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Fish Supply and Demand in the Near East Region and Projections to 2015

by

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According to FAO Near East fisheries data for 2003, the thirty two member countries as a group produced a total of 4.4 million tonnes of fish from all sources (marine and inland waters as well as catch and aquaculture). About 3.7 million tonnes (85 percent) of this production came from capture fisheries while the balance of 669 000 tonnes (15 percent) came from aquaculture in marine, brackish and fresh water bodies.

A computerized calculation was formulated to project the food supply gap by 2015; the demand for fish for the target year was calculated on the basis of the average annual growth in fish production which resulted to be 4.2 million tonnes. Consequently, the population growth was a given rate. Assuming that fish *per capita* consumption remains constant at 5.83 by 2015, the supply gap is likely to be about 735 000 tonnes, which is a relatively modest quantity. However, only some countries will suffer from a supply gap.

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FISH SUPPLY AND DEMAND IN THE NEAR EAST REGION AND PROJECTIONS TO 2015

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EXECUTIVE SUMMARY

The FAO Regional Office for the Near East (RNE) initiated this desk study to present a general review of the current status of fish supply and demand in the Region and make projections up to the year 2015. A Fisheries Consultant was recruited to carry out this assignment.

The total land area of the FAO Near East Region which comprises of thirty two member countries is about 30.5 million km², a continental shelf area of 1.3 million km² and a coastline of 35 000 km. These countries are spread over a very wide geographical area in three continents of Africa, Asia and Europe. Their overall area borders two oceans, several international and regional seas and a number of rivers some of which cross international boundaries as well as contain several inland bodies of water, natural and man-made lakes, reservoirs, and irrigation canals.

According to FAO Near East fisheries data for 2003, the thirty two member countries as a group produced a total of 4.4 million tonnes of fish from all sources (marine and inland waters as well as catch and aquaculture). About 3.7 million tonnes (85 percent) of this production came from capture fisheries while the balance of 669 000 tonnes (15 percent) came from aquaculture in marine, brackish and fresh water bodies.

Information on fish trade within each country, inter-regionally and intra-regionally is still not comprehensive. However, the estimates for 2003 indicate that a total quantity of fish and fishery products of 718 000 tonnes were exported at a value of US\$1 888 million. On the other hand, the member countries imported a total quantity of 774 000 tonnes at a value of US\$923 000 during the same year.

The above figures for production and fish trade indicate that the total fish supply made available for consumption is 3.9 million tonnes for a total population in 2003 estimated at 671 million people or an annual average *per capita* fish consumption of 5.83 kg.

The above resulting calculations show the situation for the Region as a whole. However, in order to give a more homogeneous analysis to highlight the differences and dissimilarities in each of the countries' fisheries sectors, for the purpose of this study the Region was subdivided into four sub-regions. These are: The Arab Countries, Countries in Central Asia, Countries in Western Asia and Countries in the Northern Mediterranean. Looking at each Sub-region separately, the above fisheries parameters will differ. As far as the average *per capita* fish consumption, these are 8.68 kg, 1.08 kg, 2.95 kg, and 7.96 kg respectively. Differences in production, consumption and trading as well as other aspects of the fisheries sector also vary. (See detailed Tables attached at end pages of study).

A computerized calculation was formulated to project the food supply gap by 2015; the demand for fish for the target year was calculated on the basis of the average annual growth in fish production which resulted to be 4.2 million tonnes. Consequently, the population growth was a given rate. Assuming that fish *per capita* consumption remains constant at 5.83 by 2015, the supply gap is likely to be about 735 000 tonnes, which is a relatively modest quantity. However, only some countries will suffer from a supply gap. Furthermore each country has its own reason for having either a gap or excess due to each country's individual circumstances.

The fish supply and demand situation in the Region is subject to the ability of each country to overcome its capture resources limitations that are becoming more evident especially in major marine fish stocks. Most of these stocks have already reached their exploitation rates and are facing severe crises of depletion. These limitations are threatening the abilities for recovery to supply future demand for fish to satisfy high population growth in the Region which is expected to increase from 671 million people in 2003 to 858 million people by 2015.

Capture fisheries from marine and inland waters are grossly over-exploited and are increasingly under pressure from a range of activities. Over-fishing and pollution are the main reasons for this dilemma whether in marine or in inland water bodies. To recover, countries will need to develop various policies for better management of the resources including up-to-date stock assessment, effects on the environment and related issues. There are some good opportunities for some countries to raise their production from marine capture fisheries by better managing their fisheries in the years to come and also by exploiting their EEZ fishing grounds where these exist.

Aquaculture in marine fresh and brackish water is currently the fastest growing food production system and several countries are increasing their fish supply from this source. It is looked upon as the source that will narrow the gap in the future and compensate for the reduced supplies of fish from capture fisheries. However, this source has also its several limitations not only those associated with availability of water resources and suitable coastal marine areas, but also with technological challenges, funding, pollution, and marketing and consumption patterns. Several recommended measures are needed to improve fish supply by the year 2015. Some of these measures are to be taken in marine and inland fisheries. Also in the various aquaculture systems used in traditional water bodies which could be extended to off-shoring and capture base aquaculture.

For the countries to meet their fish needs by 2015 there are several issues that have to be addressed in order to have better resources management and enhancement in fish trade. These include overfishing, reduction of by-catch and discards, environmental degradation, uncertainty and risk. Initiatives by member countries to overcome these issues have to be taken. These initiatives which are included in various international instruments and agreements and Regional Fisheries Bodies and projects are endorsed and enacted by concerned international organizations such as FAO and WTO has become part and parcel of the international community to adhere to. These initiatives calls for making fisheries more responsible and better conserved for future generations and also to allow fair, safe, rewarding and more liberalized global trade in fish and fishery products.

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ABBREVIATIONS AND ACRONYMS

AOAD	Arab Organization for Agriculture Development
CBA	Capture-based fisheries
COFI	Committee on Fisheries
COPEMED	Artisanal Fishery Communities in the Mediterranean
EEZ	Exclusive Economic Zone
EU	European Union
EU-MED	Euro-Mediterranean (Partnership)
FAO	Food and Agriculture Organization of the United Nations
FAO/RNE	FAO – Regional Office for the Near East
GATT	General Agreement on Tariff and Trade
GAFTA	Greater Arab Free Trade Agreement
GCC	Arab Gulf Cooperation Council
GFCM	General Fisheries Commission for the Mediterranean
GLOBEFISH	FAO Fish Marketing and Information Data Bank
GNP	Gross National Product
HACCP	Hazard Analysis and Critical Control Points
INFOSAMAK	Center for Marketing Information and Advisory Services for Fishery Products in the Arab Region
ISO	International Standards Organization
IUU	Illegal, Unreported and Unregulated (Fishing)
MSY	Maximum Sustainable Yield
MSC	Marine Stewardship Council
NGO	Non-Governmental Organization
NPoA	National Plan of Action
PERSGA	Regional Organization for the Conservation of the Environment in the Red Sea and Gulf of Aden
RECOFI	Regional Commission for Fisheries
RTA	Regional Trade Agreements
SIPAM	Information System for the Promotion of Aquaculture in the Mediterranean
SPS	Sanitary and Phytosanitary (Measures)
TPT	Technical Barriers to Trade
WTO	World Trade Organization

STUDY ON FISH SUPPLY AND DEMAND IN THE NEAR EAST REGION AND PROJECTIONS TO 2015

1. INTRODUCTION

FAO Near East figures for the global fish production in 2003 from capture fisheries and aquaculture¹ reached 132.5 million (live weight equivalent) of which 90.2 million tonnes from capture fisheries (68 percent) and 42.3 million tonnes (32 percent) from aquaculture. The thirty two member countries of the FAO Regional Office for the Near East produced a total of 4.4 million tonnes² of which capture fisheries produced 3.7 million tonnes (85 percent) and 669 000 tonnes from aquaculture (15 percent).

Fish supply and demand worldwide are at a turning point, as the past expansion of fish production from natural stocks is leveling off and reaching its limits. At the same time, aquaculture has become the fastest growing global food industry supplying in 2003 over 32 percent of fish and fish products for an increasingly globalized market. Overall, net export revenues earned by fish trading countries in 2003 are estimated at over US\$63 billion, an increase of 9 percent over 2002, of which over US\$18 billion are earned by developing countries. As demand for fish is expected to grow further through population increase and changing consumer preferences, long-term strategic planning and investments in fish production will become crucial for meeting the world's development needs. The Near East Region which in 2003 exported seafood products to about US\$2 billion reflects many of the globally changing trends, being a fish producer, importer and exporter of fish and other seafood commodities.

This study attempts to review the current status of the fisheries sector in the Region at large while focusing on the major producing, consuming and trading countries in fish and fishery products. The study will also describe the fish consumption patterns as well as the trade trends in fish and fishery products indicating the supply of fish from all sources. It will also identify the gap that exists between the supply and demand conditions and give recommendations on the possibilities of narrowing the gap in the coming decade or so in view of the high growth rate of the populations of the countries of the Region. Relevant conclusions reached as a result of the study will be highlighted.

Improvements in the demand and supply situation in countries of the Near East Region should lead ultimately to greater economic opportunities. In this endeavour, various related activities would develop including research and technology acquisition and transfer in various fields of fisheries, in developed marketing systems and trading, increased information capabilities on the sector, enhancement of efforts in building up

¹ All data on capture and aquaculture used in this report only include FAO Yearbook species, e.g. excluding aquatic mammals, aquatic plants, corals and sponges, pearls and shells, reptiles. Data used for calculation of consumption exclude production, imports and exports of fish meal.

² Production for food and non-food uses.

capacities and expertise in various fisheries disciplines, issuing legislation to better manage the resources, its exploitation and introduction of new investments in related industries.

It is believed that this study could ultimately lead to further studies to identify the future trends regarding fish supply and demand in relation to food security and poverty alleviation, rational management of fisheries resources, employment opportunities, new industries in fisheries and related services and leads to ways and means in developing strategies for better exploitation of available resources for the coming years.

1.1 Scope and Methodology of Study

The primary aim of this desk study is to assess the present fish demand and supply situation from all sources available to each country member of the FAO Regional Office for the Near East. The Region has a membership of thirty-two countries covering a very wide and dispersed geographical area. From the west, the East Central Atlantic Ocean, crossing several regional seas, national and regional rivers, lakes and various bodies of water and passing through the large northern expanse of the Indian Ocean and Arabian Sea to the arid and dry highlands of Central Asia, to the east.

In addition to assessing the current situation, the study also aims at projecting the demand and supply requirements to the year 2015 using scenarios that would project increases in fish supplies and consumption and growth in populations. These projections are based on the latest published fisheries and demographic statistics. As a result of the findings of the study, proposals are recommended for steps to be taken to narrow the projected gap between demand and supply for the Region as a whole, and for each of the member countries separately.

Under the circumstances of conducting a desk study without investigating, discussing and researching first hand in the field in any of the member countries of the Region, heavy reliance had to be placed on the various sources which had accessible reports, statistical data, the Internet and other relevant studies in order to reach most reasonable conclusions on the Region. The study will focus on the major fish producers, consumers and traders to arrive at the best possible and appropriate analysis and conclusions.

Furthermore, due to the wideness and disparity as well as the heterogeneous parts of the Region, and to reach a reasonable description of the fisheries sector, the Region was subdivided into four Sub-regions comprising member countries that are thought to be as most congruous as possible with their fisheries sector. This subdivision is used to simplify the understanding and comprehension of the analysis and will be apparent in all sections of the study.

1.2 Terms of Reference of Study

The following Terms of Reference for the desk study were provided to the Consultant:

“Under the overall supervision of the Senior Regional Fisheries Officer (RNE), the Consultant will carry out a desk study to present a general review of the status of the fish

supply and demand situation in the countries of the Near East Region and make projections for the future up to the year 2015. In particular, the study will:

1. Describe the fisheries sector in the Region with emphasis on major fish producing, trading and consuming countries and highlight the importance of the sector in their economies;
2. Explain the fish supply situation from capture (marine and freshwater) sources as well as from aquaculture;
3. Clarify the consumption patterns for fish and fishery products and the importance of the role of fish in national diets;
4. Highlight the Region's trade in fish and fishery products and the role played by imports in enhancing local fish supplies;
5. Determine the present local demand for fish and fishery products and the levels of self sufficiency from national sources;
6. Show the existing gap between supply and demand in countries of the Region and forecast expected future trends in consumption;
7. Suggest formulation of fisheries policies in countries of the Region to help narrow the gap and improve the fish supply and demand situation; and
8. Make specific projections of fish supply and demand to the year 2015 in view of increasing populations."

2. THE ISSUE OF FISHERIES AND FOOD SECURITY

FAO World Food Summit held in Rome in 1996, defined food security as ‘...exists when all people at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life’. The role of fish in enhancing food security lies in the importance of fish in supplementing the minimum diet of populations at large, and in particular, of sectors having low purchasing power. In addition, fish has a role to play in food security even if fish workers themselves cannot afford to eat them, as long as the fishery provides them with income sufficient to buy food. In most of the Near East countries, especially those with high population growth rate, high *per capita* food consumption from local production supplemented by imports, may only be able to continue this trend as long as the importers (governments or private sectors) are able to allocate foreign currencies to continue to meet the cost of fish imports.

Fishing and fisheries contribute more than any other animal production activity to the protein intake in most of the developing regions of the world including most of the countries of the Near East Region. Fish and fishery products are important for the food security and the alleviation of poverty of many coastal populations in some sections of the populations. But, by all accounts, many wild marine and freshwater resources are on the decline and this is a source of growing economic and social problems. Fisheries, including aquaculture, provide a vital source of food, employment, recreation, trade and economic well being for people throughout the world, both for present and future generations. In the Near East Region, fisheries are an important economic sector and aquaculture is becoming of importance, both contributing, albeit at different levels, to

national development through employment, trade and food security. Total fish quantities from capture has increased in the last few years, but between the years 1998 and 2003 the growth has begun to diminish.

The rapid growth of the past decades in the exploitation of those sources has taken its toll: during the fifties and sixties, the global catch from commercial fishing grew three times faster than the world population. Production growth was slower afterwards; currently, as global fishery production (capture and aquaculture) oscillates around 130 million tonnes per year (almost 133 million in 2002, a record so far) with declining capture fisheries but steadily rising from aquaculture production. The global average *per caput* supplies seems to be on hold around 16.0 kg/annum. These trends have an obvious impact on prices: during the last decade seafood prices have risen almost 4 percent a year on average, rendering a traditionally cheap source of protein much less accessible to the poor.

The blame for the depletion of capture resources has been put mostly on two factors: These are:

- i. The development of excess fishing capacity with respect of existing fish stocks and their natural growth rates; and
- ii. The deteriorating condition of fish stocks due to the pollution of sensitive water areas (inland and marine waters).

Small-scale fisheries in developing countries comparatively played a minor role beyond their communities, although at times the pressure of growing local demand contributed to the over exploitation of coastal waters.

The development of fishing capacity has taken place mostly in the large-scale (industrial) and medium-scale fishing sub-sectors. Since the early days of international development assistance, the main objective of fishery development projects has been to increase fishing efficiency and income levels through motorizing boats, improving gears and investment in harbour development and other infrastructure facilities. The sector and its labour force grew, also drawing workers from rural to urban areas.

At the same time large numbers of small-scale fishers had no access to that assistance, finding it increasingly difficult to survive in an overexploited environment. In this perspective the crisis of fisheries also is a crisis of livelihoods.

The implications go far beyond dwindling fish stocks available to small-scale fishers. Globally, fishing and fish farming provides a source of living for about 130 million fishers and their families, the majority of them the world's poorest. They are among the 1.3 billion people - nearly a fifth of the global population - for whom fish is the main source of animal protein. The scarcity of resources is leading to clashes between neighbours as fishing fleets stray across maritime borders after depleting stocks in their own waters.

