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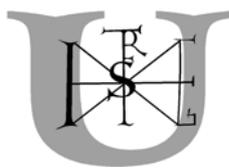
DEVELOPMENT OF RURAL AREAS AND SOCIETIES IN LIBYA

DOCTORAGE THESIS

HUDA FATHI SALEM

GÖDÖLLŐ

2004



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Title of

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Science: Economics

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I GIVE THIS DISSERTATION FOR MY FATHER
HUDA FATHI SALEM

To My Father,

In the name of God

My neverending thankfulness is addressed to my beloved Father, who has been beside me with His heart and forever support since my first year of school.

He has always couraged me for the best efforts I can to overcome the difficulties of life.

His golden advices have been leading me in my study as well as other parts of the life throughout the years till this moment.

This is why I devote this study to Him, which is the fruit of his best efforts to help me succeed in the road of life. Therefore, this study is to Him, and I offer this work as a gift for my Father, in order to give small thanks for his great guide to me for the life.

God may bless Him!

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Introduction

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 km² 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 compare 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.

1. GENERAL REVIEW OF REFERENCES

The Great Man-Made River Project has very important influences on the economic and social development of Libya. These influences resulted in some main important economic and social changes in the Libyan society, which concerned rural and urban development, production efficiency, development agricultural production technology and environmental conservation. Libya could get considerable oil incomes, which ensured this economic social development. The country set main project, namely Great Man-Made River Project, which became centre for this development and could realise many changes in rural and urban areas of Libya.

Naturally Libya has emphasized the international experiences of economic development. In this case it is very important to make a review about the different scientific resources and articles, which provide some important useful declares for Libyan development.

Also Libya has some main important strategic targets for agricultural and economic development, which were emphasized by Hungarian authors for agricultural development in European Union and Hungary: “...*priority and motivation of the reform is to stabilize the agricultural and food markets,.....increase market orientation of production and competitiveness.* There is an emphasized importance to *increase income-ensure* of economic activities, to *decrease the income-difference* between the agricultural producers, create the possibility for *obtaining the additional incomes and alternative incomes* concerning to agriculture. ., (Popp, J. – Potori, N. – Udovecz, G., 2004, p.3.).

There are some other important targets in Common Agricultural Policy of European Union for Libya, as the same authors write: “.....arrangements of environmental conservation, animal welfare, quality of food and food ensure became important.....to stabilize confidence of consumers.” (Popp, J. – Potori, N. – Udovecz, G., 2004, p.3-4.).

In Libya the main strategy for the economic development is to increase the direct payment, financial different kinds of support – for example interest supports for investment and buying agricultural machines, fertilisers – and the rural development. In European Union also the financial subsidies for rural development contents the supports for young farmers with farm

advisory system, establishing forestry, supports for less favourable lands and environmental conservation. (In detailed see the article of Popp, J. – Potori, N. – Udovecz, G., 2004, p.43.).

The agricultural development strategy needs to increase qualitative level of agricultural and food products, as some experts declared, that it is important to keep the qualitative requirements, for increasing the level of the technological and technical development in farming. This can be realised by significant investments in the application of new technology. (Fehér, I.- Zsarnóczai, J.S.-Szűcs, E., 2001, p. 222.).

Also there is an important issue for Libya, that the marketing activity should be extended, as some experts declared: „The length and parts of selling channel are influenced by economic developed level, characters of products and structure of market.” (Lakner, Z. - Lehota, J. 1998, 34.p.).

The Hungarian experts ensure the importance to keep to the qualitative requirements, it is importance to increase the level of the technological and technical development in ...farming. This can be realised by significant investments in the application of new technology. (Fehér, I.- Zsarnóczai, J.S.-Szűcs, E., 2001, pp. 222.).

The qualitative demands are needed for obtaining market share either in the world market or national, or local markets. To have market share, which also needs competitiveness. As Hungarian authors declared, that “In competitiveness on the international market, a key role is attributed to groups of different strategic aims, targets as well as marketing potential. The study deals with the typifying of strategies according to the method of Porter. By the method of questionnaires, factor- and cluster-analysis has been attempted in order to determine the strategy of Hungarian wineries. Characterization of different strategic groups has been based on the following components: degree of market orientation, specification of the structure of competition, the role of innovation, links to the supplying chain, the spatial and assort mental coverage of the market, the saturation of the sale's channel, trade market and indication of provenance, as well as characteristics of effectiveness. Substantial part of the Hungarian wineries is specialized to strategies of different targets, but there is a high ratio of enterprises without specified strategic aims.” (Lehota, J. – Komáromi, N. – Szabó, Z., 2004, pp. 91-92.). Naturally they emphasized the competitiveness in a special field of the

Hungarian agricultural product, namely wine, but their declaration also is generally valid for all agricultural producers and their products.

Additionally to the qualitative demands of EU, it is important for the farmers to create cooperation between themselves. This cooperation was emphasized by some famous Hungarian authors, for example Udovecz, G. wrote:

“The prevention of bankruptcy and further dramatic regression of production should be the task of the producers and the processing entrepreneurs. First of all, the attitude has to be changed: a partnership of reliable cooperation on the long run may substitute the competitive efforts! A collectively designed program of production and marketing strategy with negotiated and fulfilled contracts are important guarantees of keeping a lot. The change of attitude, of course, is only one of the conditions of effectiveness. Farmers should examine their conscience. Farmers should ponder over resources and possibilities comparing them with their antecedent career and recognized facts.” (Udovecz, Gábor, 2004, p.91.).

The other author emphasized the wide economic cooperation between the market participant in direction to the setting up integrated product channel, which he summarized, as it follows: “The agro-economical approach to product course integration has seen a significant development during the past decades. Vertical integration - the classical notion of the seventies - evolved to the product course models of institutional economics through new methods of scientific approaches, and to the perception of the relational chain of the market as a value chain. Despite the diversity of approaches, until today it became general to define product course integration as a marketing process or marketing channel. This present-day approach is the one that is near the approach outlined in this article, according to which product course integration is a market relational chain, a division of function and labour between the players of the product course based on market foundations and organized by the implements of the market, where the objective of the integration is to improve competitiveness. In this approach integration is an organizational tool in the hands of the players of the product course.”(Markovszky, Gy., 2004, p. 9.).

In Hungary there are some very important experiences concluded in the field of rural development, which is as follows:

“One of the most interesting issues of the present is the rural development support during 2004-2006. The support appropriated by the Operative Programme of Agricultural and Rural Development (OPARD= AVOP in Hungarian) amounts to 81 and 27 billion HUF coming from the European Union and domestic resources, respectively. 57 per cent of this money will be allocated for the competitive production of agricultural raw material, 14 per cent for the modernisation of food processing, 26,5 per cent for rural development, and 2.5 per cent for technical aid. The measures of the National Plan of Rural Development follow the AGENDA 2000, and they amount to approximately 127 and 32 billion HUF coming from the European Union and domestic resources, respectively, allocated for the support of the eight measures in question. The impacts to be expected are described in the paper as well.” (Mohácsy, G. 2004, p. 143.).

The same author emphasized that the OPARD includes main financial supports for rural population in Hungary in some fields, which are follows:

- 1/ Strengthen the competitive basic material production in agriculture (for example: agricultural investment, modernisation in fish catching, support for initiative young farmers and education, advisory services);
- 2/ Food manufacture modernisation;
- 3/ Development for rural areas (infrastructure for agriculture, extending livelihood for rural people; village development and conservation of village instrumental and theoretical heritages, LEADER program);
- 4/ Technical supports: for newly setting forestry and basic services for rural inhabitants and companies. (Mohácsy, G. 2004, pp. 64-65.).

Also the author described the structure of National Rural Development Plan (NRDP = NVT in Hungarian), which includes the main fields of supports, which are as follows:

- “1.- Agricultural environmental conservation;
- 2.- Supports for less favourable areas (LFA);
- 3.- Setting forestry in agricultural areas;
- 4.- Earlier pension system;
- 5.- Supports for compatibility for environmental, animal welfare, hygienic demands of EU;
- 6.- Supports for partly independent farms to change their production structure;
- 7.- Supports for establishing producing groups and their economic activities.”

Naturally the majority part of supports, either OPARD or NRDP comes from EU financial resources, namely FEOGA and fishery fund. (Mohácsy, G. 2004, pp. 68.).

The other author declared concerning the rural development conception, that “In the framework of the Sapard program, the calling for tenders of AVOP (Operative Program for Agricultural and Rural Development) offer subsidy to investments in animal husbandry and in some sections of the processing industry. Other programs of the National Development Project stimulate the cooperation of farmers and stockbreeders, marketing, environmental conservation as well as the protection of animals, i.e. the necessary investments meet the respective requirements. Also for the marginalised farmers are assisted to find employment or adequate supplementary income. The „state” is not expected to abandon agricultural policies, animal husbandry included, but its presence and intensity will be modified in de future. It means that the selective effects of the market cannot be counteracted blindly by state subsidies! The state is ready to help those, who know well what to do within the limits of real possibilities!” (Udovecz, Gábor, 2004, p.91.).

Also some authors emphasized the importance of competitiveness in developing trends of agricultural production and food industry, which has strong contacts with agricultural and food basic production. “Competitiveness is a complex category since it is influenced by numerous factors, sometimes to a very different degree. In short, competitiveness means standing one's ground in competition. When judging the competitiveness of a person his position as compared with that of his competitors can be valued. Competitiveness can be studied on national, sectorial, and company level, as well as in terms of products or services. Needless to say, international competitiveness means the extent to which a country is capable of standing its ground in worldwide competition making use of its available resources and goods. As for Hungary, that will become member of the European Union in 2004, wherefore market competition, more severe protection of the consumers' interests, food safety, technological discipline, and quality issues will come to the front. Due to the expansion of the market, it can be expected that the efficiency of national resources available for agriculture will improve after the entry of the country into the European Union.” (Bozsik, N., 2004, p. 141.)

The Hungarian experts declared that the competitiveness has important role for the rural development: “The majority of agricultural products is processed in the food-industrial

sphere, so the competitiveness of food industry is an important factor for rural development and employment, too.” (Lakner, Z. – Hajdú, Istvánné, 2002, p. 7., and see 7. Figure in Appendix). It can be emphasized also, that the competitiveness can ensure for the agricultural producers to remain continuously on the markets, which also ensure an adequate livelihood for them. In this case the farmers are not stimulated by disadvantageous rural income conditions to leave their original rural home-place.

Also the experts determine the definition of the competitiveness in point of national views, which are as follows: „International competitiveness” is an important but elusive concept. The difficulty of giving the term a unique meaning or a unique definition stems partly from the various levels at which the concept should be examined. *Competitiveness is used both in micro- and macroeconomic context:* There is a competitiveness at the national level, at the industry level, at the level of the firm in relation not just to domestic competitors, but also to global ones, or it can theoretically even be limited to individual products. (Lakner, Z. – Hajdú, Istvánné, 2002, p. 20.)

The other experts have emphasized the role of comparative advantages in strengthening the competitiveness. “According to the classical theory the comparative advantages of each country are based on its relative production costs. However, at present state intervention is important as well, especially in the form of subsidies, and backed by exchange rate policy. For the purposes of an exact analysis indices can be calculated in order to reveal protectionism and determine competitiveness. It is still the theory of comparative advantages that constitutes the theoretical basis of the Investigation of competitiveness but at present this issue requires already a much more complex approach; e. g., the competitiveness of prices can be measured, or evaluation can be carried out using different indices. The so-called Grubel-Lloyd index is used for measuring trade within a sector, and the RCA index indicates comparative advantages showing up.” (Bozsik, N., 2004, p. 141.)

“Economic conditions in the various trading countries ultimately determine the international pattern of comparative advantage. This pattern, in return, governs the pattern of international trade, production and consumption among countries. Indices constructed from production and consumption, and perhaps other post-trade variables are normally used to indicate comparative advantage and are referred to as indices of revealed comparative advantage. These causal linkages are depicted in the following diagram: economic conditions

-> comparative advantages -> pattern of international trade - RCA.” (Lakner, Z. – Hajdú, Istváné, 2002, p. 22.).

Naturally the Hungarian experts gives some examples, how the national competitiveness can be kept. “Several strategic developments are required for increasing the competitiveness of Hungarian agricultural products, such as: investments into technologies and environmental protection, and the support of companies in respect of coming onto the market. Farmers have to be supported by means of private storage, as well as offering them export guarantees and export credits. Such measures as the establishment of producing and selling cooperatives, and the support of effective marketing activities (e. g. by means of designation of origin, improvement of packaging, etc.) may further add to the competitiveness of Hungarian agricultural products.” (Bozsik, N., 2004, p. 141.). These examples can also be very useful for the development of Libyan agriculture.

The experts pointed on strong contacts between the competitiveness and the quality assurance, which are as follows: The “... *firms lay more emphasis on product quality and marketing. They want to achieve a market-leader position in the region, laying greater weight on product and technology development and better utilisation of resources.* (The authors emphasized the lines). These enterprises sell their products not only to retailers, but also to wholesalers, that's why they attribute greater importance to building up better relations with wholesalers. This is a strategy of development-oriented small and middle scale enterprises, oriented on satisfaction of local and/or specific demand. For these firms the regional and country wide dimension in marketing strategy is more important than for firms in cluster 1. The main competitive edge of these enterprises is the upgrading of the logistical system on the purchasing and distribution side too. Enterprises in this cluster are operating mainly in the meat processing, bakery, wine-making, distillery and brewery industries.” (Lakner, Z. – Hajdú, Istváné, 2002, p. 69.)

As the same authors declared that in general the firms and farmers should “.....follow a *quality and technology oriented strategy* (The authors emphasized the line). This strategy includes better product quality and improvement of various inputs of production. These firms are processing agricultural or horticultural raw material. These enterprises utilise the favourable image of the firm and the region. This is the strategy pattern of small and middle scale enterprises, which are increasing their efficiency by technical and technological

improvements and continuous technological and technical development, as well as product innovation.” (Lakner, Z. – Hajdú, Istváné, 2002, p. 69.)

“The state should support this process by market-conform actions, while the food industry producers must be organised in a way, that they could build a counterweight against the activities of multinational firms, creating a more intensive market competition. (Lakner, Z. – Hajdú, Istváné, 2002, p. 149.)

- The desirable way would be the de-centralisation of regulation, and in this process the product councils could play a rather important role, but the lack of authorisation does not allow such a de-centralised way of regulation in the case of allocation of various forms of subsidies. (Lakner, Z. – Hajdú, Istváné, 2002, p. 155., (The authors emphasized the lines).

There is an important role for the agricultural food developments in Arab countries, as it was mentioned that „in the most of Arab countries....the annual average growing rate of food production is less than the annual average growing rate of population” (Zsarnóczai, J.S. 1992/a, 36.p.). In this case the agricultural developing programs aim at fast growing rate of food production in order to cover the all food demands of growing population.

It was emphasised that the Green Revolution had a large results, that the mechanisation could start in the Arab World. Additionally to mechanisation also he gave important role for managing the agricultural production. These strategies are very important for the agricultural production based on the implementing the Man-Made River Project and establishing family farms in Libya.

The water resource for irrigation is very important for other Arab countries, like in Egypt, where they could not build such large irrigation project, but „because the irrigating water has large importance, they provide irrigating water for farmers in Egypt”. Also this author emphasised that „new structural changing economic programs were introduced in Egypt and Jordan, in which of consequence the role of private sector increased in the agricultural development” (Zsarnóczai, J. S. 1997, 57.p.). The development of family farms based on the irrigation system can increase the role of the private sector and interests in the agricultural production in Libya.

As Prof. Fehér declared: „In the national economy the food economy has continuously considerable role, of which future is determined by the quality challenge” (Fehér, I. 1998, 65.p.). Naturally the agricultural production should be adapted to the quality demands in Libya, as well.

The most important aim of the agricultural development in the Middle Eastern countries is to make desert areas be cultivable by irrigation system, in order to increase the food production and food self sufficiency. Additionally to irrigation, the extent intensive methods of development, for example mechanisation, use of fertilisers are very important (Zsarnóczai, J. S. - Huda Fathi Salem, 2000, IV volume, pp. 304.).

Some Arab experts declared that “development means to overcome retardation and poverty through an effective mechanism helps to leave this case and follow the economic advanced countries by declaring was on retardation and by right planning and wise expenditure to obtain social justice” (Qabary M. I. P. 368, 1992). Also the other author declared, that “Agriculture is the major foundation of construction in developing countries, it secures food for individuals, it also supply most industries with the required raw materials and in many countries it secures hard currencies and many work opportunities to great sector of population. It is also considered as the only source of income for the majority of these societies.” (Mahdzsub A., 237, 1992).

Mohamed al-Fardzsani al-Hoszn declared that: “To realise complement and correlation between agricultural 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 consumble products and available services.” (Mohamed al-Fardzsani al-Hoszn, p. 67., 2002)

Additionally to the Libyan Great Man-Made River Project, in Saudi Arabia 1,35 million hectare land is cultivated of which 70 percent is irrigated at present. Since 1993 the Saudi Government had started to use the surface water very intensively, as well. Also in Egypt the agricultural sector implemented significant results, when 3,15 million hectare areas became cultivated of which 98 percent was irrigated (Zsarnóczai, J. S. 1997, p. 58.).

