%, the irrigated arable land has increased by 33%, which changed not only the volume of agricultural production, but also the social structure of Libya. Recently Egypt treated drain water through a modern main sewage system, this network produces about 2-3 km<sup>3</sup> of water per year used in agricultural irrigation although farmers did

not accept this water on buy it's agricultural products, an other disadvantage of this method is the strong evaporation loss, which is about 5-15% of treated water.

The Urban Development Department has estimated that in 1954 only 25% of the population lived in urban areas. By 1980 this proportion had increased to 66%, and it is projected to exceed 80% by the end of this year. The population is concentrated in the narrow coastal strip, which is only 2% of the country's land area. About 75% of the people are living in this area.

Because the increase of the development was considerable, this stimulated the increase of Libya's food requirements have been made, based on estimates of per capita consumption and population growth. Agrawal in 1982 estimated 'demand' in 1980/81 based on a predicted population of 3.246.000 and projected 'demand' for a population of 6.145.000 by the year 2000. A more recent estimate of self-sufficiency was made from data on imports of food products.

There has also been a marked increase in the quantities of cereals and cereal products imported, from 719.000 tonnes in 1980 to around a million tonnes in 1984 and 1985. The latter being an average of about 250 kilograms per head of population, a very high level of dependence on external supplies. Another estimate of self-sufficiency was made for 1980 in the Social and Economic Development Plan 1981-1985.

The conclusion of the foregoing estimates and facts is that the SPLAJ have been heavily dependent on imported food items, notable wheat, barley, diary products, and meat (beef and sheep meat). This dependence would have been inevitably increase as the population grows, unless agricultural production grows faster, that is at more than 4% a year. The prospects of agricultural growth from traditional rained cropping and animal production in the coastal belt is negligible, although there may be some scope for improving the productivity of rained cereals.

## 5. CONCLUSIONS AND PROPOSALS

*1. For the future strategy of rural development in Libya and its problems.* Due to the high price of oil, Libya can spend a large amount of financial resources for maintaining the arable lands productive for agricultural purposes. However, the inefficiency of water and the big areas of land requires more and more efforts to develop Libya's rural areas.

The problems arisen can be summarised as follows:

- Decreased numbers of worker. As it was mentioned before, Libya has a problem of immigration. After discovering the oil, the farmers moved to cities. This kind of immigration requires special efforts, encouraging the people to the opposite immigration - back to the countryside. The economic, social and political development pays great care of agriculture, animal husbandry, especially by the cancellation of trade. By the cancellation of trade, there was useless to stay in the city, so the immigrants moved back to countryside. So, this opposite immigration back to the rural regions had been achieved by 1. cancellation of trade, and 2. nationalisation of oil, and 3. pay big attention to the agriculture by Popular Congresses.

- The number of growth of population must be in harmony with the capacity of the city - food, health services, working opportunities. For fulfilling the natural order of the tradition, most of the people want to live in villages, however the possibilities are strictly limited.

2. By the end of 1990s, there was also a monumental new project - the Great Man-Made River, which provided the possibility for the people to develop the country all over, giving the same possibility for choosing the preferred lifestyle. This project provided deep and fast development for economy in country-side, towns and sea cost, because the water resoures could be used for agriculture, which was concentrated mainly in villages or surrounding areas to small towns; and for agrobusiness, which was concentrated mainly in towns. The Great Man-Made River stimulated very effective and strong economic development in agriculture, agrobusiness and infrastruture – like oil transport, roads, housing for population and urbanisation – also for education.

3. Also it would be important to extent the Great Man-Made River Project in direction to Tunisia. Tunisia has the first largest oil tree land in the world, but their water resource is not

enough. By the extending the Man-Made River Project in Tunisia the cooperation can be wide between two countries. The cost of the new extending project can be covered by plant oil coming to Libya in order to manufacture this, and then as value added products – for example liquid oil in bottle, can be re-exported to the world market, either Tunisia or other countries, like Arab countries, or EU member countries.

4. There is also a brave idea to feed the lake of Tchad by water from the rivers of Obongo and Shari in Kongo and Middle Africa. Then they link it with the great Man-Made river through a huge pipe line upto **Tebisti** heights through a long pipe line network (about 1000 km). After that the rivers flow by gravity to the great Man-Made river forming the greatest water net work in Africa to feed the great agricultural projects by water in order to secure food and work opportunities for millions of Africans. The matter that will limit the illegal emigration of Africans to Europe and in the same time secures the continuity and flow of water through the great Man-Made river and continuity of it's projects.



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