It is estimated that 68 percent of the World's fish harvest is still caught in the wild, and the harvesting has reached, and in many areas exceeded, sustainable rates. This, in part, is because the means of exploitation has become so efficient. Fishing fleets use sonar, radar, aircraft and satellites to track shoals. Winches and motors, hand drift nets typically containing more than 18 tonnes of fish. This enables trawlers to increase not only catches but the by-catches - species that are inadvertently netted but sometimes unwanted and consequently, discarded.

The issue of discards is a very disturbing one since it results in a very large wastage of fishery resources from discarding unwanted catches at sea. FAO estimates that from a range of 20-40 millions tonnes of fish per year may be discarded at sea to catch about 100 million tonnes of fish suitable for human consumption. Most of the discards are dead fish thrown overboard back into the sea mainly from shrimp trawlers.

3. AN OVERVIEW OF FISHERIES PRODUCTION IN THE NEAR EAST REGION

3.1 Description of the Fisheries of the Region

The Near East estimates for global fish production from all sources indicate that total world fisheries production decreased slightly from less than 133 million tonnes in 2002 to 132.5 million tonnes (-0.4 percent) in 2003. Production from capture fisheries in 2003 reached 90.2 million tonnes and production from aquaculture reached 42.3 million tonnes. These estimated figures indicate an overall decrease from 2002 capture fisheries production of 93.0 million tonnes (-3 percent), but on the other hand it shows an increase from 2002 global aquaculture production of slightly less than 40.0 million tonnes (6 percent).

Furthermore, the 2003 fisheries fish utilization estimate that 105.5 million tonnes were used for consumption as food fish, 27.0 million for non-food uses and the average *per capita* food fish supply reached 16.7 kg, a rise of 0.4 kg over the previous year.

As far as the FAO Near East Region is concerned, total fish landings of all the 32 member countries from all sources in 2003 reached 4.4 million tonnes, amounting to about 3.3 percent of the total global production, an increase of only 0.4 percent from 2002 production (See Table 1 and Figure 1).

The main fishing areas of the Near East Region are the coastal, territorial waters and Exclusive Economic Zones (EEZ) of the member countries which are bordering the Northern and Western Indian Ocean, the Arabian Sea, the Gulf and Gulf of Oman, Gulf of Aden, the Red Sea, the Mediterranean Sea, the Caspian Sea, the Black Sea, the Aegean Sea and the Eastern Central Atlantic Ocean. These fishing areas also include the adjacent gulfs, bays and lagoons of these various bodies of water. According to FAO classification of Fisheries Areas, these bodies of water are located within Areas 34, 37 and 51.

The main five fish producing countries members of the Near East Region from all sources in 2003 are Morocco with 887 000 tonnes, Egypt with 876 000 tonnes, followed

by Turkey with 588 000 tonnes, Pakistan with 577 000 tonnes and the Islamic Republic of Iran (hereinafter: Iran) with 441 000 tonnes. On the other hand the five member countries of the Region with the least fish production from all sources are Kyrgyzstan with 26 tonnes, Tajikistan with 325 tonnes, Djibouti with 350 tonnes, and Afghanistan with 900 tonnes followed by Jordan with 1 100 tonnes (See Tables 1 and 2).

The Near East member countries production from all capture fisheries sources (marine and freshwater) in 2003 reached 3.7 million tonnes which is about 84.8 percent of total landings and 669 000 tonnes from aquaculture activities in fresh water, brackish water and mariculture or 15.2 percent of total production (See Table 2).

As far as the five top fish producing countries in the Region from capture sources in 2003, Morocco leads with 885 000 tonnes, followed by Pakistan with 565 000 tonnes, Turkey with 508 000 tonnes, Egypt with 431 000 tonnes and Iran with 349 000 tonnes. Similarly, the top five fish producing member countries in the Region from aquaculture, using all systems, are Egypt with 445 000 tonnes, Iran a distant second with 92 000 tonnes followed by Turkey with 80 000 tonnes, Pakistan with 12 000 tonnes and Saudi Arabia with 12 000 tonnes (See Tables 1 and 2).

Some of the basic data which are of relevance to the fisheries sector of the Region include the land area of all the countries which amounts to about 26.3 million square kilometers while the continental shelf area which constitute most of the fishing grounds is estimated at 73.3 million square kilometers. Furthermore, the total length of the coastline of the countries combined is about 35 000 kilometers (See Table 3).

On trade in fish and fishery products by countries of the Near East Region, the total quantities exported in 2003 reached 718 000 tonnes valued at about US\$1 888 million (export value). Imports, however reached 774 000 tonnes valued at about US\$923 million. Very few countries re-exported some quantities, mostly processed value-added products. These amounted to 2 307 tonnes valued at about US\$4.0 million. The overall trade figures in 2003 indicate a positive trade balance in fish and fishery products (See Table 4).

The inland water fisheries areas include the major rivers such as the River Nile, the Euphrates and the Tigris Rivers, Indus River and various other small rivers and tributaries, irrigation canals and dams as well as the several natural and man-made lakes and water reservoirs and inland bodies of water which exist in most of the countries of the Region such as Lake Nasser, Lake Nubia and Lake Assad.

3.2 Fisheries of Sub-Regions of the Near East

Due to the extensive area which constitute the FAO Near East Region and for the sake of better identification, description and comprehensible analysis of the characteristics of the fisheries sector and also clearer and more accurate manner in presentation, the Region may be subdivided into four main Sub-regions that are believed to hold distinctive similarities. These may be divided as follows:

- **Sub-Region One:** Arab Countries, 20 countries;
- **Sub-Region Two:** Countries in Central Asia, 6 countries;
- **Sub-Region Three:** Countries in Western Asia, 3 countries; and
- **Sub-Region Four:** Countries in Northern Mediterranean, (or Southern Europe, 3 countries.

Sub-Region One: Arab Countries. The total number of the Arab countries members of the Near East Region is twenty. These are Algeria, Bahrain, Djibouti, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Qatar, Saudi Arabia, Somalia, Sudan, Syria, Tunisia, United Arab Emirates (United Arab Emirates) and Yemen³. These countries have a combined total land area of 22.5 million square kilometers, a continental shelf area of 707 000 square kilometers and a coastline of 23 000 kilometers long (Table 3.a).

The Arab countries as a Sub-region of the Near East form the largest group, about two-thirds. They have several common bonds unified by unbreakable ties of ethnic, cultural, religious, common language and history as well as developmental aims rarely available in other regions. It constitute a land area of about 10 percent of the globe and a population in 2003 reaching 300 million inhabitants or about 5 percent of the world's total population. Perhaps no other group of countries in the world has been endowed with the same opportunity and potential for cooperation, even integration, as have the Arab countries. Nevertheless, while much of the rest of the world is moving toward coming together in larger groupings, especially in today's world of creeping globalization and increased international competition, Arab countries so far failed to capitalize on the benefits that closer cooperation within the Sub-region may bring.

Latest Near East FAO fisheries statistics for 2003 indicate that the twenty Arab countries produced a quantity of 2.7 million tonnes from all available sources which constitute about 62 percent of fish production from the whole Region. Of this quantity 2.2 million tonnes were from capture sources and the balance of 476 000 tonnes from aquaculture. The major fish capture producers are Morocco with 885 000 tonnes, followed by Egypt with 431 000 tonnes, Yemen with 159 000 tonnes, Algeria with 142 000 tonnes and Oman with 138 000 tonnes. The lowest fish producing countries are Djibouti with only 350 tonnes and Jordan with 481 tonnes. As far as fish from aquaculture, only Egypt has a significant production of 445 000 tonnes (See Tables 1 and 2).

Arab fisheries resources, from the waters bordering the Arab Countries, as well as inland waters and aquaculture are considered a very important sector for development. If rationally and scientifically exploited, fisheries could play a much more important role in meeting increased demand for food, and in activating the economies of several countries. Fisheries resources have the advantage over oil resources being a renewable and self-replenishing resource, whilst oil reserves are limited, could not be replenished, and deplete after a certain period of exploitation. Furthermore, fish as food, meets the

³ There are two more Arab countries members of the Arab League. These are The Comoros and Palestine (West Bank and Gaza Strip), but these are not members of the FAO Near East Regional Office.

demands of one of the most important human instincts and could be an important contributor to Arab food security.

Marine waters border the Arab countries from all sides, the Gulf and Gulf of Oman from the east, the Eastern Central Atlantic Ocean from the west, the Mediterranean Sea from the north, and the Arabian Sea and the Indian Ocean from the south. In addition to these the Red Sea and various gulfs, rivers - mainly the Nile, the Tigris, and the Euphrates - and the natural and man-made lakes constituting inland water resources afford the Arab countries very important potential for fisheries. The EEZ expands Arab marine waters to rich international fishing grounds. Engaging in aquaculture activities in marine and inland waters, as well as better exploitation of the available fisheries resources, create a more sound and more beneficial fishery industry thus to become one of the main pillars of Arab economic activities, of no lesser importance, in some Arab States such as Morocco, Mauritania and Yemen, than the fishing industry in the economy of major fishing nations such as Japan and Norway.

Prior to the discovery of oil in some Arab States, fish had traditionally been the most important source of animal protein, particularly along the coastal areas. Increasing incomes from oil providing higher purchasing power, made other protein substitutes available, causing diversification of protein intake, thus reducing fish consumption. In recent years, however, due to various economic and social reasons, demand for fish and its consumption in fresh or processed form have risen.

Aquaculture as a major fish producing activity is a relatively new resource for fish in the Arab countries but has made significant progress since 1984 when landings from fish farms did not exceed 35 000 tonnes. During the nineties farmed fish has shown an increase of over 200 percent. It is however, to be noted that the practice of aquaculture in Egypt, Iraq and Syria has gone on for many years due to the availability of fresh water. In recent years, however, farming especially in marine waters has been practiced in several other countries where fresh water is very scarce, like in Kuwait, Saudi Arabia, Bahrain and the United Arab Emirates. The main producer of fish from aquaculture in this Sub-region and the Region as a whole is Egypt. Its 2003 production from aquaculture reached 445 000 tonnes (94 percent of all aquaculture production in the Region). All other countries combined in the Sub-region produced only 31 000 tonnes (6 percent). Most of Egypt's aquaculture production is from brackish water surface areas of its delta lakes and lagoons in the north (See Tables 1.a. and 2).

Fish marketing opportunities are increasingly opening up in the Arab countries. Such an increase in the demand for fish and fishery products may be met either from better exploitation of own fishery resources or through the importation of quantities that may not be obtained from local sources, especially from intra-regional sources.

Sub-Region Two: Countries in Central Asia: The total number of the Central Asian countries members of the Near East Region (formerly part of the defunct Soviet Union) is six. These are Azerbaijan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan. These countries have a total land area of 4 081 000 square kilometers, a

continental shelf area of 72 000 square kilometers and a coastline of only 610 kilometers long (See Table 3.b).

The total fish production of all the six Republics from all sources in 2003 was only 53 000 of which 47 000 tonnes from capture fisheries and the balance of 6 000 tonnes from aquaculture. These countries constitute areas that are typically mostly arid and dry lands where some 95 percent of total water discharges are used for irrigation. Much work needs to be carried out in these countries to allow any significant fisheries to develop in these harsh environmental conditions especially in the absence of significant water bodies where fishing may be practiced.

The main fish producer in this Sub-region is Kazakhstan which has significant water resources with good potential for fish production but little attention has been given to this sector. In 2003 its total production was 24 000 tonnes which came from capture fisheries mainly from lower Ural River, and several inland lakes and reservoirs, the largest of which is Bukhtarma. Some aquaculture is also practiced, but fish farming output did not exceed a total of 800 tonnes.

Since the Aral Sea, which was the most important source of fish for Uzbekistan began to dry up since the sixties, the production of 7 000 tonnes came from inland waters using lakes and reservoirs in addition to aquaculture which started to develop in various parts of the country. Turkmenistan marine fisheries are concentrated in the Caspian Sea. Inland fisheries are carried out in a number of small rivers and lakes. However, in recent years fish production has declined considerably and so did aquaculture (See Table 1.b)

Sub-Region Three: Countries in Western Asia: This Sub-region constitutes three countries being Afghanistan, Iran and Pakistan that are members of the FAO Near East Region. The combined total land area of this Sub-region is 3.1 million square kilometers, a total continental shelf area of 246 000 square kilometers and a coastline of 3 486 kilometers long. Afghanistan is landlocked with no continental shelf area or a coastline (See Table 3.c).

The total fish production of the Sub-region in 2003 from all sources amounted to 1 019 000 tonnes, about 23.2 percent of the total production of the Near East region. Pakistan and Iran are the main producers with 577 000 tonnes and 441 000 tonnes respectively. Afghanistan has an insignificant production of only 900 tonnes. Capture fish quantities reached a total of 915 000 tonnes while the production from aquaculture was about 104 000 most of which was produced by Iran (See Table 1.c).

Pakistan is the main fish producer in this Sub-region. Its main fishing areas are located among the Sindh coast extending southeast of Karachi to the border with India along the Arabian Sea where a broad continental shelf and coastline marked by creeks and mangrove-covered mud lands of the Indus River delta, serving as nursery grounds for many finfish and shelf species. Also important fishing grounds are available along the Balochistan coast, north and west of Karachi.

Inland fisheries are generally of a subsistence nature and carried out in the rivers, irrigation canals and reservoirs. Aquaculture is practiced in the Punjab, Northwest Frontier and Sindh Provinces on a limited scale. More attention to inland fisheries and fish farming has been shown in recent years.

Iran has a long coastline and rich fishing grounds in its territorial waters. Its fisheries is characterized by having three fishing types: the Northern fisheries which is carried out in the Caspian Sea, the southern fisheries carried out in the Gulf and Gulf of Oman and the Inland fisheries and aquaculture are carried out in rivers, natural and man-made lakes, reservoirs, irrigation canals, aqueducts and ponds which are organized as fish farms.

The third country in this Sub-region is Afghanistan where the fisheries sector is very insignificant being a land-locked country with very scarce water resources (See Table 1.c).

Sub-Region Four: Northern Mediterranean Countries: This Sub-Region may also be designated as Southern European Countries. It constitutes a total of three countries members of the Near East Region: Cyprus, Malta and Turkey. The total land area is 790 000 square kilometers, a continental shelf area of 261 000 square kilometers and a coastline of almost 9 000 kilometers long (See Table 3.d).

The total fish production of this Sub-region in 2003 reached 593 000 tonnes or about 13.5 percent of the overall production from the Near East Region. Turkey is the dominant country in fish production with 588 000 tonnes of which 508 000 came from capture fisheries and 80 000 tonnes from aquaculture leaving Cyprus with total landings of 3 612 tonnes and Malta with only 2 019 tonnes (See Table 1.d).

Turkey's main marine fishing areas are in the Black, Aegean and Mediterranean waters of the country. It has both coastal and deep-water fisheries systems. Its marine fish supply had various ups and downs over the last three decades mostly due to declines and recoveries of fish landings of small pelagics, especially anchovies, from the Black Sea.

Inland water resources contribute relatively small quantities to the overall catch but are increasing in importance as a result of developments for irrigation and energy production especially in the southern regions. Aquaculture, as in many other countries has just started to become more significant in its contribution to total production. So far technical and market limitations have prevented fuller utilization of the country's aquaculture potential.

4. FISHERIES POTENTIAL OF THE NEAR EAST REGION

4.1 Capture Fisheries:

Most of the traditional fishing areas in the various oceans and seas are facing declining catches. FAO Fisheries Statistics are already showing serious signs of leveling off. Fish producers are advised to take various measures to conserve the resources and start programmes to rebuild depleting major stocks. The Near East Region should also be facing such a dilemma if resources are to be preserved for future generations.

Using the Sub-regions of the Near East as described above, a major important fishing area for Sub-region One, Arab countries, is the fishing grounds of the Eastern Central Atlantic off the West Coast of Africa. About 190 species or groups of species were caught in the area during the 1950 -1955 period. The major marine fishing countries in this fishing area are Morocco and Mauritania. Other important fishing areas are in the Arabian Sea and the Gulfs.