While they requested to increase the food self-sufficiency in cereal and milk production, the domestic consumption demands were not concerned... the cow-milk was not popular. Also the difference between the world prices and the domestic cost of production was not concerned in the case of long term development demanding significant investments. Saudi Arabia realised overproduction in cereal production by two million ton of wheat in 1986 and 1988.

Naturally, Libya should increase developed level of food industry in order to grow value added of products for export, in order to get comparative advantageous in case of these products. Also finally the high cost of irrigation investments can increase the domestic consumption prices of food products, in spite that the farmers do not pay fee for water-use.

Finally it can be emphasized, that the development strategy in either in EU and Hungary or in Libya needs strong contacts between the quality assurance, comparative advantageous and competitiveness. By these essences of economic strategy and economic policy the governments can ensure the basic elements of life, livelihood for people in either rural areas or urban areas. The rural development strategy and its implementation can keep back the imigration of rural inhabitants to towns, which can also ensure the normal balanced development for urban areas.

2. MATERIALS AND METHODS: THE WATER SITUATION IN ARAB NATION

The importance of water is simply lies in that it is the secret of life and the major element of the presence of all creatures and plants of this planet. Water occupies $\frac{3}{4}$ of the Earth surface in addition to it's presence in the atmospheric layers, but fresh water is forms only 3% of these waters and the rest are salty water (seas & oceans) and another thing $\frac{1}{5}$ or $\frac{1}{4}$ of fresh waters lies underground.

Water is very important for human, it forms 65% of his weight and plays an important role in industry and trading. History proved the importance of water since four thousand years, the water geography had a great influence in drawing the major events of human history including both glories and disasters. Watery areas saw great culture such as Pharaohs, Assyrians, Babilonians, Phoenicians and others, those culture were beaten by an unbeaten enemy, the lack of water and became just a past history.

Water was a reason of many wars and disputes between nations to dominate watery places or to share one with others in best cases. From that point the issue of water security appeared as strategic issue in many areas in the word and became a source of continuous tension, as when even water appears, wars usually occur specially in the dry areas or semi-dry areas where water had a major role in demographic distribution of population. In the other hand the difference in quantity and distribution of water was an additional reason that increased troubles resulting due to water issues.

The World Bank report of 1990 mentioned that water presented in wrong place, wrong time and in wrong quantities the matter that leads to the spreading of hunger in a place and floods in another place.

It's clear that the lack of water problem has a strong relationship other problems of the world which became more and more severe with the fast increase of population which imposed an accelerated pressure on the sources of water and food.

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 instabileity, 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 m³ 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.

2.1. Trends of the Arab water matter

Geography of Arab Nation

1- The Arab Nation occupies a wide area estimated by 4,3 million km² 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, occupied Golan and Harmoun Mountains.

There are also a lot of flooding rivers which depend on the fall of rains and those rivers are not stable.

Table {1} illustrates more information about the Arabian Rivers.

The conclusion is that the Arabian Nation lies in dry or semi-dry areas in addition to that it's mountains are not high and do not play a remarkable role in it's weather nature or rain quantity which is limited, the main rivers are just a passing rivers flowing from foreign lands.

Table {1} The most important rivers in the Arab Nation

s/n	River name	Length (km)	Annual Quantity m ³
1	Nile	4800	84000
2	Chili	1650	1800
3	Guba	1150	6400
4	Tigris	1718	48700
5	Euphrates	2230	29000
6	Shat al-Arab	190	35200
7	Barada	79	350
8	Al-Kbir (north /south)	130	645
9	Al-Asi	571	2000
10	Alletani	170	478
11	Aljuza	33	3000
12	Jordan (Yarmouk)	130	800
13	Mujdada	380	1000
14	Um-al Rabie	600	1300
15	Sabu	500	1200
16	Abu-Rakrak	250	----
17	Malweya	450	---
18	Daraa	1200	---
19	Al-Shalif	490	

Annual quantities of White river (69.300), Blue river (48.000) and Atbara river (12.000)

Source: The management and implementation authority of the Man-Made River Project, the Great River, p.146

2.2. The world climatic changes and their influence on water in Arab Nation

The water situation in the Arab Nation

Weather is one of the major factors, which influence temperature and natural water sources and quantities. Today the Earth is facing a serious climatic changes, where reports mentioned the increase of gases coming from Earth surface, which are warming up the atmosphere and leading to an unusual temperature rising. The change in the quantities and manner of rains led

to dryness in some areas and floods in other areas, also this change reflected on the natural hydrological system the matter that effected agriculture and the natural green cover of the Earth and the wild life in general.

It's important to mention that the great increase in population also had a role in concentrating the carbon dioxide and similar gases in the atmosphere due to development of technology and the increase of power and water consumption the distraction of natural resource such as the destroy of trees and forests by bad pasturing and fires.

The world transformation from rainy (un-watered) agriculture to irrigated (watered) agriculture under the increase of temperature and evaporation ratio led to the saturation of earth by salt, manures and chemicals.

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, they 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 m³ in 1960 to 667 m³ 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.

Roots of Water Problem in Arab Nation

The roots of water problem in the Arab region are due to two major factors, a natural factor and man-made factors.

First: Natural Factors

1- Dryness:

If dryness means no enough rains to make rainy agriculture, the Arab region with less the 1% of the renewable water in the world is a dry area along with the low results of the transportation of underground and surface waters from area to another or the sweetening of salty water specially if compared with the cost and environmental effect.

2- The availability of Solar Energy:

The location and climatic region of the Arab region at the north of the Cancer orbit and its relatively short winter made it a long sunny area has a double effect on water, from one side solar energy is one of the dryness factors and on the other side sun is an energy source that can be used in sweetening salty water if studies and researches succeeded to employ it with environmental harm.

Water Wealth and it's Sources in Arab Nation

Water wealth includes all underground and surface water sources plus rain waters. Arab water resources can be classified in two major groups, traditional sources such as rains, local rivers, passing rivers, renewable underground water, and un-renewable underground waters.

The second group includes the non-traditional source of water (modern sources) such as sweetening of seawaters and high salty waters, waters transported by tankers, recycled water and the traction of Ice Mountains from the Arctic areas

Second: Tradition Water Source:

A- Rains:

Rain beside weather are the major element in determining the features of agricultural and postural activity and the environmental life in Arab Nation. Rain is also the base of unwatered agriculture, which is the most used type of agriculture in the Arab area. But rain is not steady and may fall on hard lands not suitable for agriculture and some times from hundreds of cubic kilometers of rain water only 1-10% reach the green tissue of the plant and no remarkable change is expected to happen. Winter rain falls on the north but it is not steady, the quantity of rain is estimated by 2213 billion m³ 17,6% of it falls on Sudan.

B- River Water:

The institute of world resources indicated in 1992 that the renewable water resources annual rate is about 350 billion m³, 35% of them (i.e. 135 billion m³) covered by the flow or rivers outside the region as discussed in details in the Geography of the Arab Nation.

It's important to say that up to now no real regional or international agreements have been made between the river passing countries and the river source countries to secure the right portion of water of each country so the water will not be used a pressing tool to get some political and economic interests.

C- Underground Water:

The Arab Nation got large amounts of underground water (renewable and un-renewable) which were gathered in the rainy ages from 7000 years. These waters are available in a wide regions of Algeria, Tunisia and Libya.

Then appeared the idea of using these huge quantities of underground waters by high technologies specially for the rich countries who can provide all necessary capital for such costly techniques to face in the lack of water in the coast areas by transporting these waters from the desert to the coast.

The non-traditional (un-usual) sources of water:

Arab countries spent many time effort to increase their water capabilities through the projects, which aim at controlling the surface flow of water by building huge tank and dams. But these

efforts lost their benefit specially after the decrease of water levels in rivers and the decrease of rains and the increase of evaporation rates in a addition to the increasing demand on water and food in a way that impossible to cover the needs by those means and start looking for unusual means to solve this problem, such as:

1- Desalination of Salty Water:

Majority of Arab countries choose this option because they lie on seas or oceans by thousands of kilometers. Water desalination stations manufactured by the west produce electrical power and sweetening of water came in the second place because there is a plenty of rains in Europe and that's way they employ solar energy for this purpose as Europe winter is cold, long and less sunny.

The use of water desalination stations in some Arab countries has found disadvantages such as it's not economic because the cost of one m³ exceeds five dollars or maybe 6 dollars in addition to the natural obstacles such as the sedimentation of sea water inside those stations causing a lot of damages and defects in the evaporation equipment and corrosions due to the chemical reactions of sea water with the metals of those equipment.

All these factors prevent the wide use of water sweetening stations and weaken the dependence on those stations in producing fresh water, and they are not safe from any aggressive attacks as happened in the first Gulf war (1991).

Treatment of used water (Recycling):

With the presence of big crowded cities in the world which means huge quantities of drain water which was used in houses, factories and others. This used water can be treated and used again specially in agriculture and Egypt was preferred in this field, also oil countries made good steps in this field as they have the necessary capitals to build such projects for example there are 23 water treatment stations in Libya, treat more than 262 thousand m³ of drain water per day.

Recently Egypt treated drain water through a modern main sewage system, this network produces about 2-3 cubic kilometers 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 evaporation loss, which was about 5-15% of treated water. It can be seen, that the high cost of water sweetening is similar in water treatment plants although it reduces the pressure on the underground water and reduces the deterioration of environment.

Transportation of distant underground water through a pipe line:

Due to the difficulties of getting enough superficial water, plans were directed towards the use of underground water as Geological and Engineering studies revealed to presence of huge quantities of underground water especially in north African area which contain huge quantities between rocky layers of the earth along Algeria, Tunisia and Libya.

The investment of this water in it's present place in the desert was proved to be economically and socially useless due to the hard climatic conditions and the sand nature of the land and the high cost of the transportation in agricultural products. From those areas to another the taking of the population is impossibility. The completely different areas did not have solution to take this water to a good land and suitable weather where people live. Till now only one country was able to finance and build such water system, the great man-made river was a brave attempt to face the lack of water in the coast area, this great project will be discussed in a separate chapter of this study. (Peter Rogers- Peter Lyden, 1994, p. 135.).

Transportation of water by Oil Tankers:

For example Turkey has extra water and sells it to the neighboring dry countries on the south coast of the Mediterranean sea using tankers, but the cost is high and not suitable for agricultural purposes. Oil countries made studies to exchange to salty water used to keep the balance of tanker by fresh water from the countries which buy the oil and use it in industry and agriculture purposes, and Libya proved the success of this but this quantity of water is not enough and subject to the presence of oil. Saudi Arabia is now making experiments on the transportation of ice mountain from cold area but for sure this win by very costly, and a lot of climatic and environmental obstacles will be there.

The Emulsification of Clouds:

This method made by the plantation of clouds by silver iodide vapors or by the pollination of accumulated clouds by sodium chloride but it depends on the source and temperatures of clouds and their presence along the year and on time, all these factors form restrictions on cloud plantation in addition that it was proved by experiment the low production and randomly of this method plus the risk of using chemicals in the emulsification process.

It can be concluded that chip water will always be very limited and the substitute water very costly and so dry regions will be under risk till occurs progress in the use of solar energy in water desalination.

Second: Social factors that influence water supplies:

1- Demography of population:

Population studies are important in the economic and social planning of any society as the capability of a society in the economic field depends on the number of kind of population because the development of population and the resulting changes in size, density, geographic distribution and the occupational distribution of population. All this related with the ability of the society in the economic production to cover the needs of population and increase the production. Planning of any society required complete knowledge of the population either in the past, present or future to put the best plans of the development programs and projects, which cover the needs of the society.

The increase in population means a positive increase in population, usually the increase in population comes from the increase of birth rates and the decrease of death rate due to the progress in preventive medicine and the improvement of health services. There is not doubt that development and population increase are related together and if any defect happened in the function of any of them, results will be negative on the other.

The world population now exceeds 8 billions and expected reach 11 billions in middle of this century without any success in the development plans of food, which matter that increased diseases, hunger, poverty and crimes against a decrease in the productivity of individuals in the best cases. There are in the world 500 millions living under the line of poverty and this

number is increasing if societies can not increase their productivity and stop the increase in population.

The Arab nation is now suffering from this problem and its dangerous consequences after it was controlled in the past by natural factors that limit the increase of population through the spread of hungers, diseases and the increase in death rates. Now those rates decreased due to the presence of consciousness and Health care specially between children and due to the economic development in food industry which stopped the spreading of hunger in addition to the limited success of issue limitation programs due to its clash with religion.

On the other political and military side still which was called "The human Bomb" is a strategic option of a lot of developing countries including Arab countries, because it is difficult to occupy countries of high population in addition to that the regions which suffer from natural disasters and wars consider the increase of population as a natural matter to reserve the man kind. All the previously mentioned factors help the problem of population, specially in the Arab Nation, where a remarkable increase was recorded.

It is expected that the population between 2000-2010 will jump from 296 to 370 million one with an increment ratio of (3%). This rates were only 0,6% in civilized countries and 2,3% in developing countries, 2,5% in less developing countries, meanwhile to food production rate in Arab Nation does not exceed (2%). This negatively effects the programs of development as water is an important element in any development program aims to provide food either by service, industrial or agricultural projects. The last one uses more than 70% of the available water resources and this is one of the major reasons of the failure in these programs, which lead to the increment of food importation.

The world now is facing increase in the prices of food against deficiency of the local food production of a lot of countries the matter that made them fall in the traps of taking loans from the civilized countries who are ready to give such loans to prevent those developing countries from developing their economy and stay as they are and to keep them a source of raw material and a consumer of their products.

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.

Features and Obstacles of Arabian Economy:

1- The slow growth in Arab economies is due to their consuming nature led to unemployment and the reduction of real income of individuals against the increase of prices and so the appearance of social problems.

2- The economic filiations to the west although many efforts were made to increase food but the problem is still serious.

The Arabian economic report (1990) said that the Arab Nation is one of the most food importing regions in the world where main food products represent 75% of their importations and their value was estimated in 1986 by 14 billions.

3- The domination of services sector on the other productive sectors by 47,7% of the total national income in 1991 against 41,8% in 1981 with the decrease of agriculture sector portion in the national income from 20,2% in 1980 to 18,2 in 1991.

4- The development of agriculture and industry sectors in the Arab nation accelerated the complication of the problem of water especially under the bad utilization of water.

5- The bad utilization of oil resources and the irregular emigration of production sources such as current capitals, trained personnel, experts and the enlargement of investments outside the Arab nation, in the mean time many countries seek loans from international firms.

6- Deficiency and weakness of agricultural investments where reports of the Arabian of food and agriculture mentioned that the reduction of investments in agriculture sector as compared with other sectors caused reduction in the agricultural production capacity due to the contraction of agricultural lands comparing with the total area and population.

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

In general, the Arab nation is divided into two groups, countries of financial shortage and countries of water shortage. The first group possesses water such as Sudan, Egypt, Syria and Jordan but it's not used properly due to the lack of financial resources.

The second group possesses the necessary financial resource by water, which is rare and that's why they spent billions of Dollars on irrigation projects until the cost of one ton of wheat exceeds the value per one ton of imported wheat. About 15% of the Arab nation population are possessing 90% of it's wealth, meanwhile the rest suffer from the lack of capital needed for development.

It was possible to control the water and food problem in the Arab nation if they deal with the matter as one unit where the Arab nation possesses a variety of economic resources due to it's huge geographic area, the difference in climatic environment, the fertility of it's lands, the availability of minerals and raw materials and the wideness of it's coasts and water surfaces.

2.3. Retardation and development in Arab Nation

The Arab nation is considered to be one of the developing societies, which suffer from retardation and severe development failure. We will discuss this subject in this part trying to put hand of the causes and solutions through scientific method presents everything in reality away from forging and ideological publication of policy and economy “ignorance will be ended if every thing came in reality”.

It is clear that it is hard to determine the concept of human sciences due to the numerousness ideological principles of economical and social theories, for example it’s hard to find a unique comprehension for poverty, retardation, unemployment, development or others. Retardation and development are usually dependant in researches and studies as in reality where retardation exists, development also exists and vice versa until we can say that retardation and development are two sides of one coin.

Retardation has many of different aspects and dimension which can never be ignored or separated from each other, retardation problem got the care of most human sciences such as sociology, economics, policy and history, each discussed it from his field of specialty. Retardation was purely viewed in the economic and statistical aspect.

According to the impossible standards and specifications of the west, which created a failure feeling towards the inability to approach (even a little) those standards, and appeared a lot of classifications. Names such as civilized north and retardated south or classifying the industrial societies as civilized and agricultural societies as retardated one. From this perspective, the civilized party took his right to get benefit of the retarded party’s resources and capabilities by a direct way “military colonization” or by an indirect way “investment & projects”.

The variables of ideology in free market oriented economies determine the retarded societies

1- Average individuals income and his portion of the national output where an average individual's income was fixed in the civilized countries, and any value below is considered to be retardation.

If we try to find the reason behind the creation of this average, we will know that it appeared by the time of substituting expensive manpower by the machine in industrial countries, which lead to the accumulation of products and weakness of the purchasing capabilities.

So those countries fall in the trap of their development the matter that pushed them to cheat the retarded societies by increasing their individual's income at the level of advanced countries by giving them loans and conditional assistance and made them a consuming market of their accumulated products. By this way, advanced countries got ride of their way, advanced countries got ride of their crisis and exported the debts and their interests to the retarded societies.