With regard to fish production the latest official FAO fisheries statistics show that in 2003 the Arab countries total fish production from capture fisheries and aquaculture was 2.7 million tonnes or about 2.1 percent of world catches in the same year which were 132.5 million tonnes. Arab production over a period of four years (2000-2003) fluctuated slightly but with a very modest increasing trend.

The fisheries of the area are characterized by the dominance of small pelagics especially sardines and other clupeids that account for nearly 50 percent of total catches. Total demersal catches on the Mauritanian continental shelf have been decreasing since 1984. Hakes have been considered moderately exploited while other demersal fish species are more intensively exploited. Two stocks of common octopus are caught by the northwest African cephalopod fisheries. The northern one, off the Saharan coast, is believed able to support a potential Maximum Sustainable Yield (MSY) catch of 75 000 tonnes. The southern one off Cape Blanc, is considered fully or over-exploited with an estimated MSY of 50 000 tons.

The MSY of the central sardine stock of Morocco was estimated to be some 550 000 tonnes and the present level of exploitation is considered moderate. The large stocks of small pelagics in this area, sardine, mackerel and horse mackerel, are highly variable. A biomass of mainly sardinella particularly off Mauritania is estimated at 4 million tonnes. Also, the biomass of mackerel and horse mackerel between Morocco and the Bissagos Islands were estimated to be 830 000 tonnes. One major problem about Mauritania's is the basis on which its fisheries catches are recorded. FAO statistics indicate that in 2003 Mauritania's catches were 80 000 tonnes. Mauritania's published statistics say that their annual production is in the range of 600 000 tonnes. This discrepancy may be due to the fact that foreign fleets fishing in Mauritanian waters, legally or illegally, do not record their catches as Mauritanian origin.

The other fishing area is along North Africa and the Eastern Mediterranean areas which includes Morocco along the south west coast of North Africa to the east including Algeria, Tunisia, Libya and Egypt as well as Syria and Lebanon. It is to be noted that the waters of the Mediterranean Sea are generally poor in marine resources, but the land discharge with high nutrients outflows of drainage water from the Nile Delta region and other rivers increases the productivity of the coastal region of these countries. The continental shelf, however is generally fairly heavily exploited, although there is some potential for catch increases from some fishing grounds or from additional stocks that are moderately or under-exploited, such as small shrimp, shark, and large pelagics beyond the continental shelf.

The fisheries of the Mediterranean have shown a resistance to high fishing effort. It is one of the few marine areas showing a steady increase in production. This increase in landings is an apparent contrast with a long and active tradition of fishing, large and seasonally increasing coastal populations. The species of commercial importance in the Mediterranean are anchovies, sardines, horse mackerel, sprat, etc. A recent Mediterranean phenomenon has been the dramatic increase in catches for large pelagics.

The eastern Mediterranean has little potential for increased landings from capture fisheries. On the whole, it seems unlikely that any underexploited stocks have been left in the Mediterranean, although some small pelagic stocks can increase suddenly from time to time, possibly owing to temporary environmental conditions. Relatively rich trawling grounds are found in the Gulf of Gabes in Tunisia, the Gulf of Sirtes in Libya, and off the Nile Delta in Egypt. A problem of excess fishing capacity has surfaced in the southern Mediterranean with fleet expansion in Libya.

Other important fishing areas are the waters bordering the Arabian Peninsula and the Arabian Sea. Most of the countries of this region, except for Yemen, do not depend substantially on fish and fishery products as a mainstay of their economies. By-catch and consequent discards are a serious problem in the waters of Kuwait, Saudi Arabia and Bahrain, where the by-catch from shrimp trawlers can be as much as 95 percent of the catch.

Fisheries resources in the main seas of the area are not abundant, but provide local coastal fishers with employment. There are reliable estimates of substantial mesopelagic resources which could be exploited in the Gulf of Oman and Arabian Sea. However, all commercially valuable stocks in the waters of eastern Saudi Arabia, Bahrain, Qatar and the United Arab Emirates are fully exploited and there are various estimates of the potential of the Red Sea. Considering the coral reefs and associated fish communities in the sea, the resources tend to be vulnerable to over-fishing. Important commercial species include Indian spiny lobster and shrimp.

As far as the Sub-region Three, countries in Western Asia, Iran and Pakistan are the main fishing countries. Catches from the Black Sea declined drastically a few years ago, in particular Turkish landings of anchovy. Over-fishing, pollution and the introduction of exotic species appeared to be the reasons for the decline.

Throughout the area, fisheries are threatened by environmental degradation from oil spills and industrial, urban and agricultural run-off. The comb-jelly, which devastated the Black Sea eco-system, is now also present in the north-eastern Mediterranean. The situation is even more disturbing in the cephalopod trawler, hake and crustacean fisheries off north western Africa, which has high quantities as by-catch.

In most countries throughout the Region it is difficult to estimate the state of the stocks because of the absence of complete and up-to-date surveys and relocation of part of the Turkish Black Sea anchovy fleet to the Turkish Mediterranean.

A considerable potential to increase capture fisheries exists in the waters of the EEZ as well as in international waters. The countries bordering the Eastern Central Atlantic, the Arabian Sea and the Indian Ocean may provide the opportunity to increase supplies.

4.2 Aquaculture

Aquaculture is one of the fastest growing food production systems in the world, with the bulk of its output currently being produced within developing countries, and with expectations for aquaculture to continue its contributions to food security and poverty alleviation. The vast majority of aquaculture practices around the world have been pursued with significant nutritional and social benefits, and generally with little or no environmental costs. However, it is essential for current efforts aiming at the future success of aquaculture in both developing and developed countries, that potential social and environmental problems are duly addressed in order to ensure that sustainable aquaculture develops.

The continued expansion of aquaculture since the eighties was sustained in 2003. Aquaculture increased its contribution to world fishery production and maintained such increases. In 2003 total production from finfish, shellfish and crustaceans reached a record 42.3 million tonnes, representing an overall increase of 39.0 percent over 1998 production of 30.5 million tonnes.

At present, more developing countries are engaging in aquaculture production based mostly on the culture of low-value herbivorous/omnivorous freshwater finfish in inland rural communities, within semi-intensive or extensive farming systems that use moderate to low levels of production inputs. These systems produce large quantities of affordable food fish for domestic markets and home consumption. Furthermore, some countries are engaging in the production of freshwater and marine waters of high value species such as sturgeon and shrimp.

Total aquaculture production from countries that are members of the Near East Region reached a record of 669 000 tonnes in 2003. Main producers are Egypt with 445 000 tonnes, Iran, a distant second with 92 000 tonnes, and Turkey with 80 000 tonnes. All other countries in the Region produced the balance of 52 000 tonnes. Other important and promising producers of aquaculture are Pakistan and Saudi Arabia with about 12 000 tonnes each. It is to be noted that out of the thirty two member countries, seven countries do not practice any form of aquaculture (See Table 1).

The number of species under culture continues to grow, as does the number of countries reporting aquaculture production. Also an increasing number of countries cultured crustaceans and oysters besides the major cultured finfish such as carps (silver, grass, common and bighead).

In the Arab countries Sub-region, aquaculture production account for about 71.2 percent of the Region's production from aquaculture that consists almost entirely on finfish, with common carp, Nile tilapia and silver carp as the main cultured species. Molluscs and

crustaceans make up the small balance. In Egypt, which makes up 93.6 percent of total production in the sub-region, common carp culture is carried out in rice fields. The culture of marine finfish is conducted mostly in intensive culture systems such as near shore cages and to a lesser extent, in coastal raceways and brackish water lagoons. Aquaculture production continues to grow well above global rates and there is good potential for expansion in this Sub-region not only in Egypt but also in most Arab countries where extensive research and development of mariculture is underway (See Table 1.a).

In Sub-region Two, countries in Central Asia, fish from aquaculture did not exceed a total production of 6336 tonnes, representing less than 12 percent of Sub-region's total fish production in 2003. Most of this production is produced by Uzbekistan, about 5 000 tonnes (See Table 1.b).

The future prospects of aquaculture in this Sub-region will depend on the ability of the private sector to adapt to the new conditions introduced by the transition of these countries from centralized to market economies, provided there is sufficient promotional assistance and sufficient priority from the state given to the sector and possibly involvement of foreign investment and expertise.

Iran is a major producer of fish from aquaculture in Sub-region three, countries in Western Asia. In 2003 Iran produced 92 000 tonnes or 88 percent of total production in the Sub-region. Pakistan, a distant second, produced 12 000 tonnes in 2003. Afghanistan does not practice any form of aquaculture (See Table 1.c).

Iran's farmed fish has risen constantly since 1985 and expanded rapidly to the very suitable environmental conditions and climate diversity in the country. Iran has considerable potential in increasing its production from aquaculture. Besides releasing millions of fingerlings every year in its water bodies, it is also increasing its efforts in farming high value species such as sturgeon for its caviar as well as shrimp which is now exported to international markets.

Pakistan has recently begun to increase its attention on developing its aquaculture production. Several hatcheries for finfish have been established. However, to practice farming of marine shrimp species which has started on a pilot scale, Pakistan will require more technical expertise, seeds, and various infrastructure facilities to make it a regular sustainable activity.

In Sub-region Four, Countries of the Northern Mediterranean, Turkey is the dominant aquaculture producer with 80 000 tonnes in 2003, almost 97 percent of all aquaculture production of this Sub-region. Commercial-scale utilization of the country's coastal waters for fish farming began in the late nineties and has grown into an important activity, which is considered by both industry and government to have potential for increasing both domestic fish supply and export earnings (See Table 1.d).

On its prospects for the development of aquaculture for the future, the government is already taking several steps to ensure the effective conservation, management of aquaculture within the general fisheries sector including the establishment of a dedicated directorate, preparation of laws for aquaculture and other administrative and technical improvement

5. FISH SUPPLY AVAILABLE FOR CONSUMPTION

Fish supply available for consumption in the Near East Region originates from three general sources:

- Capture production from marine and freshwater sources;
- Production from aquaculture; and
- Imports (for food use and non-food uses).

Based on the Near East fisheries statistics published by FAO for 2003, the total fish supplies from all sources available for consumption in the Near East Region (live weight equivalent) reached 3.9 million tonnes. It includes 4.0 million tonnes produced from all local sources, added to it about 795 000 tonnes from imports of fish and fishery products less a quantity of 843 000 tonnes of fish and fishery products exported to outside the Region. Some interregional trade is carried out, but the quantities traded within the Region are reflected in the trade figures (See Table 4).

The main countries in the Region with major fish supplies are those countries with high local production and/or sizable imports but before exports. Egypt has the highest quantities of supply with 1.08 million tonnes, followed by Morocco with 740 000 tonnes, Turkey with 597 000 tonnes, Pakistan with 409 000 tonnes and Iran with 432 000 tonnes.

Sub-region wise, total fish supplies available in Sub-region One, Arab countries, in 2003 from local production of 2.55 million tonnes and imports of 615 000 tonnes but excluding exports of 598 000 tonnes reached 2.57 million tonnes. The main countries were Egypt with 1.08 million tonnes, Morocco with 368 000 tonnes, Algeria with 166 000 tonnes, Saudi Arabia with 149 000 tonnes, Yemen with 141 000 tonnes, United Arab Emirates with 118 000 tonnes and Tunisia with 106 000 tonnes. The fish available for consumption in the other countries of this Sub-region ranges from 96 000 tonnes in Oman to less than 200 tonnes in Djibouti (See Table 4.a).

In Sub-region two, countries in Central Asia, in 2003 the total supplies of fish available for consumption by the population estimated at 65 million people, amount to 70 000 tonnes of which 51 000 tonnes of fish from local production supplemented by 58 300 tonnes of imports of fish and fishery products and excludes exports of 39 300 tonnes of fish and fishery products. The total fish supplies made available for consumption in all the six countries range from as low as 1 200 tonnes for Tajikistan to 27 900 tonnes for Kazakhstan (See Table 4.b).

In Sub-region Three, Countries in Western Asia, two countries, Iran with 414 000 tonnes and Pakistan with 289 000 tonnes dominate the fish supplies of the Sub-region with total

fish supplies of 704 000 tonnes. These quantities are made of combined local production of 811 000 tonnes to which imports of 31 500 tonnes are added and exports of 139 000 tonnes are subtracted from the total quantities leaving the balance for consumption by the population of the Sub-region which is estimated in 2003 to be about 239 million people. Afghanistan's supplies are only those quantities of 900 tonnes produced locally with no trade in fish and fishery products (See Table 4.c).

Also in Sub-region Four, Countries in Northern Mediterranean, the total fish supplies in 2003 reached 573 000 tonnes with Turkey being the largest contributor with 532 000 tonnes with Cyprus and Malta contributing the rest. The Sub-region's local production of 549 700 tonnes and its imports of 90 500 tonnes produced total fish supplies of 640 200 tonnes. The exports of 67 600 tonnes leave the Sub-region with 572 600 tonnes left for the population estimated in 2003 at 72 million people to consume.

6. FISH CONSUMPTION AND PREFERENCES

6.1 Fish Consumption Patterns:

Generally speaking, traditional fish consumption patterns prevailing in the Near East Region are strongly influenced, among other forces, by the ecology and the environment. They are, however, by no means static. Indeed, they have undergone significant changes during the last two to three decades under the influence of economic and social factors.

The combination of a growing urbanization, towards large urban centers along the coastal line (which have a strong tradition of fish consumption) except for countries which are land-locked with no access to significant marine or inland water bodies, and soaring red meat prices during recent years, not to mention changing consumer tastes and preferences, have, in general, spurred (domestic) demand for fish, leading to significant increases of *per capita* annual fish consumption in the Region.

Another contributing factor to the general rise in *per capita* fish consumption is improvements in domestic demand, the growing services of domestic marketing in marketing distribution and related facilities. Also the gradual development of more efficient distribution and handling systems has significantly improved the penetration of inland markets. Moreover, the relatively high population growth that characterizes the Region, coupled with increasing income in most countries especially in the oil producing countries, rising urbanization and labour migration are expected to continue increase the demand for food, in general and for fish in particular knowing the increasing awareness of its health and nutritional values in diets.

Generally speaking, fish consumption is largely affected by the conditions and systems of marketing, distribution, and transport and, to a minor extent, by tribal, traditional, and social attitudes where these exist. Fish consumption thus presents a complex pattern, ranging greatly between countries and within different areas in the same country or semi-region.

The average *per capita* fish consumption in the Near East region as a whole reached 5.83 kg in 2003 while the international average as according to FAO statistics reached 16.7 kg. However, it should be pointed out that regional averages conceal wide discrepancies not only on the countries' levels but also on national levels. On the countries' levels of *per capita* fish consumption, the discrepancies are evident as it varies greatly from as low as 0.04 kg in Afghanistan to as high as 57.4 kg in Malta. Only five countries in the Near East Region are equal to or surpass the international average *per capita* fish consumption. Furthermore 14 countries have a *per capita* consumption of less than 5kg/annum. On the national level, several countries have a varied *per capita* since coastal consumption along the coastal population is much higher than in the interior or remote and desert areas of countries such as those which exist in Morocco and Mauritania. This phenomenon also confirms the existence of considerable urban/rural discrepancies (See Table 4).

On the Sub-regional level, the fish consumption situation shows a different picture. In Sub-Region One: Arab Countries where the average *per capita* fish consumption is 8.68 kg with three countries: Oman 36.7 kg; United Arab Emirates, 29.5 kg; Qatar, 21.5 kg have an annual average fish consumption above the international average of 16.7 kg Most other countries in this Sub-region are less than the world average and six countries are even below 5 kg per annum (See Table 4.a).