If fact the individuals average income is not valid as measurement of the level of all individuals of the society due to the lack of justice in the distribution of the society's wealth and so some become very rich. This led to an increase in individual's average income in the whole society although the majority of people suffer from the reduction of their income level and poverty.

The American society is an evidence of that, where the American income changed from a low and average income into a rich one due to an increase of the income of 5% of population. As result of tax reformation, which secured great profits for the rich people, when it was reduced from 26% in 1962 to 6% in 1987.

Table {2} gives numbers of poor people and poverty rate with respect to population in USA between 1960-1985

Year	No. In Millions	Population rate %
1960	39.9	22.2
1965	33.2	17.3
1970	25.4	12.3
1975	52.9	12.6
1980	29.3	13.0
1985	33.1	14.0

Source: The main economic report (1998)

We can't forget that the high levels of income in some developing societies "oil countries" exceeds the average income in advanced societies. Not taking in consideration the difference between good prices and the average individual's income is not less that the average individuals income in advance societies. Lack of balance between the increase in population and natural resources:

The previously discussed side was taken as an indication to determine the economic & social features of the retarded and developing societies and was considered as cause and result in the same time. We can ignore the ill-treatment of advanced courtiers on the countries of highly increasing population specially under the showdown of the maturity of first. The mechanism of capitalist profits transformed the man into an animal lives to eat no more and has nothing to think about except procreation which throw him into the trap of retardation.

The spreading of illiteracy and to deterioration of education and health conditions was considered as one of indicators of retardation with knowing the reasons behind the lack or decrease of expenditure on the sectors of education and health in the presence of more important needs such as the feeding of the millions of hungry mouths and looking after failed development projects basically designed to serve advanced societies.

I am wondering, can we ask a man who spend his day running after his food to pay attention to arts, science and invention specially with the presence of unfair economic relationships?

Living Standard:

After fixing the average individual's income, the Alimental level and it's required calories, factories and fashion designers started to give the type and shape of our clothes and shoes. Also the descriptions of that we are gaining to get all this and others to reserve a fixed level of living. The advanced countries secured the provision of all these thing in the markets according to arrange prices, that will secure a plenty of profits to the manufacturing countries.

The type of economic activity: Developing countries were pushed to think that they will reach the top if they give up agricultural activity which is considered as a retardation indicator and substitute it by the industrial activity. A lot of developing countries ran after this wrong idea and suddenly collided with a different reality and the result was the failure of both industrial and agricultural sector in the same time and the failure to supply the basic alimentary needs which was possible before.

The comparison between advanced and retarded countries:

- Classification of the world according to it's development levels:

The world was classified according to it's development in to three levels:

- 1- The first world "Industrially Advanced" includes western Europe, North America and Australia.
- 2- The second world includes the rest of Europe (Socialist Countries).
- 3- The third world includes the rest of the world and represents 3/4 of the world, it is also called the developing world instead of calling it the retarded world.

The common thing between these classifications is that they are a clear picture of the a wide gap between them which becomes wider day by day. The acute gap between rich and poor people the portion of each of them from the world total result, foreign investment, exportation of goods and services. The increasing of this gap although many development contracts were executed to reduce this gap. These differences drive rich people towards wasting of money, which causes a fast termination of rare un-renewable resource especially in the increasing level of pollution, which will distribute the world on the long range.

The Concept of Development: The term “development appears in the same time with the term “retardated societies „and it is impossible to separate it from the historical situation which caused it’s appearance and neither from the ideological base from which it came.

After the second world war appeared what was called “development” when colonist countries needed to employ the resources and wealth plundered from colonies which were considered as economic regions of the colonist countries who have to make any type of investment to secure their interests. The way to that was a new method called “Development” which was introduced as the way to civilization and that there is not way to follow the convoy of culture and urbanization except the capitalist development which was previously prepared to dominate and contain the hopes of people.

The dependence on the previous assumption will not verify any progress and will no terminate retardation or secure the best and complete employment of the natural and human resources to create a better life for people who will not gain this as long as they walk in the circle of the imported concept of development.

Simply a great part of the current culture is a result of an old economic domination not because of direct effects such as conformity and material retardation and this required a revise of our retardated fact to know the reasons behind the enlargement of retardation and the deterioration of development process in our developing countries.

The development means to overcome retardation and poverty through an effective mechanism helps to leave this case and follow the economically advance countries by declaring war on retardation and by right planning and wise expenditure to obtain social justice.

Human development known as a process that aims to provide better living opportunities to people and to verify three major objects:

- 1) Longer healthy life.
- 2) Renewable knowledge for individuals and society.
- 3) Providing high living levels.

This can be obtained only in the frame of the general human development, which includes economic, social and political issues, countries will choose between two things, either to stay away with it's out of age ideas until they are swept by globalization and vanish and melt between gains or the best employment of their resources. The capabilities in a vital field greater than their national being and stop wasting their time. The power in wars and disputes and employ all capabilities in huge development programs, in a great space level.

The age of spaces is a great chance for the African Arab nations and they should use it in on African space, free of disputes from an economic and political power able to deal man to man with the other spaces.

The birth of the United States of Africa is an early respond to the call of the need, the rest of Asian Arab Nation have no way to overcome their development and political problems by Joining the African space (union) which is close to them politically, socially and economically.

Freedom along with the elevation of humanity of people's and made them responsible for their business and affair and this is the aim and mean of development in the same time. Development in it's social and economic concept aims to realize happiness, comfort and advancement to the whole society through the development of natural and human resources, both economic and social sides in fact are two faces of one coin and separation between them is just a theoretical procedure that helps to study and plan.

In the shadow of the changing condition of the world under the caver of what called "Globalization" which is based on a world economic and commercial exchange exceeds the limits of states and nations, in addition to an informatic revolution, which exceeds the limits too and made the world as a small village. We can ignore this imposed fact whether we agree or not, and developing.

If the economic complement by the collection of countries of similar economic structures supports the economic development in each country although of the difference in social structures as the case of the common wealth, then economic correlation complement between countries of different economic structures and similar social structures became a need, for

example the case of the African union which possesses all elements of economic complement such as:

- 1- Wide area of farming lands which need only some land reclamation specially in a continent of such different climatic regions which means various products.
- 2- The plentiful of water resource either rains or permanent rivers such as Nile, Kongo, Niger and Senegal rivers and others.
- 3- The existence of oil and minerals such as iron, phosphate, uranium, diamond, gold and others, those wealths if properly use will cover all development projects in Africa as the African market is huge in area and population and can include a lot of African monies.
- 4- The existence of productive and qualified human resources necessary for development.

Water from Economic View

Water is one economical resource due to it's relative importance as any other economic product "The world wealth is limited in each phase and also the society's wealth" water is a consumable wealth and so it should be wisely used specially if we know the financial resources used to get it so, it is important to differ and choose between it's various uses. Water is classified according to standards related with the offer and demand in one side and according to quantity, quality and cost of transport in the other side. If water was available in unlimited quantities demand will comply with the offer but in case of offer difference to cover the demand then gap between them and water failure will appear.

If we look at the Arab nation we will not find any Arab countries not suffering from the lack of water and the increase of it's cost and increasing gap between offer and demand and of course the increasing struggle and competition in getting water in the regional or even international level.

The consumption of the un-renewable underground reserve and reduced surface water expose it to pollution and saltiness due to the irresponsible wasting either by distribution or utilization

all this led to a wise administration of water as follows: To stop water pollution caused by industrial, agricultural and commercial activities and the recycling of drain water.

Remove all illegal water connections and the control the use of underground water by organizing the process of water well drilling and regulate the pumping of water. Change and improve the method of water transport and fairly distribute it between different area. These procedures will help the administration of the available water until other resources are secured. Reduce the utilization of water and redistribute it, the world bank assures the need to control the offering of water by controlling consumption by a more efficient method. Showing citizens how to reserve water by the guidance and instruction program and even entering those program to school curriculums.

The necessity to put a reasonable price for water which reflects the importance of water “if water is free, people will easily get it and waste it” i.e. the demand will be unlimited, so a reasonable price will limit the consumption of water and prevents wasting.

It was mentioned in general the circumstances surrounding the development process in the Arab nation either from the environmental, human or economic aspect. The scientific research subject were concentrated on the natural material aspect and it's restrictions on the development process due to it's hard geography which caused the deterioration of lands, severity of weather and lack of water the matter that put up additional loads. These conditions caused the failure of a long decades of development. Although many efforts were done to success these projects. Those efforts were in a better environment they will for sure succeed in a shorter time, with less cost and exertion.

We also concluded the difficulty to impose or succeed the same form of development in all societies as each society has its own private circumstances, which should be put in consideration in the design or execution of any development program.

This was confirmed by U.N.O. in it's world declaration about development right in 4/12/1986. They emphasized the generality of development on economic, social, cultural and political aspects along with the active, effective and free participation of people in development process with fair distribution of development facilities. They gave the right for people to decide their destination and follow the way they select for economic, social, cultural and

political development with a necessity to establish a world economic system. This new economic system can secure equality in the distribution of development opportunities between people.

Agriculture is the major foundation of construction in developing countries, it secures food for individuals, it also supply most industries with the required raw materials and in a many countries it secures hard currencies and many work opportunities to a great sector of population, it is also considered as the only source of income for the majority of these societies.

3. RESULTS OF RESEARCH: AGRICULTURAL DEVELOPMENT TRENDS IN LIBYA

Libya is situated in the northern part of the African continent, bounded by the south coast of the Mediterranean. Despite having an area exceeding 1.750.000 km², only a small part of the country has escaped the grasp of the desert. The once fertile land in the northern parts of the country has over time been damaged by the pervasive sea water.

The Libyans have throughout history experienced different forms of aggression and oppression till the new era - Jamahiriya - the society of the masses. Although they have fought to protect their land, a persistent enemy remained.

Additionally, the Great Man-Made River Project provides water for industrial use, serving established processing and manufacturing industries, particularly the large industrial complexes in Brega and Ras Lanuf. Domestic and municipal users also benefit from the newly available water, thereby improving the quality of life in the urban areas.

Economic background

The Libyan Arab Jamahiriya has a total area of about 1,76 million km². 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 /km², but varies between 50 inhabitants /km² in the northern regions of Tripolitania and Cyrenaica to less than 1 inhabitant/km² elsewhere. Agriculture contributes less than 5% to GDP, although it provides employment for approximately 13% of the active population.

3.1. The natural and geographical circumstances of Libya

The area of Libya is about 1.759.540 km², which made it in fourth place among African countries, the climatic regions of Libya are different due to both the influences of the Mediterranean (north) and the great sahara in the south .

The coastal planes in the north, the northern heights of the green mountain and aljabal algharbi mountain are subject to the moderate and rainy Mediterranean climate and the land there is fertile. The remaining regions of Libya are effected by the desert where the Saharan and semi-Saharan climate of very high temperatures and rare water which disappears as we go south, meanwhile some oases are sprinkled among this desert where underground water is available, the effect of the Sahara reaches some times to coastal regions. The population of Libya are distributed on this huge area forming sprinkled and distant dwelling zones of different natural, economic and social conditions the matter that adds an other geographic obstacle against the development process the matter that requires multiple efforts to succeed the execution of the different development plans specially those related with the reclamation of land and supply of water by the construction of a long network of roads to link different areas together.

The natural resources:

Libya possesses a huge reserve of mineral resources specially oil and natural gas in addition to a group of minerals such as iron. The reserve of iron in just two regions exceeds 2,25 billion tons and industrial rocks are available in huge quantities and used for the manufacturing of cement, lime, glass, phosphate and sulfur. The oil reserves in Libya exceeded 29,5 billion barrels in 1996, this equals 3,6% of OPEC reserve and 4,9% the Arab nation reserve. The reserve of natural gas exceeded 1310 billion m³ according to the numbers of 1997, about 6570 million m³ were produced in the same year.

Water resources:

The water resources are represented by underground water, valleys, rains and other resources such as desalination water and recycled water, this subject will be discussed in details later in this study.

The next Table {3} shows total water resources in Libya.

Table {3}: Total water resources in Libya

Water resource	m ³ / year	Percentage %
Under ground water	4670	95,6
Surface water	110	2,3
Desalinated water	70,1	1,4
Recycled water	36,05	0,7
Total:	4886,15	100,0

The history of agriculture countryside of Libya

Old historical remains indicates that ancient Libyans excised stable agriculture since long time and before the arrival of Phoenicians, Greeks and Romans to the Libyan coast. These remains shows that agriculture was improved in the period of Greeks and Romans to a stable advanced agriculture, and since the Libyans knew agriculture they exercise it either in groups (in coastal areas and oases) or as traveling Bedwin tribes.

The Turkish rule period in Libya during four centuries was considered as stagnation period as there was no remarkable development either in the urban or rural regions. But in the Italian occupation period, the Turkish ruling most Libyan were working in agriculture and animal husbandry. But the Italian occupation possessed their lands, farms and animals and dispersed them either by murdering or emigration and then settled the thousands of Italian families in their properties.

Agriculture at that time saw a remarkable improvement either by the reclamation of extra lands or improve them by the utilization of modern methods. After that quickly the second world war came and as Libya was one of the battle fields. Agricultural business in total was subject to a huge damages, which last till the period of the British government.

After independence, many sources illustrated that until the period followed the second world war (i.e. independence period) most of the Libyan population were living in rural and bedwin regions where the population counting of 1954 revealed that 78,4 % of the population were living in rural regions.

They exercise simple and primitive farming under very low capabilities until the during 1960's, which was an important conversion point in the history of agriculture in Libya where oil played a positive role in the development of agriculture and country sides although this role was slow specially during 1960's because of the foreign domination on oil resources.

But the modernization process which associated the discovery of oil encourages the emigration from village to city recording a great reduction in the population of rural regions and a great growth in the population of urban regions.

This is clear in Table {4}, after the population of urban regions was 21% of the total population in 1954 it became 68% in 1984, in same time the population of rural regions reduced from 53 % in 1954 to 29 % in 1984 and the population of bedwins also reduced from 26 % in 1954 to 3% in 1984. In general the total population amounted 4.389.739 according to the last counting of population.

The definition of the rural society in Libya that there was not an agreement on one definition of rural population in the Libyan society. The people who live in villages or rural regions, in immobile houses, working in agriculture or animal breeding or any other profession either it was official, service or vocational trade and this is the difference between them and the agricultural society of which people work in no any kind of economic activities, but only agriculture and animal breeding.

He also mentioned that western researchers are dividing societies into two types only, urban or rural society, but the Libyan society is divided into five different types as follows: The urban society or people who live inside average or large cities in modern houses working in public jobs or service business.

Table {4} Libyan population between 1964-1995

Year	Population (thousand)			Population	
	Total	Urban	Rural	Urban %	Density / km ²
1964	1515	-	-	-	0,85
1973	2052	1180	871,5	57,5	1,16
1984	3231	2409	821	74,6	1,82
1995	4389	3748	641	85,4	2,47

Source: The national report of human development, Libya (1999)

Forms of settlement in rural societies of Libya

There is not doubt, that the economic, natural and geographical circumstances of the society control the forms of settlement in rural societies in addition to the type of agriculture (watered or un-watered and finally the size of population and area of the farm).

The previously mentioned elements directly effected the forms of settlement in rural societies which are usually in a form of a separated farm, a village on the main road, linear village or gathered village. So, the people of Libyan villages were divided in to many groups distributed over different areas of Libyan villages in the form of:

a/ Village society, which forms a small village in which people work in services or official business in addition to some other economic activities in relation with agriculture and animal breeding, this group form about 20% of the population according to the population of 1984.

b/ Agricultural society, of which people live in farms in modern houses built outside city maps in the form of along road village or linear agricultural village which is one of the oldest rural settlement in the world and usually built in a parallel line with main roads and rivers.

This form of villages in Libya usually started with the gathering of some bedwin groups around service centers in tin houses or tents which was then converted by the execution of development programs in agriculture sector into modern houses given to them free of charge. Also appeared by favor of development programs in agriculture sector the best types of

settlement in Libyan villages where latest scientific methods were used in the reclamation and investment of lands in the form of large un-watered farms or small watered farms.

These villages are usually composed of 100-150 farms attached with a house, houses built in groups of four houses, every two adjacent houses facing another two adjacent houses on the opposite side of the road.

In general the population of agricultural society forms 5% of the total population according to the counting of 1984.

a/ Pasturage society, includes traveling and semi-traveling bedwins forming either villages or semi-villages is one of the newest settlement forms in Libyan country side after the construction of agricultural projects, usually it lies near major or minor roads and may include about 40 houses.

The pasturage society is considered to be the origin of villages in future after they were working in animal breeding and live in mobile tents where bedwins are known by their continuous mobilization seeking pastures for their animals in a hard unproductive environment, this environment led to their correlation and not mixing with other groups, they forms about 3% of the total population.

b/ Oasis societies, where people live in sprinkled and isolated oases in the south inside stable but badly built houses made of bricks or palm leaves working in primitive agriculture and animal breeding, but now there life changed to the best through the construction of modern houses and the provision of many services, oases population forms 4% of the total population. It can be recognized the distribution and possession of agricultural lands from the agricultural population 1987-1995.

Table {5} shows the reduction of agricultural lands during the period of the two countings by 3,8 %. We also notice that in general the agriculture is depend on a seasonal rain, which formed 81% in 1987 against 19% of the watered agriculture. The watered agriculture was improved by the technical and technological revolution to reach 26% upto 1995. 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.