The fish quantities mentioned as consumption are those quantities which were made available for local consumption, plus imports and minus exports (all live weight equivalent). Quantities of product for non-human consumption (fish meal) reported by FISHSTAT to be produced in those countries are subtracted (in live weight equivalent) from total fisheries production in the region in order to extrapolate the total fish production aimed at human consumption. However, those quantities may be under-representative of the real extent of fish meal production in the Arab Region. This may explain the high quantities in fish supply in some fish meal-producing countries such as the United Arab Emirates. Furthermore, the countries with high *per capita* consumption are those countries with low population such as Oman, and Qatar as well as the United Arab Emirates (See Table 4.a).

In the other Sub-regions, only Sub-region Two: Countries in Northern Mediterranean Sea have an average *per capita* above the international average: Malta with 57.4 kg and Cyprus with 22.5 kg The third country, Turkey with its large quantity of fish supplies for consumption but also with a high population have an average of only 7.5 kg which causes the overall lowering the average for the Sub-region to only 7.96 kg (See Table 4.d.).

Next in importance in fish consumption is Sub-region three: Countries of Western Asia where none of the countries have consumption higher than the international average. Iran has the highest available supplies for consumption but with high population and an average of 6.2 kg/pc. Also Pakistan which has considerable quantities for consumption, but has the highest population in the whole Near East Region as well as substantial exports has an average consumption in 2003 of only 1.9 kg bringing the Sub-region average to only 2.95 kg (See Table 4. c).

The least consumption of fish in the Region as a whole is in Sub-region Three: Countries in Central Asia. The overall average consumption rate is only 1.08 kg *per capita*. The highest rate of fish consumption by the six countries is found in Turkmenistan with only 3.08 kg while all the others have a rate of consumption less than 2.0 kg (See Table 4.b).

To sum up, fish consumption in the Region as a whole has some distinctive characteristics which may be summarized as follows:

1. Fish consumption is highest in coastal countries where fish is comparatively abundant and the population is low;
2. Countries that are land-locked generally have a low consumption rate. This is mainly due to low production levels, high population figures, and shortage of hard currencies to import fish as a supplement to local supplies. Furthermore, in some countries people live in remote areas with poor communications receive only minor quantities of fish, if any; and
3. Fish consumption patterns have changed somewhat in some of the countries having a substantial foreign labour population, notably the oil-producing countries. This is due to the increased importation of non-traditional species to satisfy new consumer demands, the introduction of new fish preparation methods, and also new eating habits, innovations in product-forms, marketing, etc.

For a summary comparison of 2003 fish supplies available for consumption and the rates of *per capita* by Sub-region See Table 4.e.

6.2 Factors Affecting Change in Fish Consumption Patterns

In dealing with the factors affecting change in food consumption, including fish in the Near East Region, it should be pointed out, that there are vast discrepancies in terms of socio-economic, ecological and cultural conditions among different countries in the Region. The Region comprises some of the poorest countries and some of the richest countries, especially the oil producing countries. Based on *per capita* income in 2002, the total average annual income for the Region is US\$6 880. Country wise there are at least 22 countries which have less than this average annual income while there are eight countries that have an average *per capita* income reaching as high as US\$24 000 (See Table 5).

Food consumption patterns in a given country are a function of food prices and consumers income. Food consumption changes as personnel income grows. In fact, there is a positive relation between income and calorie derived from animal protein. Low income groups tend to be conservative in their food choices and resistant to change, while high income groups increase their demand for variety of foods.

The social and cultural factors affect food consumption patterns. The level of education, family size, employment of women, health and nutrition awareness, etc. plays an important role in food consumption. Also the cultural factors including religions, beliefs and taboos, traditions of certain geographic locations, etc. also play a significant role in

food consumption. In many countries in the Region there has been quite a change in life styles, particularly in countries importing labour which helped new food habits to emerge. This pattern is most significant in the Arab oil producing countries that recruit large numbers of foreign workers.

Furthermore, the food (fish) industries and advertisements play a vital role in changing the consumption patterns in several countries in the Near East Region. This is exemplified in the wide variety of fresh, chilled, canned and frozen fish and fishery products from local production and from imports coming from many parts of the world and displayed in the local and international chains of super markets which are fast spreading across the Region. The phenomenon of fast foods chains is also a contributing factor to the changing patters of food consumption.

6.3 Fish Consumption Preferences

The preference throughout the Near East Region is generally for fresh fish. However, in recent years, whole individually chilled and frozen fish have become widely accepted in most countries. Labelling of the whole frozen fish includes information on recommended dates for consumption. Cured fish (mostly dried) is also popular, but mainly in remote areas.

Consumers in the region traditionally eat fish species caught in the waters bordering their countries or from inland waters. However, due to the limited fishing methods employed, only a small variety of fish types are familiar, such as the large-size demersal species of which red snappers, grouper and silver pomfret are the most abundant. Pelagic species such as tuna, sardines, and mackerels are also widely accepted. Of the freshwater fish, the Nile perch, carp and tilapia are in demand, while river shad is popular in Iraq, rainbow trout is popular in Lebanon and Iran.

The list of preferred locally produced seafood species includes shrimps, lobster and cuttlefish, caught mostly in the waters surrounding the Arabian Peninsula, the Arabian Sea as well as Algeria, Morocco, and Mauritania. However, as local market demand in the region is limited to high income groups and tourist outlets, such species are largely exported due to their high international market prices.

In most countries, possibly with the exception of the countries in Central Asia, fish is a popular food item and provides an important part of the total animal protein intake. Fish is often consumed in small amounts with daily meals. Fish consumption may be more important than it really is but it is believed that the average *per capita* may decline due mainly to the rapid population growth and rising prices. Also, a drop in imports is usually aggravated by the weaker purchasing power of some countries and the decreasing share of domestic production retained for local markets as artisanal fisheries increasingly turn to the more lucrative export markets.

Fish consumption varies widely among countries. It averages from less than 1 kg per person per year in Afghanistan to about 50 kg per person per year in Malta. The general average however, is 5.83 kg annually. Fish is usually consumed fresh, particularly

demersal fish, cephalopods and shellfish. Small Mediterranean pelagics such as sardines and anchovies are used in fresh, canned or salted form, and tuna is mainly canned. In Yemen and Oman, small pelagic fish are also dried on the beach to be used as animal feed and in Morocco, United Arab Emirates and Iran in addition to canning; they are utilized for producing fishmeal and oil.

7. TRADE TRENDS IN FISH AND FISHERY PRODUCTS

7.1 International Trends

Internationally, fisheries and aquaculture products are highly traded goods. The value of international fish trade continues to increase. In 2003, the value of international fish exports reached US\$63 billion, up 9 percent relative to 2002. In recent years developed countries accounted for about 50 percent of total fish imports in value terms. Japan continued as the world's largest importer of fishery product. The United States is the world's second biggest importer and the European Union further increased its dependence on imports for its fish supply. The imports of these three markets continue to increase.

For many developing nations, fish trade represents a significant source of foreign currency earnings. The increase in net receipts of foreign exchange in developing countries - deducting their imports from the total value of their exports - is impressive, with a further increase in the coming years is very likely.

On balance, the developing countries export more to the developed countries than they receive in imports and this trend is likely to continue. Developed countries will continue to be net importers of aquatic products in the near future unless they increase their aquaculture production dramatically, or unless the overall production in developing countries decline sharply. The supply-demand gap is predicted to increase in the near future and this will keep pressure on trade and prices.

Trade and high economic value of some species will place additional pressures on developing countries to exploit their stocks and intensify their aquaculture. The pressures of trade on sustainable fisheries production in the developing world have not yet been fully recognized.

7.2 Trade Trends in Near East Region

7.2.1 Fish Exports

Although the collection and dissemination of fishery statistics has generally improved over the last few years in several countries of the Near East Region, information on fish trade within each country as well as between countries within the Region is still not sufficient to provide a complete picture. For example it is not well known how much of the total fish production is marketed. Subsistence fishing level is practiced to a considerable extent in the region, especially in the fishing areas bordering remote water bodies and along the shores of inland lakes and rivers. Therefore, it is assumed that a considerable portion of total production is consumed by the fishers and their families and

is unreported. Furthermore, data on destinations and or sources of exports and imports as well as re-exported quantities are not adequately reported by a number of countries.

Catches from capture fisheries constitute about 85 percent of catches in 2003. Quantities not consumed locally are mostly exported, especially the high value species, processed and value added products. These exports are not to be interpreted as genuine surplus as there is probably a strong potential demand for fish in the exporting country, but the allure of hard currency earnings and foreign demand are strong incentives to export.

In 2003 total exports of fish and fishery products from the Near East Region amounted to 718 000 tonnes, equivalent to 844 000 tonnes live weight for human consumption, which represented 21.3 percent of regional production of fish and seafood for human consumption. Export is valued at US\$1 888 million. The major exporter by far is Morocco, especially canned products, with 328 000 tonnes valued at US\$989 million followed by Pakistan with 96 000 tonnes valued at US\$137 million and by Oman exporting 52 000 tonnes valued at US\$80 million.

Most countries in the Region are engaged in exporting fish and fishery products except for three countries. The value of exports varies widely between the values of exports from one exporting country to another. This variation depends on species exported, as well as to the level of value-addition and their destination. In the case of the main exporters noted above, while the quantities exported from Pakistan are almost double those exported by Turkey, the average value per tonne of the Turkish exports is higher. It is US\$3 100 per tonne for Turkey and only US\$1 400 per tonne for that from Pakistan (See Table 6).

The same characteristics regarding the exportation of fish by countries in the Region as a whole may also be said on the Sub-regions. In Sub-region One: Arab countries, the total exports of fish and fishery products reached 523 000 tonnes, equivalent to 598 000 tonnes live weight, e.g. about 23.5 percent of regional fisheries production for human consumption in 2003. The major exporters are Morocco (for its canned and cephalopod production) and Oman. However, there are other important fish exporters from the Sub-region, such as Mauritania with 43 000 tonnes, Yemen with 27 000 tonnes and United Arab Emirates with 25 000 tonnes (See Table 6.a).

In Sub-region Two: Countries in Central Asia, the total exports are limited to only 32 000 tonnes, valued at US\$26 million and equivalent to about 39 000 tonnes live weight, e.g. 77.1 percent of fisheries production for human consumption in Central Asia.. These exports are mainly attributed to Kazakhstan which is apparently engaged in re-exporting some of its fish imports which may also explain the very low *per capita* consumption rate (See Table 4.b and Table 6.b).

In Sub-region Three: Countries in Western Asia, total exports are 113 000 tonnes valued at US\$218 million and corresponding to 139 000 tonnes (live weight equivalent) or 17.1 percent of fisheries production for human consumption. Pakistan is the main exporter with 96 000 tonnes valued at US\$137 million. Iran also exported 18 000 tonnes

valued at US\$81 million. It is to be noted here again that although Pakistan exported larger quantities, exports from Iran, which are supposed to include caviar and shrimp, fetched higher average value per tonne (See Table 6. c).

Sub-region Four: Countries in Northern Mediterranean exported 50 000 tonnes, valued at US\$172 million and equivalent to circa 68 000 tonnes live weight, e.g. or 12.3 percent of its total fisheries production for human consumption. Most of the exports are those from Turkey which exported 47 000 tonnes valued at US\$149 million. The other two countries in the Sub-region are Malta and Cyprus. Exports from Malta were 1 824 tonnes valued at US\$19 million and exports from Cyprus were 609 tonnes valued at US\$5 million. However, it is believed that all three countries exported to European markets, but the average value per tonne of their products varied considerably: US\$10 300 for exports from Malta, US\$7 800 for Cyprus and only US\$3 100 for exports from Turkey. This again reflects that the variation lies in the species, quality, value-added, marketing and promotional experience and destination (See Table 6.d).

7.2.2 Fish Imports

Except for Afghanistan, all countries in the Near East Region are engaged in importing fish and fishery products to supplement local supplies. In 2003 the total quantities imported into the Region amounted to 776 000 tonnes, valued at US\$923 million, equivalent to 795 000 tonnes (live weight equivalent for human consumption), e.g. 16.7 percent of the Region's fish supply for consumption before exports (catches and imports). The major importers are Egypt with 178 000 tonnes valued at US\$110 million, followed by Saudi Arabia with 100 000 tonnes valued at US\$136 million, Iran with 91 000 tonnes valued at US\$69 million, Turkey with 70 000 tonnes valued at US\$46 million and United Arab Emirates imported 44 000 tonnes valued at US\$105 million (See Table 6).

In Sub-region One: Arab countries, imports reached 529 000 tonnes, valued at US\$726 million and equivalent to 615 000 tonnes (live weight equivalent for human consumption) or 19.4 percent of the Sub-region's total fish supply for consumption before exports. All Arab countries are importers of fish and fishery products. However the two major importers are Egypt with 178 000 tonnes valued at US\$110 million and Saudi Arabia imported 100 000 tonnes valued at 136 million. It to be noted here that the price per tonne of imports are higher for Saudi Arabia (US\$1 400) than that of Egypt (US\$620) since the latter imports lower value fish to be sold to consumers with lower purchasing power. Imports to Saudi Arabia are aimed at satisfying the demand of foreign communities and higher income groups for high value species and seafood delicacies and specialties. Other important importers are the United Arab Emirates with 44 000 tonnes valued at US\$105 million, Tunisia with 28 000 tonnes valued at US\$36 million, Morocco with 22 000 tonnes valued at US\$21 million and Algeria with 22 000 tonnes valued at US\$17 million. It is to be noted that the values for imported quantities vary greatly between one country and another (See Table 6.a).

In Sub-region Two, Countries in Central Asia, the whole Sub-region imported 46 000 tonnes valued at US\$21 million, equivalent to 58 000 tonnes live weight for

human consumption, e.g. 53.4 percent of its total fish supply for consumption before exports. Most of these quantities are those imported by Kazakhstan, the main fish producer and trader in the Sub-region (See Table 6.b).

Countries in Western Asia: Sub-region Three imported a total of 91 000 tonnes valued at US\$69 million and equivalent to 31 000 tonnes live weight for human consumption⁴, e.g. 3.7 percent of its total fish supply for consumption before exports. Iran is by far the main importer with 91 000 tonnes (of which more than 60 000 tonnes of oily fish meal, which has been excluded from the calculation of fish consumption patterns in the region) valued at US\$69 million. Pakistan is a major fish producer in this Sub-region but its imports are very meagre, only 535 tonnes valued at US\$400 000 (See Table 6.c).

Sub-region Four: Countries in Northern Mediterranean, the total imports amounted to 107 000 tonnes, valued at US\$106 million and equivalent to 90 000 tonnes live weight for human consumption, e.g. 14.1 percent of total fish supply for consumption before exports. All three countries in the Sub-region import fish and fishery products. Turkey is the largest importer with 70 000 tonnes valued at US\$46 million, Malta with 20 000 tonnes valued at US\$23 million and Cyprus with 18 000 tonnes valued at US\$37 million (See Table 6.d).

7.2.3 Balance of trade

In the above analysis of the fish trading situation in the Near East Region, it would appear that the Near East Region has an unfavourable balance of trade in quantity terms but a favourable one in value terms. The excess of quantities imported over exports is 56 000 tonnes while the excess in value is US\$966 million, slightly over double the amount of imports, which in reality gives the Near East a favourable trade balance in fish and fishery products. This favourable balance in trade is mainly attributed to the exports from Morocco. Other important exporters are Turkey, Pakistan, Tunisia and Mauritania (See Table 6).

On the Sub-region level, the Arab countries' quantities of exports and imports are almost equal in volume, i.e. 523 000 tonnes and 529 000 tonnes respectively while the value of exports of US\$1 472 million is almost double the value of imports at US\$726 million. This situation may show that the Arab countries are net exporters of fish and fishery products. However, when the exports of Morocco are excluded, the Arab countries are in fact net importers (See Table 6.a).

In Sub Region Two: Countries in Central Asia, the Sub-region is not a significant fish trading partner due to the small quantities traded and low consumption levels. It is a net importer quantity wise but is a net exporter in value terms. The role of Kazakhstan in fish trading in this Sub-region makes the difference (See Table 6.b).