Table {5} Uses of agricultural land possession according to the counting of 1987-1995

Type	1995		1987		Change Total %
	Area	%	Area	%	
Watered areas	482303	26	363666	19	+ 33
Un-watered areas	1337966	74	1570648	81	- 12.3
Total area	1860269	100	1934314	100	- 3.8

Source: The national report of human development, Libya (1999)

3.2. Water conditions under ground

Currently, aquifers are only recharged only in the northern regions, namely in the north-western zone, Jabal Nafusah and Jifarah Plain, and in the north-eastern zone, Jabal al Akhdar. Renewable groundwater resources are estimated at 800 to 1.000 million m³/year, but part (perhaps 50%) now flows out either to the sea or to evaporative areas (sabkhas). Not all the renewable groundwater can be abstracted without affecting the environment, because of the deterioration of water quality by saline water encroachment. For this reason, the safe yield has been estimated at 500 million m³/ year. South of the 29th parallel, an important development of Palaeozoic and Mesozoic continental sandstone enabled water to be stored safely during the long period of the late Quaternary, before the climate turned extremely arid. Most water used in Libya comes from these huge fossil reserves.

Through the Great Man- Made River Project fossil water is expected to be transported from the desert to the coastal areas, mainly for irrigation but part will be used for the water supply of the major cities. About 87% of total water withdrawal is used for agricultural purposes. All desalinated water is currently used for domestic and industrial purposes and all treated wastewater for agricultural purposes.

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.

3.3. 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.

(6) The best utilization of the available natural resources, protecting lands from sweeping and the utilization of the best methods to obtain water and use it.

(7) Increasing the cultivated areas and reclamation of new lands and giving a special care to soil and water studies.

(8) The protection of land against sweeping and sand crawling by the plantation of *wind resistant trees* and the utilization of oil to stabilize the sand.

(9) Improvement of the agricultural production and capacity and improving soils by using modern fertilizers and manures, selection excellent seeds, moderns farming means and the latest irrigation equipment.

(10) Searching for new water sources such as cloud emulsification to increase rain quantities, construction of dams to feed underground water reserve, building of huge tanks and the regulation of water well drilling to stop the bleeding of underground waters and the establishment of strategic water projects.

(11) Spreading of the agricultural education between farmers, the establishment of Agricultural Universities and Institutes and providing of training courses to teach farmers the best and modern methods of farming.

(12) The establishment of agricultural cooperative associations, farming conferences and agricultural banks to provide loans and assistance to framers.

(13) To take care of the animal wealth and develop it by the improvement of natural pastures, providing veterinary services and the establishment of breeding stations for cows, sheeps, camels and chicken to increase the production of meat, milk, eggs and other relevant products.

(14) To obtain a balanced population development by the establishment of productive and settlement projects in the desert and rural areas.

Figure {1.} (Source: Political, social & economic transitions in Libya1970-1987, see in Appendix) illustrates a more precisely information about what was progressed during the period 1970-1987, and table {6.} illustrates the actual expenditure in agriculture sector during the period 1969-1999.

Table {6.}: Actual expenditure in agriculture between 1970-1987 (million LD)

Year	Actual expenditure (million LD)
1970-1972	135
1973-1975	55
1976-1980	1703,2
1981-1985	1494,1
1986	130
1987	137
TOTAL	4145,8

Source: Political, social and economic transitions in Libya (1969-1994)

The average expenditure on agricultural sector amounted to LD 231 millions/ per year

to LD 19 millions monthly
to LD 650.000 daily.

Investments in Agricultural Development

A lot of agricultural projects were established to realize a balanced and complementary agricultural development in all regions according to their possibilities and natural, environmental and human resources.

In this part I will discuss projects which were executed along the past 30 years since the 1969 revolution, where a great five geographical regions of agricultural development were established as shown in Figure {2.} and {3.} (Source: Libya in 25 years. Political, social, and economic transformation, p. 245, see in Appendix), including the following projects:

2. Green Mountain Projects.
3. Dfara plane project.
4. Green snakes project.
5. Kufra & Sarir projects.
6. Fazzan projects.

The policy of these project progresses in two parallel lines, first line targeted the execution of strategic agricultural projects and second line targeted the execution productive settlement and projects.

Strategic Agricultural Projects

1- The main target of these projects in the beginning of its construction, was the plantation and production of strategic products such as wheat and barley to realize a self sufficiency in addition to other products such as winter and summer forages needed to grow up sheep and camels in those projects.

Later on it was added the plantation of vegetables and beans in limited areas to cover a part of the needs of vegetables and meats which provided a part of those needs of vegetables, beans and meats.

2- The improvement of the agricultural project economy, Table {7.} illustrates the remaining basic information about those projects such as total area, irrigation units, area of the circle and number of productive wells.

Table {7.} Strategic Projects

Project	Total Area ha	Number of water spray units	Circle Area (Hectare)	No. of wells
Kufra	10000	100	100	100
Sarir	18960	237	60-80	237
Mknousa	3930	90	40-50	90
Alarial	2600	61	40.5	122
Barjouj	3650	73	50	73
Irawan	1350	27	50	27
Abushaiba	1100	--	--	31
Total	41590			680

Source: The revolution in 20 years. In Economical, political and social changes, Libya.

According to the availability of water as a development determination factor, those projects can be divided into:

1- Watered projects where a continuous water source is available such as underground water, surface water and dam water, the latest and economically useful methods of irrigation were used such as irrigation by dropping

2- Un-watered projects in the areas of steady rains (not less than 200 million l /year).

3- Watered/un-watered projects in the areas of steady rains (not less than 200 million l / year) in addition to the availability of underground and surface waters, you can find watered areas for the production of vegetables and forages and un-watered area for the plantation of fruits, grains and for pasturage.

4- The production of Kufra, Sarir, Maknousa, Barjouj, Alarial and irawan projects was during the season 2001-2002 as follows:

Wheat: 11258 tons (2,66 tons per hectare).

Barley: 17873 tons (2,75 ton per hectare).

5- The planted area executed for different products during the summer season was (3535,5 hectare) as follows in hectare:

Yellow corn 630,5

Sweet corn 560

Red corn 36,0

Sugar cane 1361,0

Clove 857,0

Other forages 91,0

6- Animal Production:

Sheep 25516

Camels 1433

Cows 419

7- Those projects created 1554 work opportunities, 1130 of them occupied by national employee and the rest occupied by expatriate employees (i.e. only 27.3% of the total).

3.4. Settlement agricultural projects

Many these projects targeted the reclamation of lands by the building modern farms equipped with houses and give them free to farmers with all facilities required for a stable and easy life and to encourage the investments in this field.

These projects are based on stable agricultural system depends on irrigation to produce fruits and vegetables in addition to the un-watered agriculture for the production of grains and forages needed for animal breeding to realize the self sufficiency of food.

We will introduce the green mountain project as a sample of settlement projects distributed in the above mentioned five regions.

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 area of the Green Mountain was divided according to rain quantities as follows:

500 (ml/yr) and up Rain area:

Area of the farm is 25 hectare divided as follows:

6 hectare for wheat and barley.

6 hectare for forages.

5 hectare for vegetables.

8 hectare for fruits.

400-500 (ml/yr) rain area:

Area of the farm is 50 hectare and contains fruit trees with the focusing on the plantation of grains and forages and animal breeding, it is divided as follows:

10 hectare for fruits (beach, grapes and plum).

20 hectare for wheat and barley.

10 hectare for forages.

10 hectare for pasturage.

300-400 (ml/yr) rain area:

80 hectare of fertilize and deep land to produce grains and forages, also used for animal production.

300 and less (ml/yr) Rain area

An area of hard lands used in sheep breeding, pasyres were improved, dam and water channels were built to distribute water coming from its available valleys. For more details see Table {8.}, which illustrates some production estimates of fruit trees with prices and annual income of the different fruit trees in the project.

Table {8.}: Production Estimates in Green Mountain Project (Summer 1989)

Type	Tree production (kg)	Price LD / Kg	Tree income LD/ year
Grapes	5	0,20	1,00
Beach	10	0,50	5,00
Plum	10	0,50	5,00
Pear	10	0,5	5,00
Fig	10	0,50	5,00
Nuts	8	1,00	8,00
Apricot	10	0,50	5,00
Apple	10	1,00	10,0

Source: Field study of the agricultural society in Green Mountain area, page 259.

Table {9}: Production per hectare in Green Mountain Area (summer 1988)

Production/ Hectare (Cantars)	Derna	Baidha	Marj	Price L.D/ Cantars
Wheat	3	5	7	10
Barley	5	8	10	10
Oats	-	20	40	10

Source: Field study of the agricultural society in Green Mountain area, page 260.

At the end of this part in which two types of agricultural investment were illustrated either strategic projects which aim at realizing the self sufficiency of grains in first place or the settlement projects which aim to create stable dwelling zones to stop the emigration to cities and provide an easy life to the farmer through his production of agricultural and animal production as a share in national production.

There is no doubt about the huge amounts of money spent on these projects but no doubt that any investment project needs a many studies and researches to know the chances of its failure and success.

Regarding the Green Mountain project it is difficult to make such researches and studies in such modest study specially the evaluation of such project needs the concentration the efforts of all firms and needs human and financial support to make the necessary field studies.

It is useful to summarize the result of: “A field study of agricultural society in the Green Mountain Area”, which was made in 1988, ten years after the entry of this project to the production phase. The team of this study which was composed of researchers from Omar Al-Mukhtar Agricultural University, the research centers of eastern area, the Department of Agriculture and land settlement and the employees of this project.

Under the spot light of the plan, the project was evaluated as follows:

1- Natural resources of the region was used and led to an increase of agricultural production and left the importation of many products. See Table {10} and {11}.

2- Great numbers of the rural people were settled in there place of residence in addition to the appearance of an opposite emigration from cities to rural areas.

3- The farmer income increased to exceed the income of other people working in other sectors in cities, Table {12} and {13} illustrates the ratio of modern appliances owned by the farmers of the project.

4- It has been noticed the concentration of farmers on products that gain a high and quick income such as live stock breeding and forage plantation and ignored the production of targeted grains.

5- Most results of the survey of different areas revealed the low capacity of the project due to the continuous lack of water which drove farmers to the negligence of their farms trying to find other sources of income except agricultural business.

The lack of water also resulted in a remarkable deterioration of farm facilities and its trees, animals and equipment. I would like also to mention the negative effects, which was reflected by the sanctions imposed on Libya which led to a severe lack in farming equipment, spare parts, seeds, manure, and chemicals.

Table {10}: Production sources in different area of the project in LD (1988).

Area	Fruit	Animals	Grains	Chicken	Total	Net
Shahat	9586	2717	378	173	12854	6427
Gernada	6411	4731	475	157	11774	5887
Labrag	4722	3622	867	445	9649	4823
Gubba	5606	3385	474	695	10160	5080
Wesita	1719	2072	295	--	4086	2043
Massa	868	1463	208	29	2568	1284
Mukhtar	207	2168	807	202	3482	1741
Fatoyeh	53	954	755	772	2534	1267
Average	3645	2039	539	315	7138	3569

Source: Field study of the agricultural society in Green Mountain area, page 286.

Table {11} Average income in agricultural projects (Al-Marj region)

Region	Fruit	Grains	Chicken	Animals	Vegetables	Total	Net
Alfateh	3274	7884	28	8788	--	19974	9987
Farzouga	2785	7764	299	4770	--	16118	8059
Al-Marj	3048	3843	502	3837	344	11574	5787
7October	1679	4245	19	3248	1251	10442	5221
AlJehad	1190	5114	30	2814	--	9148	4572
Average	2395	5770	276	4991	319	13451	6726

Source: Field study of the agricultural society in Green Mountain area, page 300

Table {12}: Percentages of modern equipment of the farmers in al Baida and Derna regions

<i>Region</i>	<i>Car</i>	<i>TV</i>	<i>Video</i>	<i>Washing machine</i>	<i>Milk Mixer</i>	<i>Phone</i>
Shahat	94	96	13	77	76	11
Gernada	89	93	15	79	89	--
Labrag	64	83	-	67	51	--
Gubba	78	83	5	72	63	6
Wesita	73	85	-	91	56	-
Massa	73	83	1	80	64	6
Mukhtar	77	83	9	76	77	--
Fatoyeh	77	87	10	76	34	--
Average	87	88	7	76	61	3

Source: Field study of the agricultural society in Green Mountain area, page 286

Table {13}: Average percentage of modern appliances owned by farmers in Al-Marj region

Region	Car	TV	VCR	W/MACHINE	MIXER	PHONE
Alfateh	89	95	83	92	85	10
Farzouga	96	94	12	84	77	2
Al-Marj	86	94	7	70	59	-
7October	84	85	11	73	57	1
Batta	65	77	2	69	48	-

Source: Field study of the agricultural society in Green Mountain area, page 300.

Animal Wealth Development

In addition to what was executed in the previously mentioned strategic and settlement projects there were development projects of animal wealth and pastures as follows:

- Wide pastoral areas projects up to 1.202.217 hectare i.e. 14% of the total pastoral area of Libya.
- The establishment of many productive projects for animal breeding where the number of cow breeding stations in Libya reached the number of 92 stations in 1985 with a total capacity of 46 thousand cows for the purpose of meat and milk.
- The establishment of many sheep breeding projects such as Kufra and Sarir project and camel breeding projects in Fazzan, Kufra, Batnan and central areas.
- In the field of domestic animals, many project were established to provide meat and eggs with a capacity of 162 thousand mother for meat production and 34 thousand mother for egg production and four hatching station able to produce 15,9 million chicken per year. In addition to a fattening farm produces 7,5 million tons per year and another one produces 2,25 thousand ton per year. Table {14} illustrates the development of animal production during the period 1970-1987.

The animal wealth also suffered, as agriculture, from the negative effects of dryness and economic sanctions which led to the reduction of production levels and the deterioration of pastures in general this required a general study of all pastoral areas of Libya to treat the environmental consequences of dryness, lack of water and bad pasturage, the study classified pastures as follows:

- **Reserved pastures**, where rain quantity is relatively high, their area equals 3,6 million hectare, 1,74 million hectare of it were targeted by development in 2001-2002 season.
- **Open pastures**, where rain rates are low, their total area is about 6,9 million Hectare, a suitable program was prepared to improve them by providing water and spreading of 28 veterinary clinics.
- The report of the general people's committee issued in 2002 (production file) mentioned that the project of chicken and cow breeding project produced since its establishment up to 2000 the following quantities:

Table {14} illustrates the development of animal production during the period 1970-1987

Chicken meat	22,054 million tons
Hatching eggs	50,124 million eggs
Meat chicken	46,889 million chicks
Table eggs	18,813 million eggs
Egg chicken	1,018 million chicken
Egg chick	3,453 million chicks

The project added self investments of about 66,430 million Libyan Dinars at a ratio equals 30,8% of the employed investments in it which amounted about 215,77 million Libyan Dinars and created 4832 work opportunities for local manpower at a ratio equals to 99,2% if the total man power of the project which is estimated by 4871 employees.

Table {15} Growth of animal production during the period 1970-1987
(quantities in thousand tons).

Product	1970	1987	Absolute growth
Meat	42,3	130,0	87,7
Milk	52,4	200,0	147,6
Eggs	45,0	607,5	562,0
Honey	30,0	400,0	370,0

Source: Political, social and economic growth in Libya during 30 years.

3.5. Development of water resources

It is clear to every one how strong is the relationship of the projects of industrial, agricultural and population development projects with the available water resources.

Water resources development programs got a special care to follow the great economic and social changes and reach the preferable water situation that covers the needs of water for different uses without harming it's natural environment.

The water resources, which are as follows:

- 1- Under ground water.
- 2- Surface water.
- 3- Desalination water.
- 4- Recycled water.
- 5- The Great man-made project.

Water Sector Investment Projects

First: Underground Water

It is the water that stored between the earth rocky layers which resulted from the leak of rain water such as the renewable underground water in the north and the un-renewable underground water in the south.

Underground water is one of the most important water resources in Libya as it equals 95,6% of the available water resources.

The investment of underground waters started by appointing some international companies to prepare exploration studies to determine the general properties of underground water tanks and their link with the surface water source to know the best areas for development and put them under a more precise studies to a reliable base of all plans of water development projects.

- Control and test wells were drilled and water projects were programmed by computer to secure the best use of underground water based on precise scientific standards to secure the continuity of this water. But the huge economic and population trends resulted in a big gap between the input and output of underground water due to the severe reduction of rain and the leakage of sea water. The pumped underground water exceed 4,7 billion m³, while the substitution does not exceed 500 million m³/ per year, meanwhile sea water leaks by 4,2 billion m³ to substitute the underground waters level in the coast area. This made the saltines level in some areas ten times the international levels.

Second / surface waters:

Surface water is one of the important water sources in the northern area where rain water quantities in this area varies between 150-450 million litre per year and some times exceed 600 million litre, but a large part of it wasted in the sea. Surface water forms 2,3% of the total available water resources so, many huge dams were built to save water.

Table {16} lists those dams, which cover the following projects:

- 1- Feeding of underground tanks.
- 2- Utilization of Dam waters in many purposes.
- 3- Control of floods.
- 4- The resistance of soil sweeping.

The total designated capacity of these dams is 325,35 million m³ per year, but actually it provides only 80 million m³ due to the lack of water and the increase of vaporization rate.

Table {16}: The most important dams in Libya*

No.	Name of Dam	Total storagecapacity (million m ³)	Area of collection rain water in km ³
1	Ka'am	111	2310
2	Qattara	94	1224
3	Hjernin	58	578
4	Ghaar	30	620
5	Bumansour	24	602
6	Zaart	15	175
7	Libda	6	174
8	Zayid	2,6	600
9	Jarif	2,4	70
10	Elzahawiya	2,2	17
11	Zaza	2	11
12	El-Thikar	1,6	10
13	Tabrit	1,6	
14	Derna	1,5	620
15	Ben Jawad	0,5	94
16	Mirges	0,1	8

* 14 Dams are still under construction

Third / Desalination Water

It is a major element in the equation of water resources in Libya and can be considered as a non limited source of water due to the long seashore of Libya which exceeds 2000 km, Libya produces 8% of the total desalination water in the Arab nation and 5,4% of the world's productions.

This limited production of desalination water is due to economic, natural and engineering problem (in detailed see the next chapter). But due to the insistent demand on water, many desalination stations were constructed along the seashore with a total capacity of 701 million m³, which is a very small quantity as it forms only 1,4% of the total water resources.

Figure {2} and {3} shows the distribution of those stations along the coast and although of the high production cost of one m³ which is amounted about 0,620 LD (2,14 US\$) and the high technology used, the world has a great hopes that researches which are going on will succeed to use solar energy in desalination process (Libya. The revolution, 1969-1994, p. 267.).

Fourth / Recycled Water

Due to the necessity of the utilization of all water resources as and the existence of new technologies in this field, many water recycling stations were built specially with the remarkable enlargement of cities which means the increase of drain water (used water) which can be treated (recycled) and used for irrigation purposes although of the sanitary warnings.

Now 23 recycling station are treating over 262 thousand m³ of used water, but similar to desalination water, recycled water is expensive.

Those stations produces 0,7% of the total water resources in Libya. But recycled water has the advantage that it contains some soluble manure in addition to that the recycling of water reduces pollution of environment and reduces the pressure on the limited underground water reserve.

Fifth: water on oil tankers:

It is known that the empty huge oil tankers which sail towards exporting oil ports arrived full of sea water which is used to keep them in balance, this sea water is discharged in the port to load the oil.

Oil countries which suffer from the lack of water tried to buy and transport fresh water on these tankers instead of filling the tanker by sea water to keep it's balance the oil and use it in industry and agriculture purposes after treatment and removal of polluters, and Libya proved the success of this experience but this quantity of water is not enough and subject to the continuity of oil resources.

Sixth: cloud emulsification

This method made by the plantation of clouds by silver iodide vapors or by the pollination of accumulated clouds by sodium chloride but the success of this process depends on the source and temperature of clouds.

In the 1980's Libya started a successful tests in this field, but it was not used in a wide range due to the small quantities of water gained by this method. The high cost and the unavailability of clouds along the year or on time in addition to some difficulties in control the location of falling rain and the possibility of depriving some other regions from rains the matter that might threaten the survival of wild animals.

The general water situation in Libya

From the previous point we can conclude a precise and clear information about the general water situation in Libya where as:

1- Water resources depend, basically, on underground water which forms 95,6% of the total resources, and it will remain so, according to the present international prerequisites.

2- Surface water is limited and it can only be relied on at a very small rate.

All present studies indicate that its participation in the total needs, cannot exceed 5%.

3- The present cost of technical an economical prerequisites of sea water desalination and the maintenance of these plants, is so exceedingly high. Therefore, it is not possible to expand in this direction, at present, on the light of the current technological and economical circumstances in the world of today.

4- The difference in the quantities of underground water from one area to another is very great. In the northern parts it is clearly very low, while in the south the surplus is enormous.

5- There is a deficit in the water balance in the northern parts of Jamahiriya, studying all available scientific prerequisites in this field and taking into account the economic and political prerequisites prevailing presently in this part of the world. After thoroughly

examining all suggestions for providing water in the northern parts of Jamahiriya, as well as, taking into account the cost per one m³ of potable drinking water (in investment and operating) see table {17}. Taking all these points into consideration, that it is clearly evidently ultimate and preferable solution to this problem, which is to transport soft water from the southern parts of Jamahiriya to the coastal areas.

Table {17} Cost of water production by various resources

Method of Water Production	Cost 1 m ³ in Libya Dirham	Cost of 1 m ³ in American cent
Man-Made River	68	20
Desalination Plants	1271	375
Water Transported by ships	950	280
Water conveyed by a pipe from south Europe to Tripoli	1356	400

Source: Economic, political and social transition in Libya, 1969-1989, p. 270.

4. ECONOMIC IMPORTANCE OF THE GREAT MAN-MADE RIVER PROJECT IN LIBYA

The Great Man-Made River Project

The Great Man-Made River Project has very important economic and political influences on the development of Libyan society. Even that these influences can also make deep effects for future development of the country, there were some difficulties for implementation of this Project. 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, and if we try to summarize the reasons behind the failure of The Arab economic unity project, which are as follows:

- 1- The political ideas are satisfied by the discussion of economic unity without taking any action because of some external economic and political pressure imposed on it.
- 2- The depends on emotional senses in taking decisions of the Arab Economic unity with no success to convert it to reality.
- 3- Ignorance of studying the different economic structures to reach a common formula.
- 4- The lack of an advanced information system and the lack of information about the Arabian economic capacities and resources.
- 5- The ignorance of economic cooperation and the total utilization of latent capacities under the concept of notional security.
- 6- The resort to binary regional agreements instead of whole economic unity.

The situation of Arabic countries requires any way a complete review after the extinction of the oil revolution and all resulted economic wasting as financial suffocation hit many Arabic countries while the growth of population still very high causing a severe unemployment crisis.

These factors and others imposed the regional view on the Arabic project of development and caused many negative results which in turn led to the stumbling and failure of development in many times due to the unique depends on one element of the available production elements the matter that prevent the continuity of development in best cases.

Earlier chapters discussed the huge agriculture development plans in Libya, which attempted to solve the problem of food by the reclamation of wide areas of land and convert it to strategic settlement projects to reach a self sufficiency of food and build a luxury society based on the fair distribution of wealth.

Where as the water is the major basement of all development projects, Libya strongly tended to treat the severe lack of resources by using improve irrigation and reserve every drop of surface and underground water through reservation of it's permanency. So there was the construction of dams, huge tanks and the protection of underground water. But the changing climatic conditions led to the decrease of rain quantities and the spreading of dryness. The matter is that limited the output those projects and effected the capacity of agricultural projects in general, then it was necessary to find some other water resources such as desalination water and recycling of used water. So it was important to support all studies and researches in this field and the employment of solar energy in their operation.

For sure there will arise a question about the economic advantage of these projects. Although the experts don't agree with the formula of this question, which should say; what did these projects provide to population, did they provide easy life and fair distribution of wealth and reduce the social gaps between individuals? Another point, this study does not evaluate the performance of those projects in addition to the difficult evaluation of those projects due to the geographic and numerous extension of those projects which requires great efforts from the concerning parties. But this will not prevent from dropping a spot of light on the subjective and historical condition of that stage to determine some evaluation indicators.

First of all, we can not neglect the relatively hard natural aspect which is responsible for the low capacity of land and human which was a factor against development and the disappearance of a wide and constant over agricultural production. The Libyan performance

has many specification and consideration which should be put in mind when evaluating the previous projects.

The huge improvement of public incomes after the discovery of oil in 1961 resulted the beginning of the first development plan in Libya (Five year plan between 1963-1968), which resulted a high levels of the total national output and reached 14% per year.

The country was suffering from very bad economic and social conditions in addition to a retardated situation depended on external aids before the discovery of oil and even after the discovery of oil. The unfair distribution of oil profits created social and economic gaps among the population. But after the 1969 revolution the authority followed compulsory planning as a basic tool to provide easy life and social fairness for all people specially in the presence of the relationship between the small population and the great income of oil.

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 three development plans as follows:

First plan	(1973-1975)	2203,0 million LD
Second plan	(1976-1980)	8813,2 million LD
Third plan	(1981-1985)	13167,8 million LD
Fourth plane	(1986-1996)	13000,0 million LD
	Total:	37184 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 government 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.

The weakness of the Libyan economy is obvious by it's dependence on an unique source of income (oil) and the dependence of all other sectors on the income of oil to finance investments. Libya faced many problems in covering the increasing financial needs of

different sector. The matter, which negatively effected the economic performance in general and the development sector in special way. If we agreed that national policies also have some effect on the developmental performance by the wasting and bad using of resources and lack of developmental culture among the population the matter that exposes the country to a social indebtedness able to fail the developmental plan.

The economic development gained some mixture of success and failure from time to time. Although it can not fix to continue and grow due to some un-ignorable international and foreign factors, which can determine the state of poverty and wealthy as national development can not succeed without the suitable international background. The international influences give equal development opportunities to all nations away from threatenings of wars and economic sanctions.

Libya is a life example for that as it was badly effected by the international sanctions imposed from 1992 which resulted a huge financial losses estimated by 14 billion US\$. The created performance deformity and the failure in payment balance and budget became two sources to resist the development process add to this the technical forbiddance imposed from abroad. In this case specially the air embargo, which made impossible to supply different projects by the latest technologies and necessary equipment.

We can not also ignore many problems that effect the development process, which are a historical result of the colonist period which expose the country to an incorrect cultural change the matter that made this change it self an obstacle on the way of the correct change. Great Libyan experience in dealing with the problem of water which is the *great man-made river project*, as Libya does not suffer from the lack of water but it suffers from the lack of balance in the distribution of available quantities water on the different areas of Libya. The great Man-Made river project aims at redistributing water-stock in Libya by transporting from it's sources in the Sahara (south) to the costal strip by best scientific and economic means through a great network pipe lines of total length of about 4000 km. This water will be used in the purposes of farming and irrigation of small and big farms. The 200 thousand hectare are targeted.

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 km². The total annual pumping rate is estimated by 700.000 million m³ 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.

It is well known, that the water of the great Man-Made river is not renewable and the estimated age of this project is 50-70 years. This means, that the battle with dryness will continue and Libya and this in turn will push the authority to find other sources to feed the great Man-Made river with renewable water and this is difficult without the assistance of advanced countries such as U.S.A, Russia, Europe, China and the United Kingdom.

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.

At the end of this research I would like to mention even in brief the people's choice of development in Libya (People's Authority), which has a special economic ideas through the relation between the ideology of the society and the social policy in the same time. This is clear in decision for development, which is taken by all people and no one takes the decision for the people as the ruling system in Libya.

All Libyan are members of those congresses and all of them have the right to accept or refuse and so the planning for development became a people's business, people choose what serves their interests. This people's authority exceeds the participation in decision making to the settlement of social fairness through the fair and best distribution of the national income and country's resources and secure a better future for the next generations.

4. 1. Socio-economic aspects and aims of water utilisation

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, of beef and mutton, and of milk and dairy products, all vital to human life, can be increased while expensive imports are reduced.

The cost of conveying this underground water from the desert makes it more economical than any other alternative. It is considered that the Great Man-Made River Project is significantly less than the comparative cost of desalinated water.

To secure successful development of as much agricultural land as possible, a water storage and distribution plan has been adopted. The plan aimed to maintain a constant extraction of water throughout the year through the construction of large storage reservoirs. This storage system allows users to draw water as required. When, in summer, peak demand is higher than the maximum delivery capacity of the pipeline, additional water is drawn from storage reservoirs which are refilled during periods of low water demand.

According to previous plans, number of these water reservoirs are in south west of Benghazi, to a total capacity of 76 million m³, with further reservoirs in the Sirt area sized at 37 million m³. 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.

The main crops are wheat, barley, maize, sorghum, alfalfa, and legumes to meet local requirements for these strategic commodities. Provision is also made for growing fruit and

vegetables for local consumption. The ensuing agricultural development is a mixture of smallholdings, each of 6 hectare, and larger integrated farms and co-operatives of between 1600-2000 hectare each, run under the supervision of Agricultural Service Centres in each area.

The larger farms are producing cereals, legumes and livestock, and are equipped with modern machinery and overhead sprinklers for irrigation. The small holding produces fruit and vegetables and run by their owners under the direction of the Agricultural Service Centre engineers. The area of these smallholdings was determined on the assumption that each can provide an income of not less than five thousand Libyan dinars per annum, enough to maintain a comfortable standard of life for a single family. Overhead sprinklers, a drip feed system, or a mixture of both, are used for irrigation of the smallholdings, as technically appropriate.

Studies and soil surveys have been undertaken to determine the most suitable areas of land to benefit from the water, and recommendations have been prepared. Naturally, some areas of land will need reclamation and treatment, while others will need construction of drainage systems. It is also contemplated that an Agricultural Service Centre is to be established at each large farm or co-operative and a smaller service centre will maintain a group of smallholdings. Such centres need to include offices as well as maintenance units and central workshops for the repair of agricultural tools and equipment.

Regarding the social factors, some facts and the connected comments are needed to be mentioned in the followings:

- The population of the Libya, for example, in 1987 was about 3,5 million and continuous growing at about 4% per year. This fast growth rate has resulted from a sharply reduced death rate, particularly infant mortality. It is projected by the World Bank to reach 17 million by the year 2025.

- Another important consequence of the fast population growth is that economic growth must increase at a rate of at least 4% a year, if living standards will be improved. The World Bank has estimated that GDP growth in the period 1973-84 was about 3% a year, although agriculture's contribution grew at 6,5% a year.

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.

Various estimates of the 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. Although the numbers of live animals and quantities of meat imported has declined, imports of dairy products have increased.

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, dairy 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.

This means that dependence can be reduced only by development of non-traditional agriculture, including irrigated cereal crops and intensive livestock production. There is no doubt that the Great Man - Made River Project contributes significantly to the aims of the SPLAJ (Libya). The Agricultural Master Plan has taken account of these aims in optimising cropping patterns and planning livestock enterprises. The project can produce substantial

quantities of wheat, barley, maize, milk, beef, and sheep meat - all substituting for imports, and thus reducing dependence on imports and expenditure of foreign currency.

The project also helps to diversify the economy by increasing agricultural production, and can improve standards of living by improving the availability of food produce and providing some additional employment. The project also contributes towards more balanced regional growth by developing areas which are presently not very productive.

4.2. Importance of the Large Irrigation Project

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.

Approximately the 95% of all Libyan area is desert, other part is distributed to grass about 3,6%, and 1,4% arable land, of which only 0,1% is irrigated. In this case it is very reasonable to develop the irrigation system in Libya and to support the farmers with bank credits for seed, fertilisers and machinery. Earlier since the beginning of 1970-s the considerable project has been implemented in area of Kufra Oasis in order to irrigate 10.000 ha land. Also there were other reclamation projects in some areas in Libya, which were as follows: Tawurgha, Sarir, Jebel al-Akhdar, Jefara, Wady Qatara and Wadi Jaref dam had started their operation since 1976.

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 m³ 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.

The \$ 5300 million second stage of the GMMR was eventually pipe 2 million m³ of water per day from Sawknah to Tripoli, a distance of 600 km.

Three additional stages were planned including the extension of the first phase southwards to Kufra Oasis (doubling its capacity to 4 million m³ per day) and the construction of pipelines to serve the north-eastern coastal town of Tobruk (from Agedabia) and to link the eastern and western systems of the first two stages along the coast (Tripoli-Sirte), thereby creating a national water grid.

If all phases are completed, there will be a total of 4.040 km of pipeline, with a water-carrying capacity of 6 million m³/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.

Quarter part of the first phase was completed until March 1991. This part of the GMMR Project was opened by a grand ceremony held in August 1991 near to Benghazi with participation of leaders coming from different Arab and African countries. The main object of the Libyan Authority was that 80% of water given by the GMMR Project would be used by the agricultural sector.

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.

The phase three was intended to link Tobruk (500 km to the east) and Kufra (325 km to the south) to the phase-one supply system and to create a 180 km coastal link between the phase-one system serving Sirte and the phase-two system serving Tripoli. The phase-three had an estimated cost of US\$ 5100 million and a target completion date of 2006, in the beginning of the twenty first century. Phase-four would involve the development of a new complex of desert wells at Waw al-Kabir, to be linked to Sirte via a 715 km pipeline systemic an estimated cost of 4900 million USDollar.

The total value of South Korean Companies' past and existing GMMR contracts amounted to 3700 million USDollar for building the phase-one, and 6700 million USDollar for phase-two.

Irrigation systems by the Great Man-Made River Project

Major element of the project is to build a suitable and productive irrigation system in the land. Now, it would be mentioned, that some comments were about organising the irrigation systems.

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.

Two types of systems have been considered in more detail, centre pivots (with and without integrated corner system), and linear move systems. In circumstances of land shortage, straightforward centre pivots are not efficient at utilising all the available land and other systems filling in the gaps between circles need to be considered. Solid set, portable sprinkler, rolling sprinkler, rain guns, small centre pivots have all been studied. They tend to suffer from disadvantages of increased costs, higher labour requirements, poor infixing characteristics and difficulties for mechanised farming.