⁴ Nearly 60 000 tonnes of fish meal are imported every year by Iran. These quantities have been excluded from the calculation of live weight imp for human consumption orts of fish for human consumption, hence the discrepancy between net weight and live weight data.

In Sub-Region Three: Countries in Western Asia, the trade balance in quantities and values are in favour of the Sub-region. It exported 113 000 tonnes valued at US\$218 million and imported 91 000 tonnes valued at US\$69 million. Pakistan is the major exporter while Iran is the major importer of fish and fishery products (See Table 6.c).

In Sub-region Four: Countries in the Northern Mediterranean, the Sub-region is a net importer in quantities and values. It imported 107 000 tonnes valued at US\$106 million and exported 50 000 tonnes valued at US\$172 million. Turkey is the major importer and exporter in this Sub-region (See Table 6.d). (The overall fish trading situation in the Near East Region by Sub-region is summarized in Table 6.e and Figure 3).

7.3 Trade Characteristics in Near East Region

The main characteristics of imports in the Near East Region is that the type of imported products and their values are very much, in most cases, a reflection of the importing country's *per capita* income which consequently reflects the Gross National Product (GNP) and indicates the ability for the country to provide hard currencies dedicated to importing fish and fishery products. The Arab oil producing countries and a few others are countries with high average *per capita* income and therefore import fish and fishery products of high value as well as specialty products and delicacies such as the United Arab Emirates, Qatar, Cyprus, Malta, and Saudi Arabia. All these countries have moderate or important fish production but have very low population (See Table 5 and Table 6).

On the other hand, there are fish importing countries, especially with high population, which are at the lower end of the average *per capita* income but needs to import fish and fishery products as a means of providing their people with food to supplement local supplies and to enhance food security measures. Some of these imports are subsidized by the government as part of national policy. Some of these countries are themselves good producers of fish but lack sufficient low value products at locally affordable prices. These countries tend to export their high value species to international markets in pursuit of hard currencies that are used to pay for low value fish products. Egypt, Turkey, Iran and others follow such a practice. Furthermore, some countries tend to import quantities of high value fresh, chilled or frozen raw material fish species for processing and value-adding for re-exportation. Some of such products are sold locally for those who can afford them but the bulk is for re-export. This is practiced in countries like Egypt, United Arab Emirates and Oman.

Trade trends in fish and fishery products in the Near East region vary considerably from one sub-region to the other. In some countries there is a high consumption of fish along with the coastal areas and large urban centres which surpasses the average *per capita* for the whole country. Large quantities of fresh fish are landed in the local markets, while more frozen fish is being marketed. In recent years more fish utilization is also characterized by greater production of a wide range of value-added products or preparations, for both national and international markets.

Post-harvest losses of fish have been substantially reduced in recent years as a result of improved infrastructure for landing, storage, transport and marketing. However, considerable seasonal losses in value still occur in some fisheries. Losses from oversupply are increasingly being channelled into feed for aquaculture.

Several countries struggle with a variety of constraints in their inter-regional trade. These constraints include high transport and storage costs, poor handling practices, limited distribution networks and a lack of harmonization and proper enforcement of fish trade regulations. Tariff barriers and other trade restrictions persist among countries belonging to custom unions.

In general, the Region does not contribute substantially to international fish trade, although Morocco is a major exporter of fish and is expected to increase its exports as the European demand for high value fish increases and the Moroccan national fleet expands. Its sardine processing sector, which contributes substantially to the Moroccan economy, has incorporated the latest technology to allow competitive production at world prices. Other countries, Tunisia, and Mauritania, export mostly high value fish, with some cephalopods and crustaceans, to European markets and Japan. A number of countries have a modest expanding trade in fresh and frozen fish to Europe and inter-regional trade to Saudi Arabia, Bahrain, Qatar, and United Arab Emirates.

Economic growth and policies of open trade have meant that the fish trade has expanded significantly over the last decade. Some countries, particularly the new members of the World Trade Organization (WTO), are reported to be currently lowering their tariffs following the outcome of the General Agreement on Tariffs and Trade (GATT) Uruguay Round and other subsequent trade negotiations in Doha, Geneva, and the December 2005 meeting in Hong Kong.

Notwithstanding the overall favourable trade balance in value terms which seems to be due to the exports of canned products from Morocco and high valued species from a very small number of the member states, it is very important to point out that trade in fish and fishery products in the majority of the member states faces a number of constraints of a varied nature including:

- Shortage of reliable information on products and prices;
- Lack of information on potential trade partners;
- Shortage of information on supply and demand situations;
- Tariff barriers;
- Insufficient knowledge of the various resources available;
- Limited capabilities on resource management and conservation;
- Inadequate infrastructure including fishing harbours, cold storage, wholesale markets, ice plants, processing facilities, etc.

8. PROJECTIONS ON DEMAND AND PROSPECTS FOR SUPPLY TO 2015

8.1 Projected Demand to 2015

The outlook for global demand for food fish is largely determined by population growth, availability of supplies, changes in *per capita* income and the pace of urbanization as well as changing patterns of consumption of fish in the diet and form of utilization. The interplay of these factors will to a large degree determine the future for fish and fishery products up to 2015 and beyond. Other factors may also influence demand for fish including the general preference for red and white meat, the lack of good access roads for marketing and distribution to remote areas, preference for exporting the higher value species and value-added products and local tourist marketing outlets.

However, the fact remains that population growth is a dominant factor upon which projections for estimating the demand for fish by 2015 in the Near East Region.

Based on the published information on World Population Prospects by the United Nations Secretariat, the estimated population for the thirty two countries of the Region in 2015 is expected to increase to a total of 858 million from 671 million reached in 2003, a projected increase by 28 percent (See Table 5).

Consequently, assuming that the current annual average rate of fish consumption in 2003 is 5.83 kg remains constant, the projected demand for the Region as a whole would be in the range of 4.9 million tonnes. Main countries in the Region which are expected to be with the highest demand are those countries with projected high population growth and/or high *per capita* consumption such as Egypt, Turkey, Iran, Morocco and Pakistan (See Table 7).

Using the same formula for calculating the projected demand for the Sub-regions would give a varied set of results. In Sub-region One: Arab countries, the population will grow from 296 million people in 2003 to 385 in 2015. By using the 2003 *per capita* fish consumption of 8.68 kg, the projected demand for fish is therefore 3.3 million tonnes by the year 2015 (See Table 7.a).

Likewise for Sub-region Two: Countries in Central Asia, the population is expected to grow from 65 million in 2003 to 74 million in 2015. This Sub-region has a very low annual per capita consumption of 1.0 kg Therefore its demand for fish in 2015 is expected to be only 76 000 tonnes (See Table 7.b).

Sub-region Three: countries in Western Asia, the population is expected to grow from 239 million people in 2003 to 315 million people in 2015. This Sub-region also has a comparatively low average rate of fish consumption of 2.95 kg. Therefore, its demand for fish up to year 2015 is expected to be 876 000 tonnes (See Table 7.c).

Sub-region Four: Countries in Northern Mediterranean, the 2003 population is 72 million expected to grow by the year 2015 to 84 million people. Therefore with a *per capita* consumption of 7.96 kg, the demand for fish is expected to be 664 000 tonnes

(See Table 7.d). A comparative summary of the Sub-regions for the projected population, fish demand and supply gap is available in Table 7.e.

The projected demand will possibly increase as an influence of the currently high growth rate of the population in most countries. Growth is also expected to increase in *per capita* income, tourism development, advances in marketing and distribution channels and the lure for increasing exports to more lucrative foreign markets especially for high value species and products. Demand is also expected to increase not only for human consumption, but also for non-human uses such as fish meal to be used as feed for the poultry industry and aquaculture, which is expected to increase, and also as fertilizer.

8.2 Prospects for Increasing Supply by 2015

The FAO fisheries statistics for the years 2000 to 2003 indicate that fish production from capture marine and inland waters within this four year period fluctuated at a decreasing rate. This would indicate that the capture fisheries in the Near East Region as a whole are nearing their maximum sustainable exploitation levels. Their growth up to 2015 is expected to take the same pattern unless major fisheries resources emerge. It is believed that conventional fisheries, not only in global fishing areas, but also in areas bordering the Region are probably near the ceiling of their potential. However, higher levels of production could probably be obtained by targeting small pelagic species and mesopelagic resources believed to be in the Arabian Sea and adjacent waters.

Capture fisheries in marine waters are not expected to increase in the future except for countries that are able to extend their fishing operations within their EEZ. In order to increase future supply, countries may engage in distant water fishing through their own capabilities or foreign assistance. These distant waters in the Eastern Central Atlantic and the Indian Oceans are accessible to countries in the Region that are bordering them such as Mauritania, Morocco, Yemen, Somalia, Oman, Iran and Pakistan.

For example, Morocco in July 2005 made such a move by reaching after almost a five year break, an agreement with the EU by initiating a Fisheries Partnership Agreement allowing as of March 2006 for a four year period a fleet of 119 vessels, mostly Spanish and Portuguese, to fish mostly pelagic species in the Moroccan Eastern Central Atlantic Ocean fishing grounds. In return Morocco will receive financial contributions from the EU as well as technical assistance and investments in the fisheries sector. Mauritania already has an ongoing agreement with the EU.

In inland capture fisheries, fish stocks are also under threat of declining, mostly due to over fishing, unmonitored stocks and exploitation, environmental degradation and poor statistical gathering to monitor status of stocks. Many of these fisheries are in remote areas, cross international borders and are subject to many internal disputes and various authorities.

Therefore, with the uncertain potential of increasing fish supply from marine and inland capture fisheries, the future supply of fish in the Near East Region most likely will lie on aquaculture and/or importation.

Aquaculture is becoming established outside the traditional confines of many countries with growth in some countries faster than in others. It has become popular because it provides a source of income rather than simple subsistence and can be incorporated into local agriculture systems to diversify the production base. There is considerable potential for further expansion under favourable conditions.

Aquaculture in industrialized economies has normally targeted high-priced species but, although this trend continues, the cost reductions achieved now make feasible the industrial or technically sophisticated culture of large volumes of comparatively low-value species as a substitute for “white fish”. In the low-income countries outside Asia, the growth of commercial aquaculture will be stimulated by easier access to wealthy consumers in high-income countries and by the adoption of macro-economic policies aimed at providing a conducive environment to small-scale entrepreneurs.

The two main constraints on aquaculture are environmental degradation and the availability of land and water. The first constraint sometimes results from the mismanagement of aquaculture facilities and secondly from competition with other land and water uses, particularly in agriculture, and from urban encroachment into coastal zones. These factors will limit growth. However, it is still not clear that growth in aquaculture production can compensate for the possible stagnation in aggregate food fish production from capture fisheries.

In order to improve the situation of fisheries in the majority of the member states of the Region and in order to achieve the socio-economic, environmental and nutritional importance of fisheries, and the growing demand for fish products, certain actions are required to be carried out by the states concerned. Among these actions:

- Reduce over fishing by taking drastic measures;
- Rebuild and enhance fish stocks through better management and resource conservation;
- Minimize wasteful fisheries practices, discards and post-harvest losses,
- Develop sustainable aquaculture; and
- Develop fisheries for new and alternate species based on principles of scientific sustainability and responsible management.

7.3 Implications on Production, Trade, and Consumption

World demand for fish and fish products is expected to increase owing to population growth in developing countries. The major importers of fish products, beside developing countries who import to supplement local production and satisfy demand, are developed countries in the European Union (EU), Japan and the United States. Main traded species are shrimp, groundfish, and tuna as well as value-added products.

International interest in the trade of fish and fishery products will be stimulated by the various agreements concluded at the establishment of the WTO. The expanded membership of this Organization and the ongoing rounds of discussions are aimed at

further liberalization of trade which is expected to facilitate the flow of fish and fish products to markets with strong purchasing power. Any official links between environmental protection, particularly resource conservation, and international trade will affect future trade volume and destination.

Based on empirical data, it is expected that the average world *per caput* fish consumption by about the year 2015 will most likely not exceed 20 kg per annum. However, the real price of fish will have increased somewhat and regional consumption and production patterns will have been shifted. Total production for human consumption should have increased from about 100 million tonnes to 110 million tonnes.

Consumption is likely to remain at around current level, but at somewhat higher real prices in traditional industrial economics. By the year 2015 *per capita* consumption may have grown in Arab countries, countries in Western Asia and Mediterranean countries but decline even further in countries in Central Asia. The shift in production patterns will come from the increased share of food fish supplies from aquaculture. Substantial progress will have been made on matching fishing capacity to available stocks and discarding will have been substantially reduced, although catches will not yet have markedly increased as a result.

In countries in Central Asia, *per capita* consumption will probably continue to decline due to low imports and inability of local production to keep up with population growth. The low fish consumption in western Asia will most likely continue and may increase somewhat. In the Arab countries, *per capita* consumption will increase slightly but remain near its current rate of 9 kg. Oil-based economies will continue to import fish as also countries with high population like Egypt. Most local production, except for major exporting countries like Morocco, Pakistan, Iran, and Oman, will be domestically consumed.

9. FISH DEMAND - SUPPLY GAP IN 2015

9.1 The Fish Supply Gap by 2015

Based on a computer calculated exercise, Tables 7, 8 and 9 are reached in order to project an estimated fish supply gap in the Near East Region by the year 2015. The resulting gap is calculated to be around 735 000 tonnes. This projected supply gap seems to be rather attainable. This gap is reached by using the average of the historical data for a four years fish production for consumption period (2000 – 2003). This average is applied to a projected growth to the year 2015. The result of this calculation puts the projected production for consumption of the Region as a whole at 4.2 million tonnes by the target year.

Consequently, the calculation of demand for fish and fishery products is based on the expected total population of the Near East Region by 2015 which is given to be 858 million people. Assuming that the *per capita* consumption of the Region of 5.83 kg remains constant, the projected demand will therefore be around 4.9 million tonnes by the year 2015.

Finally, on the basis of the above two basic calculations which takes the average fish production growth and population growth, the projected fish supply gap is therefore around 735 000 tonnes or about 15 percent of demand for fish by 2015 (See Tables 7,8, 9 and Figure 4).

9.2 Can Aquaculture Narrow the Fish Supply Gap?

With the fast growing population and almost stagnant capture fisheries, the question is often asked whether aquaculture can narrow the fish supply gap to provide food for the masses in the coming years.

To answer this question several issues have to be considered including populations growth trends, prospects to increase production from capture fisheries, availability of more natural resources for aquaculture, other development trends, purchasing power of populations, governments' policies and legislation, technological advances, genetic improvements in species, environmental aspects, etc.

While some countries in the Near East region are better prepared than others to answer the question, most countries however, are faced with several limitations to have a proper analysis to answer the question. These limitations are centred on the following:

- Statistical time series for population growth and capture fisheries and aquaculture production;
- Shortage of usable information on alternative uses of resources for aquaculture production, including some economic evaluation;
- Lack or shortage of reliable models to forecast medium and long term scenarios, in particular for macro-economic development; and
- Limited information on marketing capacity in major producing countries, as large part of aquaculture is marketed domestically.

These limitations may not be equally valid to all countries of the Region but their effects are certainly global. They provide challenges and obstacles in reaching the proper conclusions for the Region as a whole. Therefore, the conclusion to be reached here is that some individual countries may provide answers by overcoming one or more of these limitations on national basis and then generalize the answers to the Region.

In addition to the above limitations, there are various obstacles associated with the development of aquaculture in many countries in of the Region with varying degrees that needs to be overcome. These may be summarized as follows:

- **Natural obstacles**: Shortage of fresh water resources, loss of ground water, contaminated water, shortage of suitable coastal waters and effects of increasing tourism;
- **Technical obstacles**: Shortage of experience in fish culture and poor management practices, poor planning, lack of local consulting firms, lack of scientific references and literature on the subject;

- **Economic obstacles:** High cost of fish farming projects, high initial cost and operational costs, lack of local feed manufacturers and provision of seeds;
- **Administrative obstacles:** Shortage of experts and well trained manpower, few local hatcheries for fry and lack of specialists in fish disease; and
- **Legal obstacles:** experience in establishing fish farms is faced with too many bureaucratic demands, lack of aquaculture legislation to regulate the activities, etc.