However, infixing 50 hectare pivots with smaller (8,5 hectare) pivots, for example, enable a typical 1500 hectare block of centre pivots to increase its land utilisation from 76% to around 85%. This compares with typical utilisation for a similar sized block of linear move irrigators of 96%.

The data indicate relative advantages and disadvantages of the systems. Centre pivots with corner systems need a high level of technical expertise for maintenance and their reliability is poor. Straight forward centre pivots (that is, without corner system) are in use, but in areas where land is not constraint. Experience of linear move systems in Libya is also extremely limited.

At Abusheba, a small number of linear move irrigators have been installed but structural failures have caused concern as to the reliability for these types of irrigators. From experience elsewhere, this would appear to be an isolated design or manufacturing fault not evidenced in other countries. The views of manufacturers and users generally indicate that the control systems and manufacture of linear move irrigators are simpler and more reliable than centre

pivots with corner systems. They also apply the water more evenly and therefore most efficiently. Against this, unless a special power distribution system is installed, linear move irrigators need individual diesel generators to supply power for propulsion with a consequent need for daily refuelling and also need to have drag houses or channels to supply the water.

For example, in Sirt, the option to use channels for the water supply does not exist because of the undulating topography. However, provided the power supply drawback is accepted and houses of adequate quality are used (with provision for timely replacement) linear move appears to be a possible alternative to centre pivots, and help to reduce the considerable constraints on good land in the project.

The final layouts reflect the type of system chosen and needs to optimise the size and shape of fields within the many constraints of the development area.

The decision on the irrigation system is fundamental to the distribution system design and needs to be made very early in the programme.

Small farm irrigation systems are less mechanised however must remain efficient in water use. For grain and fodder crops such as wheat, barley and alfalfa, portable sprinkler systems are proposed. With the pressurised water system, no on-farm pumping is required.

For vegetables and fruit trees, drip irrigation is proposed. This is highly efficient and well suited to the high temperatures and high evaporation experienced in the summer months, coupled with the sandy soils at Sirt. Row crops (vegetables) are irrigated by using bi-wall tubing, and fruit trees with individual or groups of emitters.

Farmer training in both systems are important but while they may have had some experience with sprinkler systems, it is unlikely that they are familiar with drip irrigation. Particular attention is needed to be paid in the training programme to this method of irrigation. As concluding words, it must be mentioned that irrigation systems are a part, however a significant part of the Great Man-Made River Project and the new water utilisation programme.

5. WATER UTILISATION INFLUENCING ON FARM INCOME CONDITIONS IN LIBYA

5.1. Economic analysis of the water utilisation phase

Having discussed shortly about the viability of large and small farms in the financial analysis dealing with the economic viability of the whole water utilisation phase. The economic analysis do not include the capital costs of extracting and transmitting water from the well fields to the end reservoirs. In conventional terms these have been treated as 'sunk costs'. The results of analysis should eventually be useful when planners appraise other similar projects.

The project costs consist of capital and recurrent costs of the water utilisation phase, as well as the opportunity costs. The capital development costs are the same as in the financial cost schedules, because it has been assumed that GMMR will not pay any taxes or duties on project inputs and therefore, there are no distortions to be removed. Virtually all of the capital development costs have been incurred in the first six years of the project (1988-1993), and they amount to approximately US\$ 3,15 billion.

Regarding recurrent costs, the followings shall be mentioned:

The main differences between the recurrent costs in the economic analysis and those in the financial analysis are that the opportunity cost of labour has been included for family labour on small farms, and the opportunity cost of home-grown fodder and cereals used for animal feed have been included in both large and small farm budgets. At full production the recurrent production costs are estimated to be US\$ 260 million per year.

Regarding the opportunity cost of land the followings can be mentioned:

Because of the relatively low yields of rained barley and cereal hay from the project areas, and because of the relatively low price incomes for barley grain and hay, it is estimated that there are no net economic returns from rained cropping. The sheep that seasonally occupy the project area utilise the hay, crop residues and some grain from rained cereal production, but the relatively low price incomes for sheep meat result in no net economic returns from sheep.

Results: The Great Man-Made River project, which has been built since the middle of 1980s could provide a good background, adventured possibilities to develop the different branches of the agricultural sector.

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.

5.2. Farm Development and Land Settlement

Alternatives were explored to establish the most cost-effective way to establish life into the land. The aim was to obtain the largest quantity of water for one Libyan Dinar. The answers

that came back were definitive and challenged the Libyans to face once again their historical adversary - the desert. It was calculated that one Dinar would provide more than 14 m³ of water. Comparing the costs of other solutions of gaining water is the following:

- if the water comes through pipelines from Europe, the quantity of water per one Libyan Dinar is 0,74 m³,
- by desalination the possible quantity is 0,79 m³,
- by ship transportation the possible quantity is 1,05 m³.

From this above mentioned comparison it is clear, that the most economic solution is what can be gained by the Great Man-Made River Project. So, on 28th of August, 1984 the foundation stone was laid in Sarir area for the commencement of its construction.

In the northernmost part of Libya, the completed pipelines re-emerge at the end of their great journey from the southern desert to feed huge coastal reservoirs. These vast storehouses of water from the Great Man-Made River Project are constructed like suspended lakes. A total of five reservoirs are ready to receive the water after its long journey north. The height of the lakes was calculated with extreme care so that gravity aids the flow of water as much as possible. This attention to detail reflects a preoccupation with cost efficiency that has governed the whole project.

The vision finally became reality on 28th August, 1991 when the water from deep beneath the Sahara first reached the coast. In the followings, it is described shortly the socio-economic aspects of the project itself.

The strategy of agricultural development in the Jamahiriya aims at increasing both crop and livestock production to a level that achieves the highest possible rate of self-sufficiency and reduces dependence on imports from foreign markets to the lowest possible level. It also aims at increasing the productive capabilities of the labour force and to the capital investments in the sector, and at producing raw materials for food processing industries.

While food security is the principal objective, the agricultural strategy also recognises that agriculture will be required to provide more employment and family occupation in the future than it does at present. Even the number of farms is increasing from time to time due to the Great Man-Made River Project. The development concept therefore, accommodates both of

these requirements. Food security will be addressed by the development of large farms producing cereals, meat and milk. Employment and family occupation will be provided by the development of small family farms with the necessary back up services.

The GMMRA (Great Man-Made River Authority) is responsible for the supply of water to all agricultural users as well as to the municipalities for their distribution as domestic and industrial supplies. Also, GMMRA is responsible for the development and establishment of all agricultural areas. During the establishment period, GMMRA provides the management. Regarding small farm projects, this management works directly, however in case of large farms it can be indirectly through management contracts with Libyan or foreign organisations. In the event that foreign management is used, the same organisation can also be used to develop the farm system in the first place.

In the long term GMMRA will devolve all of these agricultural management responsibilities to other Libyan organisations. Then, it will function as a water supply organisation delivering water to the farm gate. It is expected that GMMRA will charge for the water which it supplies.

Financial analysis and profitability of farms

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 m³ 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 m³ 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.

Nevertheless, the amount of capital the farmer provides and the interest and capital repayments that he has to make, will be crucial to the margins available for GMMRA to recover costs. As in the case of large farms, the net incomes of small farms do not reach their maximum level until the seventh year after production starts.

5.3. Conclusions - Project benefits

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.

Consequently, the net contributions of processing activities to economic benefits resulted in higher benefits in this sector than in basic agricultural production on farms. The estimated total benefits at full production are US\$ 256 million per year from farming, and US\$ 308 million per year including processing. The preliminary economic analysis indicates that

quantifiable net benefits from farming activities are sufficient to cover the recurrent costs of the water utilisation phase of the project. However, even when net benefits from processing are included, the flow of annual net benefits (about US\$ 48 million per year) are insufficient to cover the capital development costs incurred in the first six years.

In addition to the quantifiable benefits used in the estimates, there are un-quantifiable benefits resulting from employment generation, improved food availability, more balanced regional development and improved social welfare of the people in the project area.

Main Results of the Great Man-Made River Project

1. These irrigation investments aim at increasing the food self-sufficiency in Libya. In spite of its importance, in case of some Arab countries the agricultural development results in some economic difficulties, for example in Saudi Arabia.

2. These investments make necessary to analyse the domestic market demands, the consumption customs and export possibility concerning the cost-benefit ratio of domestic production comparably with the market prices. The Hungarian experiences also strengthen the importance of the domestic consumption demands: the producers should follow their demands from time to time and they have to adapt flexibly to these changing demands. Also they declared some Hungarian experiences, that development of the agricultural production in case of meat production needs modernisation of small scale farms and strengthening the integration between small and large scale farms, as well Also this Hungarian experiences could be useful for Libyan agricultural sector. (Rácz Szabó, R.-Zsarnóczai, J. S. - Szűcs E., 2001, pp. 716. and 711.).

3. Naturally Libya should increase developed level of food industry in order to grow value added of products for export, in order to get comparative advantageous in case of these products. Also finally the high cost of irrigation investments can increase the domestic consumption prices of food products, in spite that the farmers do not pay fee for water-use.

4. The agricultural development strategy needs to increase qualitative level of agricultural and food products.

5. Also there is an important issue for Libya, that the marketing activity should be extended.

6. RURAL AND URBAN DEVELOPMENT IN LIBYA

6.1. Indicators of the Economic Development

The economic situation and status of a country is emerging from the national production, the level of the producing (material and personal) resources, further more, the usable assets being referred to the authority of the current state. The scientific standards which are connected to show out the average level and statement of a state's economic status, which is the following:

- GDP (gross domestic product): this is the summit of all the acceptable values, like material products, services, and so on have been produced within a certain period - a year - in the territory of the country.
- GNP (gross national product): this is the summit of the value of GDP and the products and assets from abroad together.

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).

The low average worker income in agriculture is due to the dominant traditional organisation of Libyan agriculture and must change as income levels will be higher connected to the developing. The manufacturing sector is undergoing a transformation towards modern medium and large size of factories, and expected to employ not more than 1-5 workers. So, as a conclusion, these are the sectors and the connected facts which can describe the development and the statement of Libya's economy.

Rural development trends

History of agriculture in rural regions of Libya.

The agriculture is well known by Libyan people for a long time, which is demonstrated in archaeological researches. In ancient times, the climatic conditions were similar to the present situation of Europe. Libya exported agricultural products everywhere. There are archaeological evidences for the fact, that in 330 BC Libya fed Athena, the city, which had suffered from starvation in that period. However, later on, the climate had changed, and largest part of Libya became desert, becoming unusable for agricultural purposes. Only, small coastal area had conditions for agriculture. After the World War II., as Libya became independent, the majority of people was nomad - Bedouin.

In 1954, 78,8% of population of Libya was Bedouin and rural. In that time, there were two ways of rural lifestyle - settlement in Libya:

1. farmers' settlements in coastal area and oasis,

2. groups, tribes of Bedouins travelling through desert making temporary settlements from time to time.

Because of the above mentioned fact, there was not any organised rural population in Libya, except the life in oases. In fact, there was not rural life in Libya. But after discovering the oil, the rate of rural population decreased, meanwhile, the urban population increased. This was the cause, why the people were encouraged for immigrate to rural areas - opposite immigration - in order to work in sectors of agriculture and animal husbandry. Simultaneously, the services in the rural area had been also developed in the field of infrastructure inventions.

Libya has highly developed its agricultural resources, and declared agricultural revolution, which contains a lot of projects, like The Great Man-Made River Project, which is an epoch-making invention in order to bring the freshwater from desert by four thousand km long tube system. Also, the infrastructure development reached the highest tip, as the rural area had all the required services for the benefit of population.

The effectiveness of culture on rural regions` economic development

The positive change of financial situation of people certainly gives changes in moral attitudes as well. The progress shall be in harmony with the traditional moral values of human. The development cannot reach its goals by force, or if the people do not feel the advantages of it. In fact, it can be said, that the appearances of development in rural region often meet the antipathy, further more, refusal of traditional population. The social and economic change sometimes is in conflict with rural traditions.

Therefore, the solution is the best co-ordination of old and new. Involving the change in traditional society requires the harmonisation going on between the thoughts of old thinkers and new thinkers. So, there are two ways of implement changes in traditional society:

1. Refusing everything. This solution will indicate the anger and refusal of people.
2. Harmonising the new with old, remaining all the positivities of old thoughts - this is the right way of changes.

There is also one important fact regarding the cultural circumstances of development. Especially in rural area, there is a big generation gap between parents and their children, and

the main cause of its is the illiteration of fathers. Nowadays, the youth try to find solution for each problem using scientific ways, which sometimes cause problem for the old thinker previous generation.

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.

The way of organising this project comes in the followings: First of all, the best area shall be pointed out by a special committee. After that, roads, buildings, and other infrastructure services are construct; also, the farm is well equipped by the best modern machines. After fascinating all the above mentioned requirements, the farmers will be pointed out by special committee, which has many standpoint and conditions regarding, which is the best family could gain the farm. Further more, all the process of decision-making is under the control of Popular Congresses. These are the congresses, where the people have been organized and met divided into. So, by this, the supervision of the people is done by the people.

4. Semi-village - This is the newest model of settlement after starting agricultural project. In these villages, the Bedouins had been settled and built houses, which has not been more than 20 in each village, in the past. Now these numbers can reach 40 or more, with the best quality of services. This can be a model-settlement for the future.

5. Traditional village - As it was mentioned before, these are the villages around Tripoli and The Green Mountain. In this type of settlement the people feel security and good quality of services, and many of them work in the city, taking their products to the city. However, most of growers, and producers suffered from the difficulties of transportation.

The goals of rural development in Libya. Most important goal of rural development is the great positive change regarding increasing the agricultural production so Libya now is self-sufficient in meats and cereals within a short period. Another important achievement is that new settlements have been created with high standard of life; simultaneously, protecting the environmental resources, like water, the forests, the arable land. Libya is making great projects everywhere in the country, by each region's General Assembly - making plans are discussed and accepted by Popular Congress. For instance, till now, Libya has spent more than \$1 billion for developing its areas.

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 workers. 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.

- Another important effect of development, that *most of the high-educated people move from rural regions to cities, because they can find their required level of study or work just in cities*. This is the main cause, why there is no high-educated, scientific headquarters for the village. Also, the immigration of youth gives serious problem for the rural regions, because most of them are moving to the cities. This causes more than one kind of problems. First of all, there will be no worker in the field, which can cause economic disadvantages. The second problem, that the division of sexes will be highly unbalanced in the rural regions, mainly men immigrated.

- Finally, the entire *usage of machines in the agricultural production has created several connected problems ought to be solved*, just like: 1. By this method of production, the people will have a lot of spare times. It is important to find activities for them. 2. Also, it is a problem, that by the modernisation of the process of producing, many works and activities became useless. In order to solve this problem, many kinds of plans and programs are discussed.

6.2. Urban Progress in Libya

Urbanisation is a new attitude in Libya, started after the Second World War. The Libyan meaning of urbanisation is the role-appearance of the city, which gave the people a great challenge to solve the connected economic and social problems. However, the towns provide the local authorities, which govern the economic, political and social life of the state, further more organising and enjoying the benefits of the urbanisation.

Libya is something like such as lot of countries of the world being continuous increase of the inhabitants - `urban`. Beside this, Libya is recently considerable of this attitude - the wide urban growth. A long time ago, most of the inhabitants were living in the countryside zone.

Background of the country

Through the above mentioned indications, there is quick increase in the urban. By the way, most of the inhabitants are living in two centres: Tripoli and Benghazi. The statistics stated that the inhabitants of Libya, who are pure Libyans according to the statistics had been done 3.987.000 in 1989. The density of population was 2,3 /km² in 1989. The population was distributed between urban and countryside, there were 75% as urban, and 24 %, as countryside. The average grade of marriage is 25 in case of male, and 20 in case of female. The average birth was 46.000 in 1989. The total rate of the youth forms was 51%. Mortality had become lower grade because of the upgradation of health services. So, it means, the increase is highly graded all over the world - 39% regarding the mortality.

The communities are formed confirmed to water resources and soil fertilisation. So, most of the inhabitants are settled through small committees. The main activity of them was agriculture in the Northern part of Libya, where the subgrounded water is available. Meanwhile, the Southern part, where there was not enough subgrounded water, just in certain place. So, the lifestyle is the Bedouin. They used to move from place to another, forming tribal communities. Most of them become all together in the oasis, where the level of the health services are poor. However as soon as the oil had been discovered, this factor become affective - new cities are built and old cities are expended. This event also stimulated to create new settlements.

The other attitude was that a lot of people had gone to the big cities in order to find work and settlement. Before the development of oil petrol sector, there were two kinds of establishment in Libya: 1. village; and 2. the establishment similar to the village. After finding the oil, the development resulted in difference between village and city. This is the special way of urbanisation in Libya. The economic development made new structure of the population by some trends of the internal immigration: 79% of the total inhabitants were not immigrants, 9% were commutes, or travellers, while 12% were immigrate in 1960-70s.

It must be mentioned that most of the people of the whole population were living on the North-Estern part of the country, on the coast. The standard of living upon this area was the same regarding all population there. In this area - the few km wide zones throughout the coast the population had been redoubled: in 1964 the population was 1.564.359 inhabitants, which increased to 2.249.237 in 1973. However the density is not more than 1 person/km². The

percentage of the increase of population was more than 44,3% during nine years. By the end of 1990s the density became more than 1 person/km². Further more, the population of the surrounding area to Tripoli became 2/3 more, Benghazi 1/3 more than before, because several reasons such like, this area was very prosperous for agriculture, and the service net became well-being. After the successful starting of the Great Man-Made River project, the immigration of people turned its direction from the cities back to the countryside. The population of the countryside was 5% of the whole population.

Urbanisation and distribution of people

Examining and analysing the urban situation in the Middle East, Libya was the 8th country upon this list. 20% of the total inhabitants were living in cities, of which had the population more than 100.000. The number of cities with more than 20.000 inhabitants had been increased between years of 1954-64 by 25%. About Tripoli and Benghazi - the number of inhabitants had been increased by 75%, as it was mentioned before, further more in 1966, 2/3 of total population were living in Tripoli and Benghazi.

Half of population of Libya was living in groups - assembling, the number of those was more than 500. In these assembling the range of increasing upon the population was not so fast like in the above mentioned two biggest cities. The fast increase of urbanisation, and the internal immigration was still the most important factor being responsible of the demographic changes. This indicates for more changed and the diffused interaction between economy and demography. Naturally, the level of urbanisation was different according to each city, however the internal immigration decreased this difference, unless it was harmonised. By immigration the culture was also on the way to be wide spread. Also, the social generation was a good progress for cultural development.

It was worth to compare the internal immigration with the total amount of people. The number of internal immigrants were more than 600.000 in 1954, which was 40% of the total inhabitants. The large number of internal immigrants resulted in the administrative step that in Tripoli. The internal immigration level in Tripoli was three times as much as in Benghazi. The external immigration was five times as much as in Benghazi. The cause of this great level was that this city was the centre of services and health. The most valuable advantage of immigration is that it made the culture wide-spread. However, there were some negative

effects as well. The cultural and communication gap between the inhabitants from the first and the following generation was originally existed.

The area of countryside - here the number of the working adults were continuously decreasing. At the same time, the unemployment in the cities were increasing, because the people coming from the countryside in order to gain good jobs, most of the time did not have valuable specifications for work, further more, some of them were illiterates. This attitude was the cause of the housing problem around the city, which had also started to be solved by constructing modern buildings and flats. Because of the new oil resources the development upon the equal level of the country could be perfected; through making new centres in the country, creating more and more urbanised cities. Talking about fertility - the range of this was the same in cities or in the countryside. The cause of this could be considered as the strong keeping of the religious rules and teachings. The statistical data show, that the range of mortality was lower in the city than in the village (1954-64) - partly because the health services were much more developed in the city than in a village.

6.3. Conclusion - the demographic changes and its effect on people

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%.

7. CONCLUSIONS, FINAL PROPOSALS

7.1. 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.

Thechnical 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 km². The total annual pumping rate is estimated by 700.000 million m³ 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, of beef and mutton, and of milk and diary products, all vital to human life, can be increased while expensive imports are 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 km³ 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 evaporation loss during strong which is about 5-15% of treated water.

The number of main crops could be extended by results of irrigated lands, which are as follows: wheat, barley, maize, sorghum, alfalfa, and legumes meeting local requirements for these strategic commodities. Also the growing fruit and vegetables for local consumption was implemented.

The ensuing agricultural development is a mixture of smallholdings, each of 6 hectare, and larger integrated farms and co-operatives of between 1600-2000 hectare each, run under the supervision of Agricultural Service Centres in each area.

The larger farms are producing cereals, legumes and livestock, and are equipped with modern machinery and overhead sprinklers for irrigation. The small holding produces fruit and vegetables and run by their owners under the direction of the Agricultural Service Centre engineers. The area of these smallholdings was determined on the assumption that each can provide an income of not less than five thousand Libyan dinars per annum, enough to maintain a comfortable standard of life for a single family. Overhead sprinklers, a drip feed system, or a mixture of both, are used for irrigation of the smallholdings, as technically appropriate.

Studies and soil surveys have been undertaken to determine the most suitable areas of land to benefit from the water, and recommendations have been prepared. Naturally, some areas of land will need reclamation and treatment, while others will need construction of drainage systems. It was also completed to be established at each large farm or co-operative and a smaller service centre will maintain a group of smallholdings. Such centres need to include offices as well as maintenance units and central workshops for the repair of agricultural tools and equipment.

Regarding the social factors, some facts and the connected comments are needed to be mentioned in the followings:

Important consequence of the fast population growth is that economic growth must be much more increase at rate of at least 4% a year, in order to improve their living standards will be improved. According to the World Bank estimations, GDP growth in the period 1973-84 was about 3% a year, although agriculture's contribution grew at 6,5% a year.

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, dairy 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.

7.2. Conclusions and proposals

1. The most important strategical aim of Libya is to increase the level of food self sufficiency by increasing the agricultural production based on technical development, for example the Large Man-Made River Project. This means, that the infrastructure could develop, which was background of agricultural production. Based on the development of the infrastructure either in rural areas or in urban areas, the employment ratio could increase, which could provide enough livelihood for local population in order not to leave the villages. In this case the internal immigration of population did not increase in Libya.

Also the increase of food self sufficiency stimulated to decrease the food import to make a positive balance of food foreign trade for Libya. According to this positive balance of food foreign trade there is an other important aim of Libya to increase value-added content of food export based on development of food industry, in order to export less volume of basic agricultural and food products. By the increasing the value added content for products, the value of export can be increasing for Libya, which strengthen the future positive balance of food foreign trade and also the balance of paymnet. In this case also Libya can increase financial resources to develop the industrial and infrastructure development. This process can strengthen the rural development based on extenting the infrastructure.

2. *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.

3. 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 see cost, because the water resources 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 infrastructure – like oil transport, roads, housing for population and urbanisation – also for education.

4. Also it would be important to extend 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.

If it is possible the Libyan Authority can buy oil tree lands for their inhabitants from Tunisia by the price paid by Tunisian Government for cost of extending water channels – namely Man-Made River Project - in this country. Naturally this project can provide water coming from Libya for agricultural sector and population in Tunisia.

Probably other neighbour countries of Libya can not pay the cost of water pumped in Libya or building cost of extending the Man-Made River Project.

5. Also it would be important to develop the farming systems in Libya in order to increase the food production and ensure the food demands of the population. The farmers should mainly obtain much more supports of Libyan Authority in fields of technical development, like machines, equipment, and the infrastructure background for the production.

Also the farmers need advisory system and its country wide side network in order to develop their production experiences and make be ready to solve environmental and natural difficulties, which suddenly appear for them.

6. The farmers need the much more developed educational and health service network in order to develop their experiences and sure their health conditions.

7. 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.

8. SUMMARY

Abstract

1. The economic situation and status of a country is emerging from the national production, the level of the producing resources, further more, the usable assets being referred to authority of current state. The scientific standards which are connected to show out average level and statement of the state's economic status, which is the following: GDP and GNP. These are two factors, which can represent a state's economic level internationally accepted. Libya is unique in region of developing countries, because it has high social structure, and developed distribution policy. By the above mentioned facts, it can be said that the point - high standard of social services and no unemployment - represents the level of social protection. The study analyse the practical appearance of the economy by the Gross Domestic Product and the Income Distribution, because these are the two essential data in order to describe the statement.

2. Urbanisation is a new attitude in Libya, started after the Second World War. The Libyan meaning of urbanisation is the role-appearance of the city, which gave the people a great challenge to solve the connected economic and social problems. However, the towns provid the local authorities, which govern the economic, political and social life of the state, further more organising and enjoying the benefits of the urbanisation.

Libya is something like such as lot of countries of the world being continuous increase of the inhabitants - `urban`. Beside this, Libya is recently considerable of this attitude - the wide urban growth. A long time ago, most of the inhabitants were living in the countryside zone.

3. 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/ km². Share of the agricultural sector is less than 5% of GDP, although it provides employment for approximately 13% of the active population.

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;

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

4. Realisation of the Great Man-Made River Project (=GMMRP), an economic and plentiful new source of fresh water will be made available. This will reduce extraction of water from the coastal aquifer, as agriculture ceases to be dependent on existing water wells. The new source of water will, therefore, protect and enhance the fertility of the soil. It is planned to utilise more than 86% of the water output for agricultural development, so that the country will become self-sufficient in agricultural products and achieve economic independence.

The expanding economy and growing population along the fertile coastal strip of the Socialist People's Libyan Arab Jamahiriya is creating an increasing demand to water for irrigation, for industry, domestic and municipal use. At the same time, the traditional water resources are becoming increasingly at risk through intensive use which is resulting in saline intrusion of the coastal aquifer. This phenomenon would, if unchecked, turn agricultural lands into infertile sabkha.

5. 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 incomes of small farms is around US\$ 40.000. After allowing for US\$ 16.820 family allowance, margin of US\$ 23.000 remains for GMMRP to recover costs from each small farm. This margin is equivalent to US\$ 0,27-0,34 per m³ of irrigation water.

In Libya 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. 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.

6. During the last period the Libyan agriculture has realised a considerable development. On the base of data estimated by the UN Economic Commission for Africa the agricultural sector has annually grown 7% during two years between 1990-1992. In the same time the GDP has only grown 5,3%.

The agricultural sector has more significant economic role than its contribution to the GDP, which was between 7,2-7,5% in the first half of 1990s. The percentage of the population employed in agriculture considerably had fallen from about 50% at the beginning of 1970s to 16% in the middle of 1990s. One-fifth of all state investment has been received by the agricultural sector in the period 1970-1988.

9. ÖSSZEFOGLALÁS

1. Adott ország gazdasági helyzete nemzeti termelésétől és teremlési forrásaitól függ, valamint az adott ország hatóságai által jóváhagyott használható termelőeszközeinek állapotától. Tudományos szinten egy ország gazdaságának fejlettségi szintje és állapota két legfontosabb közgazdasági kategóriával jellemezhető: GDP és a GNP értékeivel. Ez a két kategória jelzi az ország nemzetközileg is elfogadott gazdasági fejlettségi szintjét. Líbia különleges helyzetben van a fejlődő országok között, mert a társadalmi fejlettségi szintje és az elosztási viszonyai fejlettek. A fentiek alapján elmondható, hogy – mivel nincs munkanélküliség, és kiterjedt fejlett színvonalú a társadalmi szolgáltatás – a szociális háló is erős. A disszertáció elemzi a GDP és a nemzeti jövedelem alapján az ország gazdasági állapotát, mivel ezek a legfontosabb szempontok a gazdasági-társadalmi fejlettség jellemzésére.

2. A városiasodás Líbia esetében új gazdasági jelenségnek számít, amely a XX. Század második felében vált jellemzővé. Líbiában a városiasodás a városoknak, mint vezető települési formának a megjelenését jelenti. A városok, amelyek komoly lehetőségeket adtak a helyi lakosságnak a hozzájuk kapcsolódó gazdasági és társadalmi problémáiknak a megoldásához. A városok adják a helyi közigazgatási intézményeket, amelyek lényegében az egész ország gazdasági, társadalmi és politikai életét irányítják, így a városiasodás következtében, a városok gazdasági megerősödéséből adódóan a városi vezetés jelentős előnyökhöz jutott. Líbiában is hasonlóan a világ más országaihoz, a lakosság mind inkább a városokban koncentrálódik. Az ország lakosságának jelentős szerkezeti átalakulása megy végbe, ahol a vidéki lakosság mind inkább a városokba áramlik.

3. A teljes népesség közel 5,4 millió volt (1995), amelynek 14%-a a vidéki népességet adja. A népesség évi növekedési üteme 4,1 százalék volt 1980 és 1991 között. Az átlagos népsűrűség 3 lakos/km². A mezőgazdaság részesedése a GDP-ből kevesebb volt, mint 5 százalék, az aktív népesség 13 százaléka.

Az öntözött területeken a farmgazdaságok három formája alakult ki:

- A kiscgazdaságok, általában 1 és 5 hektár közé eső területtel rendelkeznek, amely gazdaságok állami támogatást kapnak vízügyi eszközök, mezőgazdasági inputok beszerzéséhez, energia és energiához jutáshoz;
- A nagyüzemi gazdaságok nagyobb részét a déli területeken találhatók;
- A további nagyüzemek a sivatagi területen vannak és állami alkalmazottak dolgoznak rajtuk.

4. A nagy Ember Alkotta Folyó Beruházás, egy jelentős gazdasági létesítmény, amely elérhető bőséges tiszta ivóvíz forrást jelent. Ennek nyomán a tengerből kivehető vízforrás jelentősége csökkenni fog, így a mezőgazdaság a meglévő vízi kutaktól válik függővé. Ennek következtében az új víz forrás megőrzi és fokozza a talaj termékenységét. Azt tervezték, hogy a kitermelt víz 80%-át a mezőgazdaság fejlesztésére fordítják, így az ország a mezőgazdasági termékekből önellátóvá válik, amellyel az ország a gazdasági függetlenségét valósíthatja meg.

A bővülő gazdaság és a növekvő népesség a Szocialista Népi Líbiai Arab Dzsmahiriya (Líbia) termékeny tengerparti sávjában megteremti a víz iránti növekvő igényeket az öntözés, az ipar, a belső és a helyi közösségek hasznosítása számára. Ezzel egy időben a hagyományos vízforrások jelentős mértékben kockázatosabbá válnak az intenzív vízhasználat következtében, amelynek eredményeként a tengerpart közelében lévő víz üregekbe a sós tengervíz benyomul. Amennyiben nem találnak rá megfelelő megoldást, akkor a mezőgazdasági földek terméketlenekké válnak ebben a körzetben.

5. A különböző típusú nagyüzemi gazdaságok közvetlen költségei és jövedelmei nagyon eltérőek. Ezek az eltérések a növénytermelés és a hozamok terén nyilvánulnak meg. A nettó jövedelmek nagysága 2,25 millió USA dollártól (az 1500 ha nagyságú Al-Khadra megyében) a 7,98 millió USA dollárig (2000 ha területen az Al-Bab megyében) terjed farmonként átlagosan. Ezeknek a nettó jövedelmeknek a becsült vízhasználat szerinti megoszlása alapján érzékelhető, hogy a nagyüzemek hozzájárulhatnak az öntöző víz költségeihez.

A kiscgazdaságok nettó jövedelmei körül-belül 40.000 USA dollár. A családi farmgazdaságok számára 16.820 USA dolláros jövedelem nagyságig elengedték, míg 23.000 USA dolláros jövedelem felett minden családi kis gazdaságnak fedezniük kellett az öntözési költségeket teljes mértékben az Ember Alkotta Folyó beruházáshoz. Ez az összeghatár 0,27 – 0,34 USA dollár volt m³-kénti öntöző víz után.

Líbiában az ország közel 95%-a volt sivatag. A megművelhető területek nagysága becslések szerint 3,8 millió hektár, amely az ország teljes területének alig 2%-át teszi ki. A ténylegesen megművelt földterületek nagysága 2,28 millió hektár, ebből a megművelhető földterületeknek közel 60%-a, amelyből 1,93 millió hektáron élő növényeket és 0,35 millió hektáron állandó növényeket termelnek.

6. A legutóbbi időszakban Líbiában a mezőgazdaság jelentős fejlődést ért el. Az ENSZ Afrikai Gazdasági Bizottságának becslései alapján a mezőgazdaság éves növekedési üteme 7% volt 1990 és 1992 között. Ezen idő alatt a GDP növekedési üteme évente 5,3% volt.

Az 1990-es évek elején a mezőgazdaságnak lényegesen nagyobb volt a gazdasági szerepe, mint a GDP-hez való hozzájárulása, amely 7,2-7,5% volt. A mezőgazdaságban foglalkoztatott népesség százalékos aránya jelentős mértékben visszaesett az 1970-es évek elején körül-belül 50%-ról az 1990-es évek közepére 16%-ra. 1970 és 1988 között a teljes állami beruházások egy ötöde jutott a mezőgazdaságnak.