10. ISSUES OF RESOURCES MANAGEMENT AND INITIATIVES REQUIRED

10.1 The Issues:

i. Over-fishing and fishing capacity: Over-fishing is not a recent issue. However, it has become serious and affects capture fisheries in developing and developed countries. Unless effective action is taken, over-fishing will get worse. Population pressure and the shortage of alternative employment opportunities, together with the lack of effective conservation and management policies, will increase the attraction of fisheries as a last resort to employment.

ii. By-catch and discards: Most fishers at most times catch more types of fish, and sometimes fish of small size, than they aim to. This is by-catch. Some of it is useful and is kept; the rest is discarded as dead fish and thrown over-board. The need to minimize discards in industrial fisheries has become a major issue. FAO estimated it to be about 27 million tonnes per year. By-catch and its subsequent discarding is usually a consequence of the very nature of fishing. It may not be completely eliminated but may be reduced.

iii. Environmental degradation of coastal zones and catchments areas: Coastal fish habitats are rapidly being degraded in many parts of the world by industrial, urban and agriculture pollution, landfill, the damming and diversion of rivers, the clearance of mangrove, sedimentation, mining and oil exploration and extraction, marine based pollution, etc. While the fisheries sector suffers harm globally, it is also itself, responsible for environmental damage.

iv. Uncertainty and risk: A number of major problems confronting policy makers and fisheries managers have emerged in recent years as the complexity of management has become increasingly understood. These problems include: the lack or inadequacy of, information relating to key biological parameters and the extent to which natural fluctuations and human impacts are responsible for observed changes in a resource base.

v. Illegal, Unreported and Unregulated Fishing (IUU): FAO has adopted a set of Guidelines which contain measures that provide advice to fishing countries the objectives of which are to prevent, deter and eliminate Illegal, Unreported and Unregulated (IUU) fishing in their waters. Furthermore, the Guidelines advice countries on how to prepare a National Plan of Action (NPOA) on IUU that contain comprehensive, transparent and effective measures by which to act. IUU calls for conservation of resources, management of capacity, by-catch reduction, scientific research and good data collection and dissemination. Almost all Near East fishing countries, such as Mauritania and Somalia, are in need to implement such plans since several of them suffer from foreign fleets poaching their fishing grounds. One report indicate that every year at least US\$4 billion worth of fish is caught illegally.

10.2 Initiatives Required:

In the first half of the nineties, the international community addressed several of the management issues connected with sustainable fisheries; how to reduce over-fishing and control fishing capacity; how to reduce by-catch and discarding; how to reduce environmental degradation of catchments and coastal areas; and how to deal with uncertainty and risk.

On the international level, several initiatives were taken during the nineties. These international agreements and accords are related to the intentions of the international community to achieve sustainable fisheries. These agreements represent milestones in international efforts over many years and include the United Nations Convention of the Law of the Sea in 1982 (which entered into force in November 1994); the preparatory work, mainly undertaken in 1990-92, which resulted in Chapter 17 of Agenda 21 of the United Nations Programme of Action which included seven programme areas relating to coastal areas and the oceans; the 1992 International Conference on Responsible Fishing, held in Cancun, Mexico; and the 1993 Agreement to Promote compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas.

In addition to the international agreements reached, initiatives are also required by governments in order to make management more efficient by creating fishing rights or adopting new approaches to management. Some states have already adopted policies prohibiting or limiting the discarding of part of the catch at sea. Others, who have not so far done so, are urged to establish frameworks to deal with the issue.

There have been several initiatives by governments in recent years to institute some form of coastal management. However, most initiatives especially in the developing countries coastal management activities are relatively few and most initiatives focus on either one or two issues. In the case of uncertainty and risk, few developed countries have adopted the precautionary approach through the setting up of research and monitoring programmes related to the marine environment and other special research activities. The developing countries are not as active in this area as they should be although some have established national science policies oriented towards the marine environment and are actively involved in coastal zone research, observation and assessments.

Besides initiatives on the international and governmental levels, initiatives are also required on the part of non-governmental organizations (NGOs) the resource users and the industry who are the direct beneficiaries of better management of the resources. These initiatives can be in the spreading of awareness in the various fishing communities to influence public opinion in adopting management and conservation measures and with the industry to adhere to a number of principles embodying the proper conservation and management of fish resources.

11. INTERNATIONAL INSTRUMENTS TO ENHANCE FISH TRADE

11.1 FAO Instruments

i. COFI Sub-Committee on Fish Trade: Established by the Committee on Fisheries (COFI) at its Sixteenth Session (1985). It provides a forum for consultants on technical economic aspects of international trade in fish and fishery products including pertinent aspects of production and consumption. In particular it reviews the situation of principal fishery commodity markets; discusses specific trade problems and possible solutions and also suitable measures to provide international trade and formulations of recommendations; promotion of international quality standards, quality control and inspection procedures and regulations and also consultations on viable fishery commodity development including processing methods, the upgrading of products and production of final products in developing countries. Its membership is open to all FAO member nations

ii. FAO Fish Marketing Information Network: The “FISH INFOnetwork” encompasses the GLOBEFISH Databank which was established in 1984 at FAO Headquarters in Rome, Italy, in order to meet the increasing demand for detailed information on international trade with fish and fishery products. GLOBEFISH holds one of the few global databases specialized on fisheries marketing information. It is the purpose of GLOBEFISH Databank to provide precise and updated information on the fishery sector with special emphasis on the international trade with fish and fishery products. The Databank contains information which is considered useful to analyse the market situation of selected commodity groups. Data are divided in news items and statistics including news, exports, imports and prices.

The network also includes six regional Fish Marketing Information Services. These are INFOFISH, for the Asia/Pacific region; INFOPECSA, for Latin America/Caribbean region; INFOPECHE, for the whole African region and INFOSA, the INFOPECHE Unit for the Southern African Region; INFOSAMAK, for the Arab countries, INFOYU, for China and EUROFISH, for the Eastern European region. They have been instrumental in enhancing fish trade in their regions. They played a catalytic role in promoting inter-regional as well as intra-regional trade, by initiating international buyer-seller meets, fisheries exhibitions, conferences, etc. Also they have provided advisory services on a wide range of issues relevant to the fisheries sectors each in its own region, e.g. fish handling, processing, marketing, packaging, labelling, quality control, training, investment identification, feasibility studies, etc.

Member countries of the FAO Near East Region can benefit substantially from these Services by promoting and enhancing their inter-regional and intra-regional fish trade through them, especially that the countries have the unique advantage of having four out of the six Services operating in their proximity. These are: INFOSAMAK, INFOFISH, INFOPECHE, and EUROFISH, as well as having ready access to the services of

GLOBEFISH. The role of these Services has proven to be an important medium for boosting fish trade in their member countries. In summary these Services can:

- Enable the Near East member countries to develop in accordance with current and future market demand and to take full advantage of potential offered by their fishery resources;
- Contribute to more balanced supplies of fishery products;
- Make the best use of export opportunities within and outside the countries of the Region; and
- Promote economic and technical cooperation among its members in the fisheries sector

iii. Code of Conduct for Responsible Fisheries: The Code which was requested by COFI in 1991 was adopted at the 28th Session of the FAO Conference in October 1995. Among its 12 Articles all of which advocate responsible fisheries on global basis, Article 11 deals with “Post-Harvest Practices and Trade”. It sets out the rules for responsible fish utilization, international trade and laws and regulations relating to fish trade.

iv. Ecolabelling Guidelines: FAO during its 26 Session of COFI in March 2005 adopted a set of voluntary guidelines for the Ecolabelling of fish products in an effort to insure sustainable and environmentally-friendly production of the world’s marine fisheries. The guidelines outline the need for reliable, independent auditing, transparency of standard-setting and accountability, and the need for standards based on good science. They also lay down minimum requirements and criteria for assessing whether a fishery should be certified and an ecolabel awarded, drawing on FAO’s Code of Conduct for Responsible Fisheries to do so. Guidelines for ecolabelling inland fisheries are also proposed.

v. FAO Regional Bodies and Projects: In addition to the above international instruments, FAO initially established various Regional Bodies to deal with fisheries matters in the sub-regions where these were established. Several member countries of the Near East Region are members of at least one of these FAO initiated bodies. Their activities included research, management, exploitation, training, and other activities from which the member countries may benefit. Some examples of these are the Regional Commission for Fisheries (RECOFI), for countries bordering the Gulfs; General Fisheries Commission for the Mediterranean (GFCM), for countries bordering the Mediterranean; and Information System for the Promotion of Aquaculture in the Mediterranean (SIPAM), dealt with the development of aquaculture in the Mediterranean area. A non FAO body is also dealing with issues related to fisheries in one of the Sub-regions; it is the Regional organization for the Conservation of the Environment of the Red Sea and the Gulf of Aden (PERSGA). All above bodies are dedicated to help countries develop their fisheries sector.

11.2 WTO Agreements of Relevance to Fisheries

While FAO is the major international authority on all aspect of fisheries and is considered the “Centre of Excellence” in this field, WTO is the international body which deals with the rules of trade on global basis.

The WTO, since its establishment in 1995 as a global organization to facilitate trade and liberalize its activities, has adopted several agreements to safeguard the trading environment and play a major role in the globalization of trade. Some of these agreements have relevance to fish trading. These are:

- Agreement on Sanitary and Phytosanitary Measures (SPS);
- Agreement on Technical Barriers to Trade (TBT);
- Agreement on Subsidies and Countervailing Measures;
- Agreement on Import Licensing Procedures;
- Agreement on Anti-Dumping;
- Agreement on Rules of Origin;
- Dispute Settlement; and
- Tariff Reduction.

These Agreements set the legal ground-rules for international commerce and for trade policy. Their main objectives are:

- Help trade flow as freely as possible with maximum amount of food safety and quality;
- Achieve further liberalization generally through negotiations; and
- Set-up an impartial means of settling disputes.

WTO's global aim is to foster economic development through increased international trade to ultimately increase overall welfare. In the process, it offers a rule-based system within which to liberalize international trade. It is only through such a system that the world can protect the legal trading rights of international countries, big or small, and create a playing field in international trade. Its main function is to insure that trade flows as smoothly, predictable and freely as possible. Countries by committing themselves to WTO membership can attract invaluable foreign investments and new technologies that can come with it.

11.3 Regional Trade Agreements (RTA):

The establishment of WTO in 1995 has been the final step in a long series of discussions and negotiations that have had, as an indirect effect, the rebirth of interest in regional cooperation and agreements. As a result, various types of agreements have been established affecting countries in the Near East Region. Some examples of these are the Euro-Mediterranean Partnership (EU-MED) that represents the conclusion of over 20 years of continuous negotiations between the EU and its Mediterranean partners. Also the creation of a free-trade area between the Arab countries called Greater Arab Free Trade Area (GAFTA) as well as the establishment of the Arab Gulf Cooperation Council (GCC) which is a grouping of six of the Arab countries bordering the Gulf.

Nearly all 148 WTO members have signed Regional Trade Agreements (RTA) with other countries. Some of these agreements are wide ranging in scope; others aim to achieve trade liberalization across a number of sectors over time. As far as the Near East countries are concerned, all except three (Somalia, Syrian Arab Republic and

Turkmenistan) are either members or observers of the WTO⁵. A fundamental debate concerning RTAs, however, is their capability with the multilateral trading system. The main requirement is that the purpose of a regional trade agreement is to facilitate trade between the constituent territories and not to raise barriers to the trade of the other WTO members which are not parties to the agreement. In other words, any regional trade agreement should not contradict the rules and regulations set up by WTO and should be compatible with it.

11.4 Food Safety Issues and Requirements by Major Markets:

Food safety is an overriding concern for all countries trading in fish products in the international markets. Over the past decade there have been numerous initiatives, some regulatory, some technical, to improve food safety and communicate with consumers that the products they sell or purchase are fit for human consumption. Most of the exports of the Near East Region are to major international markets: mainly the EU, the United States and Japan. These countries have several concerns regarding the safety of the products they import and the exporting countries must take seriously if they wish to continue to export to these markets. Accordingly, the major import markets have established various requirements that the exporting countries must follow in order that their products are accepted.

Key issues related to food safety include the following:

- **Product labelling (identification of product form):** the EU and the United States developed a series of labeling programmes for fish products;
- **Eco-labelling:** A number of initiatives have been launched to promote environmentalism and sustainability to seafood consumers through an eco-label design to communicate to consumers' seafood safety. The most widely known eco-label is the one issued by the Marine Stewardship Council (MSC).
- **Product Traceability (producer/harvester to consumer):** Traceability, the documentation throughout the chain, is a fact of life in EU and most likely will become a necessary part of business in North America. It provides consumers with another level of quality assurance.
- **Processing/Packaging:** Modified atmosphere packaging involves special packaging containing gas mixtures, which slow oxidation and product safety. This is more prevalent in Europe but the trend may follow in the USA.
- **ISO/HACCP/EU Standards:** Hazard Analysis and Critical Control Points (HACCP), a process-oriented food safety management system based on the identification of potential hazards and critical points during seafood processing and labeling. This system along with the SPA agreement is now endorsed by the WTO for food safety. It is now mandatory in the major markets. The International Organization for Standardization (ISO) 9000, 14000 series of standards follows also process oriented approach.

⁵ Members are: Bahrain, Cyprus, Djibouti, Egypt, Jordan, Kuwait, Kyrgyzstan, Malta, Mauritania, Morocco, Oman, Pakistan, Qatar, Tunisia, Turkey, and United Arab Emirates.
Observers are: Afghanistan, Algeria, Azerbaijan, Iran, Iraq, Kazakhstan, Lebanon, Libya, Saudi Arabia, Sudan, Tajikistan, Uzbekistan and Yemen.

- **Farm-based HACCP:** In the US this has special guidelines that apply to aquaculture products. This process includes various drugs which may pose a food safety threat.
- **Organic Certification:** Increasing development of organic fish farm products has prompted organic certification to ensure the safety of these products.
- **Shellfish Purification:** Due to outbreak of diseases in shellfish products, initiatives were taken to help develop innovative technology for shellfish purification.

12. RECOMMENDATIONS: MEASURES TO INCREASE SUPPLIES

In summary, the measures that countries in the Near East Region may take to meet the increasing demand for fish in an effort to narrow the fish supply gap between projected fish production and projected demand in 2015, a set of measure may be taken by those responsible for the fisheries sector especially in countries where demand surpasses production. Increasing production from own sources should be a priority in order to sustain growth, local employment and reduce imports as a measure to conserve hard currencies. The suggested measures include:

i. Marine capture fisheries: The fisheries in the traditional marine fishing areas appear to be grossly over-exploited. In July 2005, FAO called upon countries fishing in the Mediterranean and Black Seas to work together to strengthen fisheries management and rebuild depleted fish stocks. FAO in its most recent global assessment identified a number of Mediterranean stocks as over-fished, including Atlantic bluefin tuna, Atlantic bonito, hake, swordfish, whiting, striped mullet and sea bream.