10. APPENDIX

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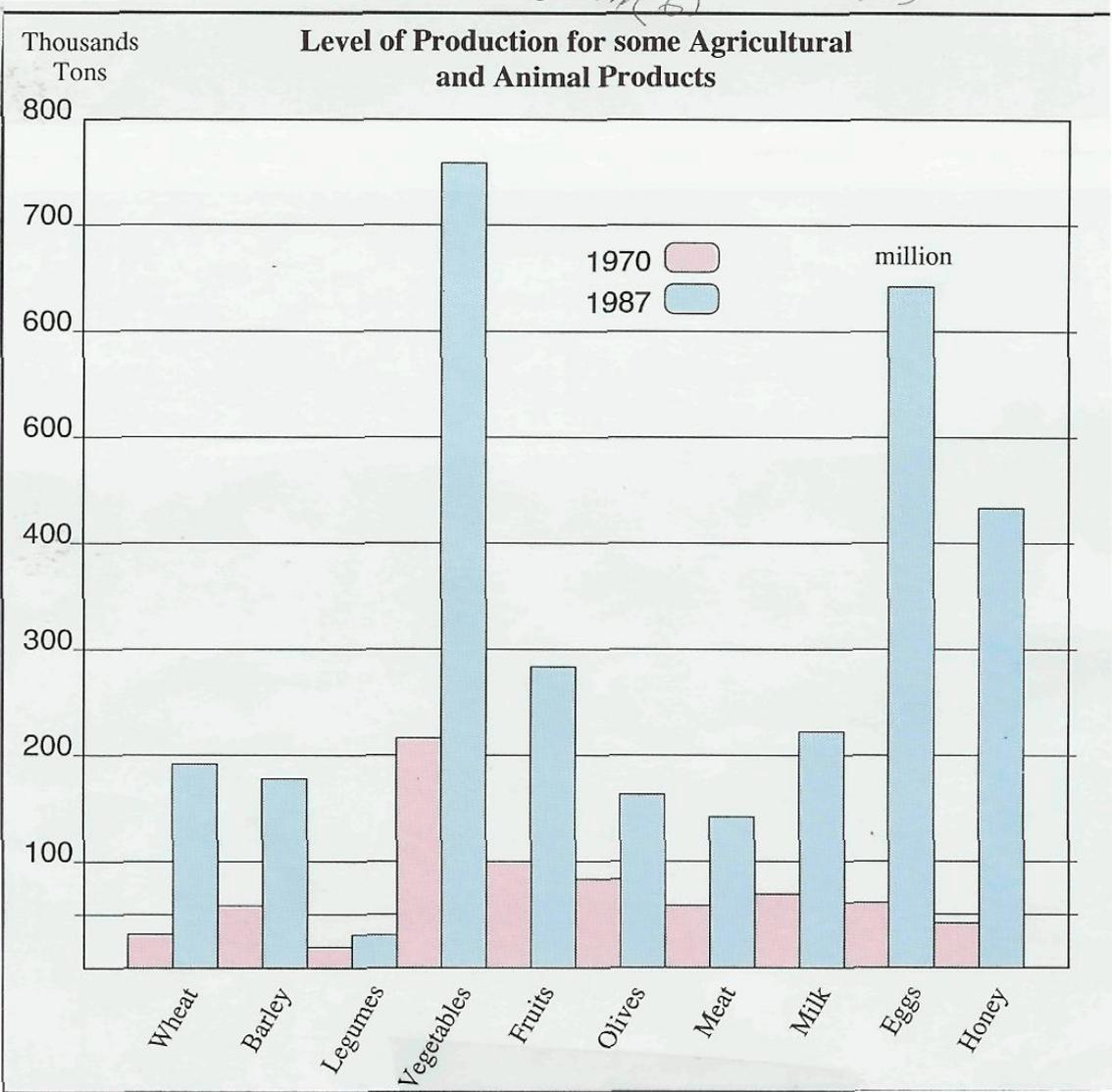
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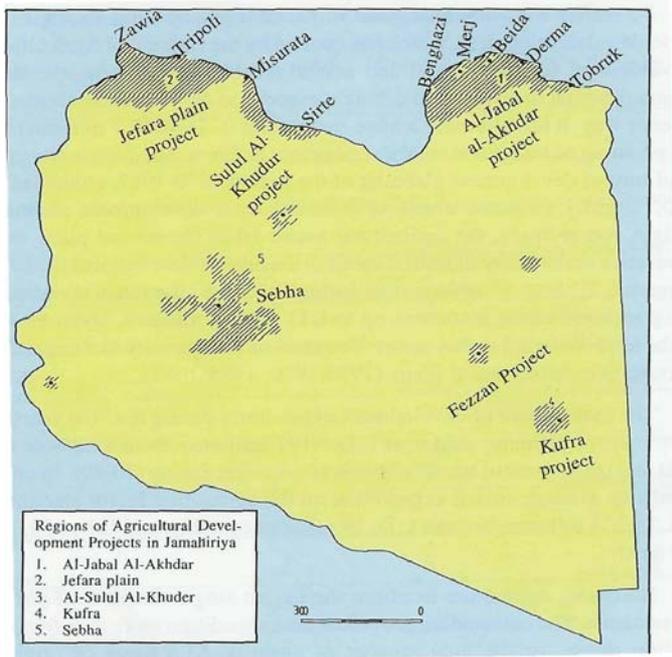
Figures

1. FIGURE



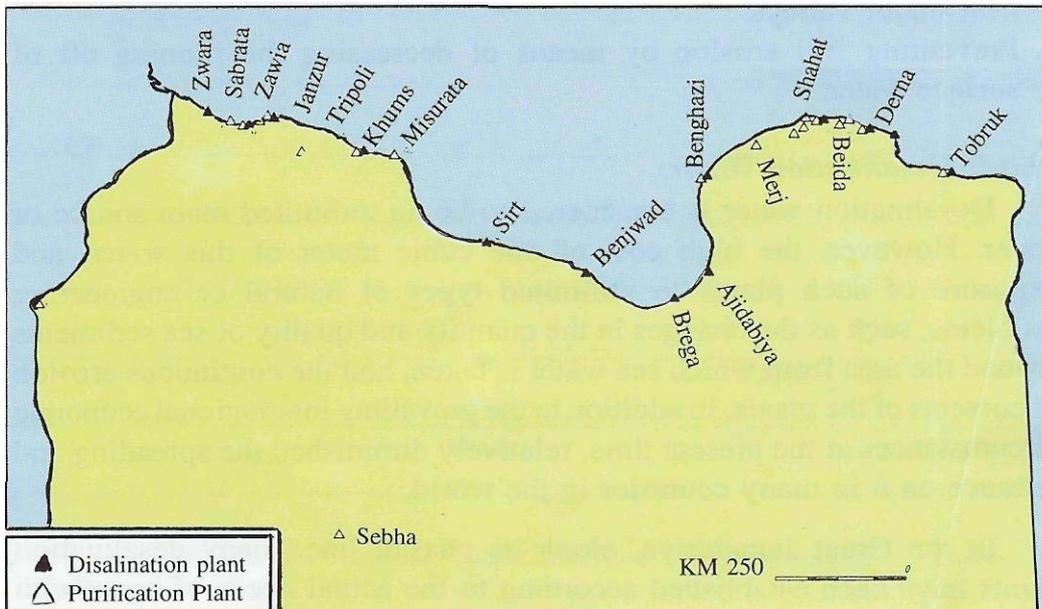
Source: Political, social & economic transitions in Libya 1970-1987

2. FIGURE: Regions of agricultural development projects in Jamahiriya (Libya)



Source: Libya in 25 years. Political, social, and economic transformation, p. 245

3. FIGURE: Regions of agricultural development projects in Jamahiriya (Libya)



Source: Libya in 25 years. Political, social, and economic transformation, p. 245

4. FIGURE: Plane of the Great Man-Made River Project in Libya



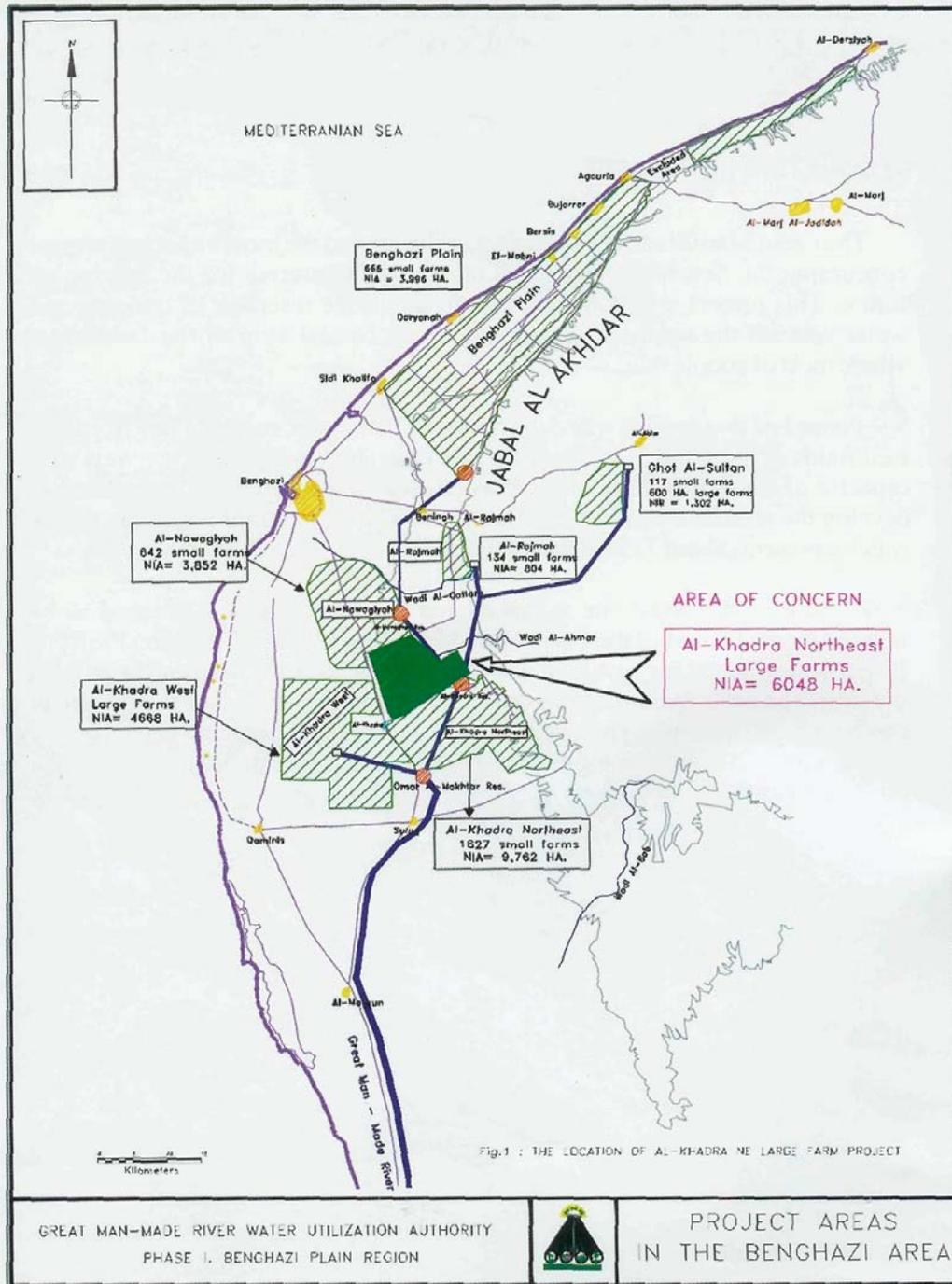
5. FIGURE

TABLE (1): CLIMATIC DATA - BENINAH INTERNATIONAL AIRPORT 1974 - 1984

CLIMATIC DATA	Unit	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVG
Monthly average temp.	°C	12.5	13.3	15.2	18.8	23.0	25.7	26.0	26.5	25.1	22.2	17.9	14.0	20.0
Average maximum temp.	°C	16.6	18.0	20.6	29.0	32.0	31.6	32.1	31.6	30.8	27.6	22.4	18.2	25.3
Average minimum temp.	°C	8.8	9.1	10.2	13.4	16.8	19.9	20.4	21.1	19.8	17.1	13.1	10.0	15.0
Average rainfall (Beninah)	mm	66.4	46.5	22.4	9.4	2.0	0.0	0.0	0.0	2.9	22.7	50.4	73.3	296.0
Average relative humid.	%	76.4	72.5	66.6	58.2	57.1	54.9	64.1	64.7	63.8	63.8	69.1	74.4	63.6
Min. avg. relative humid.	%	65.7	57.9	51.1	43.2	37.8	38.5	45.3	45.5	46.6	49.8	55.9	63.1	50.1
Max.avg. Relative humid.	%	84.7	82.1	77.7	70.3	66.9	68.1	81.3	81.4	77.2	78.2	81.6	84.2	77.8
Average wind speed	node	9.2	10.1	10.7	11.0	10.7	10.2	10.0	9.4	8.7	8.9	8.5	9.1	9.7
Average rainfall (Suluq)	mm	48.7	28.8	11.2	3.3	1.2	0.16	0.05	0.0	1.1	13.0	20.7	39.0	159.0
Ref. evapotranspiration	mm	66.5	84.8	144.0	197.0	260.0	276.6	276.8	255.7	191.4	150.0	93.0	67.0	2063.2

6. FIGURE

FIGURE (1): THE LOCATION OF THE LARGE FARM PROJECT IN AL-KHADRA NE



Source of the 4., 5., 6. Figures: The Large Farm Project in Al-Khadra Area. The Great Man-Made River Project, Socialist People Libyan Arab Jamahirija (SPLAJ = Libya), pp. 2-4.

7. FIGURE: The place and role of local food industrial processing in rural development

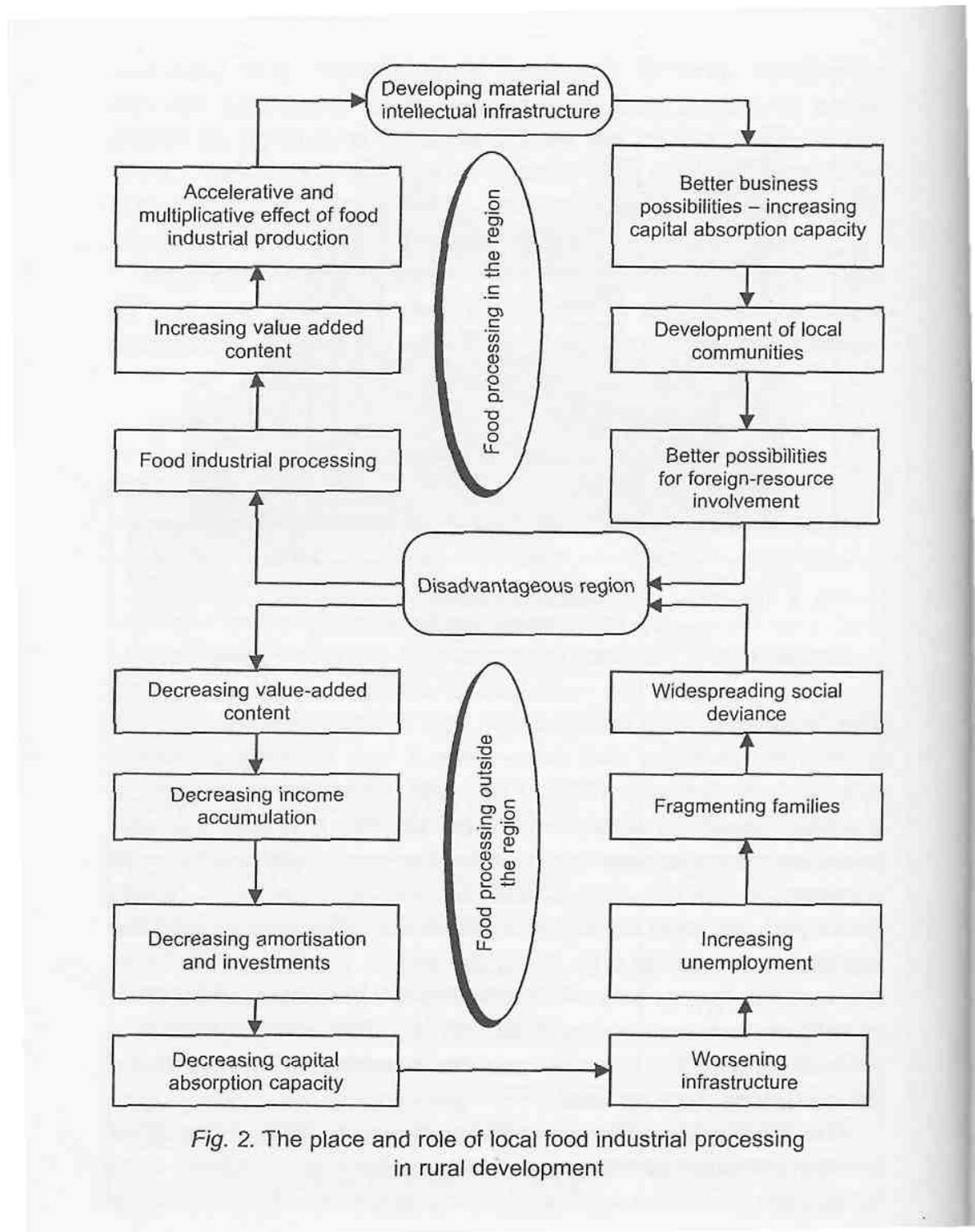


Fig. 2. The place and role of local food industrial processing in rural development

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Acknowledgment

I have the pleasure to express my sincere gratitude to my scientific supervisor Dr. Zsarnóczai, J. Sándor, Associate Professor at Department of Economic Integration, School of Economic and Social Sciences, at Szent István University.

Also I would like to thank Prof. Dr. Molnár, József, Rector of Szent István University in Gödöllő, Prof. Dr. Villányi, László, Dean of School of Economic and Social Sciences, Assoc. Prof. Dr. Fehér, István, Head of Department of Economic Integration and Prof. Dr. Popp, József, Deputy Director of Research and Information Institute for Agricultural Economics for their co-operation with me during my study.

Deep thanks and sincere appreciation to all professors, lecturers and staff members of School of Economic and Social Sciences, who helped my research work and study.

Special thanks for Prof. Dr. Hornok, László, Chairman of PhD School of Szent István University, Prof. Dr. Szűcs, István, Director of Doctorate School of Management and Business Administration at School of Economic and Social Sciences and Dr. Mészáros Gyuláne, the Secretary of the PhD School, who helped me during my study.

Also my special thanks to Dr. Khaled Karim, international secretary of the Rector Office for cooperation with me.

Finally deep thanks for my husband Younis, and my children for their sincere tolerance to make pleasant environment for my family life and scientific research work.