However, a proper and comprehensive stock assessment surveys, on national or regional levels, were not carried out in most areas during the last decade or two and are now required for most of these areas. These surveys should answer questions such as the current status of stocks, estimates of maximum sustainable yields and if there are further stocks that may be exploited and at what levels. They should also give guidance to the suitable number of fishing vessels that may be deployed and proper fishing seasons according to species without incurring damages to the stocks.

ii. Inland capture fisheries: Likewise, lakes, rivers, reservoirs, coastal gulfs and lagoons, especially those which cross international borders, also require studies to determine their MSYs. These waters are in most cases ignored from scientific studies and stock assessment programmes since they are left for subsistence fishing for the local communities. Many of these lakes suffer from environmental degradation emanating from agricultural, industrial and sewage pollution which would require programmes to reduce harmful effects, depletion of stocks, coastal erosions, mangrove destruction, etc. Corrective measures to these water surface bodies could become of considerable importance for fish production potential. Fish production in several lakes may also be developed through multi-species re-stocking programmes, construction of adequate landing facilities equipped with better and more appropriate services, processing plants, markets and other logistical support services.

iii. Freshwater and brackish water aquaculture: The latest fisheries statistics indicate that the global trend for fish availability is decreasing from marine fisheries but increasing from various systems of aquaculture production. Freshwater and brackishwater aquaculture are providing the Near East Region with about 15 percent of its fish supply. This trend is rising. More concentration is being given, especially by the private sector, to increase its activities in this field. Governments' backed research and development in most countries is now taking shape to study ways and means to increase such activities as well as increase productivity per hectare, diversify and introduce new species and at the same time increasing culture of high value species which are more lucrative in local and export markets. This trend in increasing production from aquaculture also requires deep studies and proper management efforts.

iv. Mariculture: In recent years mariculture along the coastline of several countries of the Region has become an important option to increase supplies from fish. This source can contribute significant quantities of high value species such as sea bass, sea bream and shrimp for domestic markets and for export. Already some mariculture farming takes place by countries bordering the Mediterranean coast, Red Sea coast, the Gulf coast, etc. Some more farms are under construction.

v. Capture-based aquaculture, (CBA): This latest development in aquaculture has been defined as the practice of collecting 'seed' material – from early life stages in adults – from the wild, and its subsequent on growing to marketable size in captivity, using aquaculture techniques. This category of farming includes the rearing of some species of finfish, most molluscs and certain forms of extensive culture of marine shrimp. CBA is an interface between capture fisheries and true aquaculture and provides an alternative livelihood for local coastal communities in many countries. However, a number of important issues have yet to be resolved relating to the management of such a practice and its impact on related issues.

vi. Off-shoring aquaculture: In the face of diminishing wild stocks and the growing demand for fish aquaculture is expected to dominate fish increases in production as a major source in the next one or two decades. In the light of this certainty, some countries are considering farming fish off shore in the high seas and oceans expecting that such a practice would insure sustainable fisheries production. It is believed that fish farms would move away from the coast, where pollution threats are high. However, several related issues are being studied before this practice begins implementation.

13. CONCLUSIONS

Based on the above presentation and analysis of the present and projected future fish supply and demand situation in the FAO Near East Region as a whole and by subdividing the large Region into Sub-regions for better understanding and comprehension, the following conclusions are derived:

1. Total demand for fish is expected to expand in the world at large and also in most countries of the Near East region. This increase in demand will be a consequence of

population growth which specially has a high average rate in the Region and also by economic development and other related factors causing a shortage of supply. The above analysis indicates that the shortage would differ among individual countries and the overall effect would be a general rise in the price of fish.

2. The distribution of fish and fishery products may differ significantly among the income groups within countries and fish as food may play different roles in the Sub-regions and groups. In a number of countries, due to major differences in tastes, traditions, income etc. fish consumption depicts a highly skewed distribution with very high consumption in coastal areas where fish is often considered a staple food.

3. As pointed out in the analysis, factors that will help shape future demand for fish and fishery products include population growth, economic growth and the development of disposable income and higher purchasing power and social factors such as traditional consumption patterns. Consequently over time, consumption patterns may change due to changes in social conditions, e.g. lifestyle and family structure.

4. Demand is expected to surpass expected supply of fish from all traditional fish sources. The estimated gap between supply and demand is a shortage of around 735 000 tonnes by 2015. This gap will continue to widen because of increasing human populations and the static growth rates of capture fisheries brought about by decline in stocks through conventional methods.

5. Countries currently exporting high value fish and seafood products especially to lucrative markets such as the EU, the United States and Japan will continue to do so. They are also expected to expand their fish trade to these markets. Furthermore, more countries in the Region will endeavour to establish processing fish into value-added products and meet international quality standards in order to be able to have access to the lucrative markets abroad under the cover of liberalization of global trade and in pursuit of hard currencies. This action is also bound to put pressure on the availability of fish supplies for local consumption unless measures are taken to regulate fish exports in favour of local marketing to avoid local hike in prices for fish especially the locally popular and affordable species.

6. Fish importing countries will continue to import as long as the required hard currencies are made available for such imports. Some countries with high populations which import lower value fish species to supplement local production will continue to do so but also try increase supplies from local sources. Other countries will continue to import high value species, specialties and delicacies to meet local demand for such products to satisfy demands of tourist outlets, high income groups and foreign workers who demand their traditional species.

Realizing that demand for fish will increase, there are many questions as to how fish supplies will be able to satisfy the demand.

7. The amount of fish in the world's oceans is dwindling fast because of unsustainable fishing practices. Growth in fish supplies is projected to decline. This projection has led to an increasing reliance on aquaculture. While aquaculture is believed to be the source that will increase supplies in years to come, there are many reservations to its wider expansion because it is believed it will cause widespread destruction of coastal ecosystem and pollution.

8. Nevertheless, aquaculture will continue to expand and grow in economic importance. The main reason for this is the quantifiable contribution aquaculture in making countries to fill the growing gap between supply and demand for fisheries products. However this development has to be sustainable. The issue is that marine research agendas should include identification of fish species which can be bred sustainably in captivity, where fish farms should be situated, and how fish farms should be constructed. Farming fish in offshore enclosures instead of coastal ponds would, for instance, reduce pollution and the impact on coastal ecosystem, but could cost much more. Research can help identify the most sustainable and practical options.

9. Countries which depend on fisheries as a major economic activity and as a diversification of their economy have several options to employ in order to improve their local fish resources. There are several international instruments, guidelines, research activities and opportunities which they can follow in order to conserve their marine and inland resources and improve their sustainable production and also engage in sustainable and environment friendly aquaculture.

10. Under the circumstances, it is not possible to predict demand by product type and species group. Nonetheless general trends can be identified such as increased demand for fresh and frozen products, and for value-added products and innovations. This will mainly be due to more disposable income, hence purchasing power. Price will be an important determining factor in the demand for species groups. Lucrative international markets will continue to demand high value finfish species and increasing quantities of shellfish. In turn, low value species will remain important to lower income groups in high population countries in the Region. Exporting countries will continue to export high value species and to market domestically small pelagics and lower value species.

11. Prices of fish compared to possible substitutes of red meat and poultry will also affect future demand for food fish. It appears clear that supplies of fish will not meet demand, and thus excess demand will increase prices. The way in which prices increase will be reflected in the demand and consumption patterns of the different countries in each of the Sub-regions will depend on the consumers' relative purchasing power and on the priority fish is given in the diet.

12. As a final all encompassing conclusion, from the foregoing review and analysis, there are indications that the FAO Near East Region demand for fish by the year 2015 is unlikely to be met from increases in marine fish production. Many coastal fish stocks from where currently most supplies are obtained need to be rehabilitated urgently through effective fisheries management schemes with special attention to substantial monitoring

or even reduction in fishing efforts. To satisfy increasing demand, aquaculture, and to a lesser extent, inland fisheries may provide better opportunities for augmenting regional fish production. However, improved management systems are also needed for accelerated sustainable aquaculture development, rehabilitation on inland fishery resources, and alleviation of environmental degradation.

Table 1: Fish Production by Country - Near East Region 2000 – 2003 (Tonnes)

Country	2000			2001			2002			2003		
	Aquaculture	Capture	Total	Aquaculture	Capture	Total	Aquaculture	Capture	Total	Aquaculture	Capture	Total
Afghanistan	0	1,000	1 000	0	800	800	0	900	900	0	900	900
Algeria	351	113,157	113,508	454	133,623	134,077	476	134,320	134,796	476	141,528	142,004
Azerbaijan	120	18,797	18,917	170	10,893	11,063	168	11,334	11,502	243	6,694	6,937
Bahrain	12	11,718	11,730	0	11,230	11,230	3	11,204	11,207	3	13,638	13,641
Cyprus	1,878	67,482	69,360	1,883	81,058	82,941	1,862	1,968	3,830	1,821	1,791	3,612
Djibouti	0	350	350	0	350	350	0	350	350	0	350	350
Egypt	340,093	384,314	724,407	342,864	428,651	771,515	376,296	425,170	801,466	445,181	430,809	875,990
Iran (I.R)	40,550	384 000	424,550	62,550	340,359	402,909	76,817	324,853	401,670	91,714	349,121	440,835
Iraq	1,745	20,767	22,512	2 000	33,300	35,300	2 000	35,900	37,900	1,500	21,600	23,100
Jordan	569	550	1,119	540	520	1,060	515	526	1,041	650	481	1,131
Kazakhstan	813	36,620	37,433	417	21,654	22,071	778	24,267	25,045	778	23,107	23,885
Kuwait	376	6 000	6,376	195	5,846	6,041	195	5,900	6,095	195	5,900	6,095
Kyrgyzstan	58	52	110	144	57	201	94	48	142	12	14	26
Lebanon	400	3,666	4,066	300	3,670	3,970	790	3,970	4,760	790	3,898	4,688
Libya	100	33,387	33,487	100	33,239	33,339	0	33,666	33,666	0	33,666	33,666
Malta	1,746	1,074	2,820	1,235	895	2,130	1,116	1,074	2,190	881	1,138	2,019
Mauritania	0	80,849	80,849	0	84,881	84,881	0	78,902	78,902	0	80 000	80 000
Morocco	1,889	875,215	877,104	1,403	1,083,953	1,085,356	1,670	894,977	896,647	1,538	885,131	886,669
Oman	0	120,421	120,421	0	129,907	129,907	0	142,670	142,670	352	138,481	138,833
Pakistan	12,485	614,069	626,554	16,405	600,798	617,203	12,440	599,104	611,544	12,061	564,743	576,804
Qatar	0	7,142	7,142	1	8,606	8,607	0	6,880	6,880	0	11 000	11 000
Saudi Arabia	6,004	49,761	55,765	8,218	49,167	57,385	6,744	55,330	62,074	11,824	52,929	64,753
Somalia	0	20,200	20,200	0	20 000	20 000	0	18 000	18 000	0	18 000	18 000
Sudan	1 000	53 000	54 000	1 000	58 000	59 000	1,600	58 000	59,600	1,600	58 000	59,600
Syria	6,797	6,572	13,369	5,880	8,291	14,171	5,988	9,178	15,166	7,217	8,911	16,128
Tajikistan	86	78	164	99	137	236	143	181	324	167	158	325
Tunisia	1,553	95,550	97,103	1,868	98,482	100,350	1,975	96,685	98,660	2,130	90,341	92,471
Turkey	79,031	503,348	582,379	67,244	527,733	594,977	61,165	566,682	627,847	79,943	507,772	587,715
Turkmenistan	68	12,228	12,296	43	12,749	12,792	38	12,812	12,850	24	14,543	14,567
UAE	0	105,456	105,456	0	112,561	112,561	0	97,574	97,574	2,300	95,150	97,450
Uzbekistan	5,142	3,387	8,529	4,082	4,070	8,152	5,112	2,009	7,121	5,112	2 000	7,112
Yemen	0	114,751	114,751	0	142,198	142,198	0	159,262	159,262	0	159 000	159 000
TOTAL	502,866	3,744,961	4,247,827	519,095	4,047,678	4,566,773	557,985	3,813,696	4,371,681	668,512	3,720,794	4,389,306

Table 1.a: Fish Production by Sub-Region One: Arab Countries 2000 – 2003 (Tonnes)

Country	2000			2001			2002			2003		
	Aquaculture	Capture	Total	Aquaculture	Capture	Total	Aquaculture	Capture	Total	Aquaculture	Capture	Total
Algeria	351	113,157	113,508	454	133,623	134,077	476	134,320	134,796	476	141,528	142,004
Bahrain	12	11,718	11,730	0	11,230	11,230	3	11,204	11,207	3	13,638	13,641
Djibouti	0	350	350	0	350	350	0	350	350	0	350	350
Egypt	340,093	384,314	724,407	342,864	428,651	771,515	376,296	425,170	801,466	445,181	430,809	875,990
Iraq	1,745	20,767	22,512	2 000	33,300	35,300	2 000	35,900	37,900	1,500	21,600	23,100
Jordan	569	550	1,119	540	520	1,060	515	526	1,041	650	481	1,131
Kuwait	376	6 000	6,376	195	5,846	6,041	195	5,900	6,095	195	5,900	6,095
Lebanon	400	3,666	4,066	300	3,670	3,970	790	3,970	4,760	790	3,898	4,688
Libya	100	33,387	33,487	100	33,239	33,339	0	33,666	33,666	0	33,666	33,666
Mauritania	0	80,849	80,849	0	84,881	84,881	0	78,902	78,902	0	80 000	80 000
Morocco	1,889	875,215	877,104	1,403	1,083,953	1,085,356	1,670	894,977	896,647	1,538	885,131	886,669
Oman	0	120,421	120,421	0	129,907	129,907	0	142,670	142,670	352	138,481	138,833
Qatar	0	7,142	7,142	1	8,606	8,607	0	6,880	6,880	0	11 000	11 000
Saudi Arabia	6,004	49,761	55,765	8,218	49,167	57,385	6,744	55,330	62,074	11,824	52,929	64,753
Somalia	0	20,200	20,200	0	20 000	20 000	0	18 000	18 000	0	18 000	18 000
Sudan	1 000	53 000	54 000	1 000	58 000	59 000	1,600	58 000	59,600	1,600	58 000	59,600
Syria	6,797	6,572	13,369	5,880	8,291	14,171	5,988	9,178	15,166	7,217	8,911	16,128
Tunisia	1,553	95,550	97,103	1,868	98,482	100,350	1,975	96,685	98,660	2,130	90,341	92,471
UAE	0	105,456	105,456	0	112,561	112,561	0	97,574	97,574	2,300	95,150	97,450
Yemen	0	114,751	114,751	0	142,198	142,198	0	159,262	159,262	0	159 000	159 000
TOTAL	360,889	2,102,826	2,463,715	364,823	2,446,475	2,811,298	398,252	2,268,464	2,666,716	475,756	2,248,813	2,724,569

Table 1.b: Fish Production by Sub-Region Two: Countries in Central Asia 2000 – 2003 (Tonnes)

Country	2000			2001			2002			2003		
	Aquaculture	Capture	Total	Aquaculture	Capture	Total	Aquaculture	Capture	Total	Aquaculture	Capture	Total
Azerbaijan	120	18,797	18,917	170	10,893	11,063	168	11,334	11,502	243	6,694	6,937
Kazakhstan	813	36,620	37,433	417	21,654	22,071	778	24,267	25,045	778	23,107	23,885
Kyrgyzstan	58	52	110	144	57	201	94	48	142	12	14	26
Tajikistan	86	78	164	99	137	236	143	181	324	167	158	325
Turkmenistan	68	12,228	12,296	43	12,749	12,792	38	12,812	12,850	24	14,543	14,567
Uzbekistan	5,142	3,387	8,529	4,082	4,070	8,152	5,112	2,009	7,121	5,112	2 000	7,112
TOTAL	6,287	71,162	77,449	4,955	49,560	54,515	6,333	50,651	56,984	6,336	46,516	52,852

Table 1.c: Fish Production by Sub-Region Three: Countries in Western Asia 2000 – 2003 (Tonnes)

Country	2000			2001			2002			2003		
	Aquaculture	Capture	Total	Aquaculture	Capture	Total	Aquaculture	Capture	Total	Aquaculture	Capture	Total
Afghanistan	0	1 000	1 000	0	800	800	0	900	900	0	900	900
Iran (I.R)	40,550	384 000	424,550	62,550	340,359	402,909	76,817	324,853	401,670	91,714	349,121	440,835
Pakistan	12,485	614,069	626,554	16,405	600,798	617,203	12,440	599,104	611,544	12,061	564,743	576,804
TOTAL	53,035	999,069	1,052,104	78,955	941,957	1,020,912	89,257	924,857	1,014,114	103,775	914,764	1,018,539

Table 1.d: Fish Production by Sub-Region Four: Countries in Northern Mediterranean 2000 – 2003 (Tonnes)

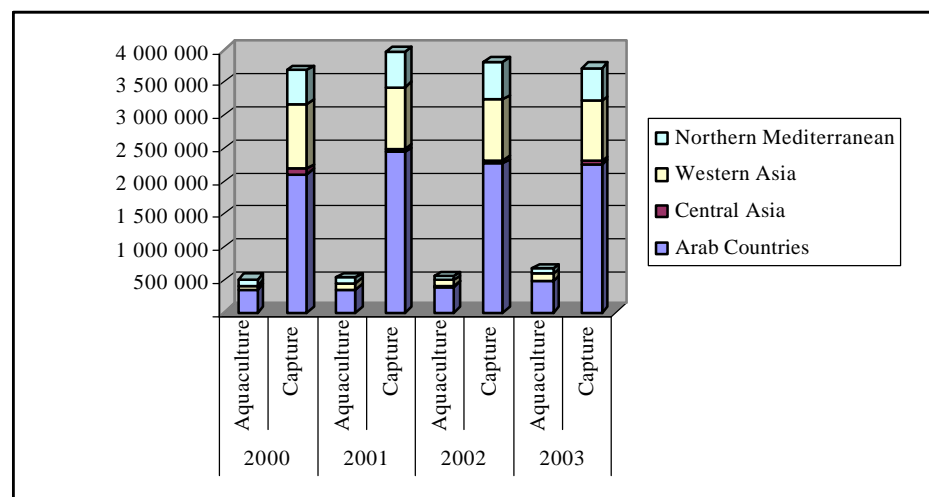
Country	2000			2001			2002			2003		
	Aquaculture	Capture	Total	Aquaculture	Capture	Total	Aquaculture	Capture	Total	Aquaculture	Capture	Total
Cyprus	1,878	2,308	4,186	1,883	2,315	4,198	1,862	1,968	3,830	1,821	1,791	3,612
Malta	1,746	1,074	2,820	1,235	895	2,130	1,116	1,074	2,190	881	1,138	2,019
Turkey	79,031	503,348	582,379	67,244	527,733	594,977	61,165	566,682	627,847	79,943	507,772	587,715
TOTAL	82,655	506,730	589,385	70,362	530,943	601,305	64,143	569,724	633,867	82,645	510,701	593,346

Table 1.e: Summary Fish Production by Sub-Region 2000 – 2003 (Tonnes)

Sub-Regions	2000			2001			2002			2003		
	Aquaculture	Capture	Total	Aquaculture	Capture	Total	Aquaculture	Capture	Total	Aquaculture	Capture	Total
Arab Countries	360,889	2,102,826	2,463,715	364,823	2,446,475	2,811,298	398,252	2,268,464	2,666,716	475,756	2,248,813	2,724,569
Central Asia	6,287	71,162	77,449	4,955	49,560	54,515	6,333	50,651	56,984	6,336	46,516	52,852
Western Asia	53,035	999,069	1,052,104	78,955	941,957	1,020,912	89,257	924,857	1,014,114	103,775	914,764	1,018,539
Northern Med.	82,655	506,730	589,385	70,362	530,943	601,305	64,143	569,724	633,867	82,645	510,701	593,346
TOTAL	502,866	3,679,787	4,182,653	519,095	3,968,935	4,488,030	557,985	3,813,696	4,371,681	668,512	3,720,794	4,389,306

Source: FAO Fisheries Statistics for 2003.

Figure 1: Summary Fish Production by Sub-Regions in Near East Region (Tonnes)



**Table 2: Aquaculture and Capture Production in Near East Region By Country: All Sources – 2003
(Tonnes)**

Country	Freshwater culture	Brackishwater culture	Mariculture	Aquaculture Totals	Capture	Totals
Afghanistan	0	0	0	0	900	900
Algeria	344	132	0	476	141,528	142,004
Azerbaijan	243	0	0	243	6,694	6,937
Bahrain	0	0	3	3	13,638	13,641
Cyprus	90	0	1,731	1,821	1,791	3,612
Djibouti	0	0	0	0	350	350
Egypt	50,641	394,540	0	445,181	430,809	875,990
Iran	84,252	7,462	0	91,714	349,121	440,835
Iraq	1,500	0	0	1,500	21,600	23,100
Jordan	50	600	0	650	481	1,131
Kazakhstan	778	0	0	778	23,107	23,885
Kuwait	0	16	179	195	5,900	6,095
Kyrgyzstan	12	0	0	12	14	26
Lebanon	790	0	0	790	3,898	4,688
Libya	0	0	0	0	33,666	33,666
Malta	0	0	881	881	1,138	2,019
Mauritania	0	0	0	0	80 000	80 000
Morocco	460	246	832	1,538	885,131	886,669
Oman	0	8	344	352	138,481	138,833
Pakistan	11,992	0	69	12,061	564,743	576,804
Qatar	0	0	<0.5	0	11 000	11 000
Saudi Arabia	2,435	180	9,209	11,824	52,929	64,753
Somalia	0	0	0	0	18 000	18 000
Sudan	1,600	0	0	1,600	58 000	59,600
Syria	7,217	0	0	7,217	8,911	16,128
Tajikistan	167	0	0	167	158	325
Tunisia	859	1,075	196	2,130	90,341	92,471
Turkey	40,217	0	39,726	79,943	507,772	587,715
Turkmenistan	24	0	0	24	14,543	14,567
United Arab Emirates	0	0	2,300	2,300	95,150	97,450
Uzbekistan	5,112	0	0	5,112	2 000	7,112
Yemen	0	0	0	0	159 000	159 000
TOTAL	208,783	404,259	55,470	668,512	3,720,794	4,389,306

Figure 2: Near East Region Fish Production By Country: All Sources - 2003 (Tonnes)

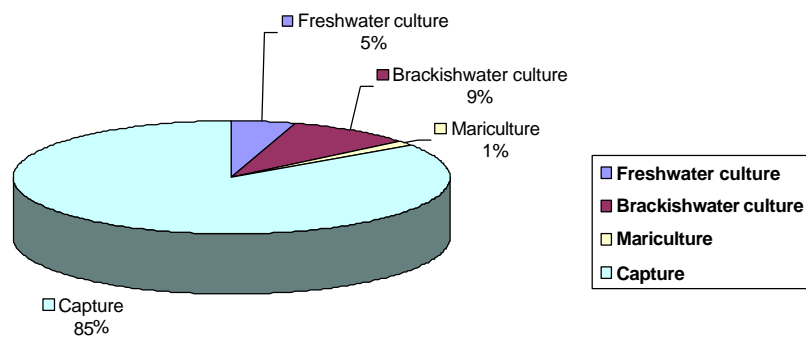


Table 3: Land & Shelf Area and Coastline - Near East Countries

COUNTRY	LAND AREA (Km²)	SHELF AREA (Km²)	COASTLINE (Km)
Afghanistan	647,500	0	0
Algeria	2,381,740	13,700	998
Azerbaijan	86,600	0	0
Bahrain	660	10 000	161
Cyprus	9,250	2,500	648
Djibouti	23 000	6,280	314
Egypt	1,001,450	87,120	2,665
Iran, I.R	1,648 000	196 000	2,440
Iraq	437,072	2 000	58
Jordan	92,300	120	26
Kazakhstan	2,717,300	0	0
Kuwait	17,820	7,200	499
Kyrgyzstan	198,500	0	0
Lebanon	10,400	1,169	225
Libya	1,759,540	50 000	1,770
Malta	316	13 000	197
Mauritania	10,030,700	36 000	754
Morocco	446,550	115 000	1,835
Oman	212,460	58 000	2,092
Pakistan	803,940	50,270	1,046
Qatar	11,437	10,700	563
Saudi Arabia	1,960,582	95,040	2,640
Somalia	637,657	39 000	3,025
Sudan	2,505,810	22,300	853
Syria	185,180	900	193
Tajikistan	143,100	0	0
Tunisia	163,610	80 000	1,148
Turkey	780,580	245,711	7,200
Turkmenistan	488,100	72,381	610
United Arab Emirates	82,880	31,600	1,318
Uzbekistan	447,400	0	0
Yemen	527,970	41 000	1,906
Total	30,459,404	1,286,991	35,184

Source: Population Division of the Department of Economics & Social Affairs of the United Nations Secretariat, World Population Prospects

Table 3.a: Land & Shelf Area and Coastline - Arab Countries

COUNTRY	LAND AREA (Km²)	SHELF AREA (Km²)	COASTLINE (Km)
Algeria	2,381,740	13,700	998
Bahrain	660	10 000	161
Djibouti	23 000	6,280	314
Egypt	1,001,450	87,120	2,665
Iraq	437,072	2 000	58
Jordan	92,300	120	26
Kuwait	17,820	7,200	499
Lebanon	10,400	1,169	225
Libya	1,759,540	50 000	1,770
Mauritania	1,0030,700	36 000	754
Morocco	446,550	115 000	1,835
Oman	212,460	58 000	2,092
Qatar	11,437	10,700	563
Saudi Arabia	1,960,582	95,040	2,640
Somalia	637,657	39 000	3,025
Sudan	2,505,810	22,300	853
Syria	185,180	900	193
Tunisia	163,610	80 000	1,148
United Arab Emirates	82,880	31,600	1,318
Yemen	527,970	41 000	1,906
Total	22,488,818	707,129	23,043

Table 3.b: Land & Shelf Area and Coastline - Countries of Central Asia

COUNTRY	LAND AREA (Sq Km)	SHELF AREA (Km²)	COASTLINE (Km)
Azerbaijan	86,600	000	000
Kazakhstan	2,717,300	000	000
Kyrgyzstan	198,500	000	000
Tajikistan	143,100	000	000
Turkmenistan	488,100	72,381	610
Uzbekistan	447,400	000	000
Total	4,081 000	72,381	610

Table 3.c: Land & Shelf Area and Coastline – Countries of Western Asia

COUNTRY	LAND AREA (Sq.km)	SHELF AREA (Sq.km)	COASTLINE (Km.)
Afghanistan	647,500	000	000
Iran, I.R	1,648 000	196 000	2,440
Pakistan	803,940	50,270	1,046
Total	3,099,440	246,270	3,486

Table 3.d: Land & Shelf Area and Coastline – Countries of Northern Mediterranean

COUNTRY	LAND AREA (Km²)	SHELF AREA (Km²)	COASTLINE (Km)
Cyprus	9,250	2,500	648
Malta	316	13 000	197
Turkey	780,580	245,711	7,200
Total	790,146	261,211	8,045

Table 3.e: Land & Shelf Area and Coastline – Summary by Sub-Region

COUNTRY	LAND AREA (Km²)	SHELF AREA (Km²)	COASTLINE (Km)
Arab Countries	22,488,818	707,129	23,043
Central Asia	4,081 000	72,381	610
Western Asia	3,099,440	246,270	3,486
Northern Med.	790,146	261,211	8,045
Total	30,459,404	1,286,991	35,184

Table 4: Fish Supply and Per Capita Consumption by Country - Near East Region – 2003⁶

Country	Population (millions) 1	Total Fish Production ⁷ (tonnes) 2	Fish Imports live weight (tonnes) 3	Total Fish Supply live weight (tonnes) 4 (2+3)	Fish Exports live weight (tonnes) 5	Total Fish for Consumption (tonnes) 6 (4-5)	Per Capita Kg/annum 7 (6÷1)
Afghanistan	23.9	900	0	900	0	900	0.04
Algeria	31.8	142,004	25,740	167,744	2,019	165,725	5.21
Azerbaijan	8.2	6,937	5,276	12,213	548	11,665	1.42
Bahrain	0.7	13,641	4,444	18,085	7,344	10,741	15.34
Cyprus	0.8	3,612	15,062	18,674	695	17,979	22.47
Djibouti	0.7	350	428	778	621	156	0.22
Egypt	67.6	875,990	203,086	1,079,076	3,834	1,075,242	15.91
Iran	66.4	400,865	31,220	432,084	18,510	413,574	6.23
Iraq	24.7	23,100	2,133	25,233	17	25,216	1.02
Jordan	5.3	1,131	21,668	22,799	1,195	21,604	4.08
Kazakhstan	14.9	21,995	44,464	66,459	38,544	27,915	1.87
Kuwait	2.4	6,095	20,259	26,354	297	26,057	10.86
Kyrgyzstan	5.1	26	5,628	5,654	0	5,654	1.11
Lebanon	4.5	4,688	23,530	28,218	271	27,947	6.21
Libya	5.6	32,166	36,553	68,719	2,305	66,414	11.86
Malta	0.4	2,019	22,861	24,880	1,939	22,941	57.35
Mauritania	2.8	80,000	15,341	95,341	51,514	43,828	15.65
Morocco	30.1	713,254	26,264	739,518	371,804	367,714	12.22
Oman	2.6	138,833	18,293	157,126	61,599	95,527	36.74
Pakistan	148.4	408,904	236	409,140	120,078	289,062	1.95
Qatar	0.6	11,000	4,003	15,003	2,132	12,871	21.45
Saudi Arabia	22.5	64,228	97,727	161,955	12,658	149,297	6.64
Somalia	9.6	18,000	221	18,221	2,777	15,444	1.61
Sudan	33.5	59,600	217	59,817	1,627	58,190	1.74
Syria	17.4	16,128	22,307	38,435	10	38,425	2.21
Tajikistan	6.3	325	882	1,207	0	1,207	0.19
Tunisia	9.9	92,471	30,447	122,918	16,459	106,459	10.75
Turkey	70.7	544,060	52,553	596,613	64,967	531,646	7.52
Turkmenistan	4.9	14,567	659	15,226	131	15,095	3.08
United Arab Emirates	4	97,450	53,756	151,206	33,274	117,933	29.48
Uzbekistan	25.6	7,112	1,436	8,548	78	8,470	0.33
Yemen	19.2	159,000	8,689	167,689	26,589	141,100	7.35
TOTAL	671.1	3,960,451	795,381	4,755,832	843,835	3,911,997	5.83

⁶ Discrepancies in computed calculations are due to computer rounding.

⁷ Net of non-FAO Yearbook species (such as aquatic mammals, aquatic plants, corals and sponges, pearls and shells, reptiles) and of production of fish meal live weight.

Table 4.a: Fish Supply and Per Capita Consumption by Country - Arab Countries 2003

Country	Population (millions) 1	Total Fish Production ⁸ (tonnes) 2	Fish Imports live weight (tonnes) 3	Total Fish Supply live weight (tonnes) 4 (2+3)	Fish Exports live weight (tonnes) 5	Total Fish for Consumption (tonnes) 6 (4-5)	Per Capita Kg/annum 7 (6÷1)
Algeria	31.8	142,004	25,740	167,744	2,019	165,725	5.21
Bahrain	0.7	13,641	4,444	18,085	7,344	10,741	15.34
Djibouti	0.7	350	428	778	621	156	0.22
Egypt	67.6	875,990	203,086	1,079,076	3,834	1,075,242	15.91
Iraq	24.7	23,100	2,133	25,233	17	25,216	1.02
Jordan	5.3	1,131	21,668	22,799	1,195	21,604	4.08
Kuwait	2.4	6,095	20,259	26,354	297	26,057	10.86
Lebanon	4.5	4,688	23,530	28,218	271	27,947	6.21
Libya	5.6	32,166	36,553	68,719	2,305	66,414	11.86
Mauritania	2.8	80,000	15,341	95,341	51,514	43,828	15.65
Morocco	30.1	713,254	26,264	739,518	371,804	367,714	12.22
Oman	2.6	138,833	18,293	157,126	61,599	95,527	36.74
Qatar	0.6	11,000	4,003	15,003	2,132	12,871	21.45
Saudi Arabia	22.5	64,228	97,727	161,955	12,658	149,297	6.64
Somalia	9.6	18,000	221	18,221	2,777	15,444	1.61
Sudan	33.5	59,600	217	59,817	1,627	58,190	1.74
Syria	17.4	16,128	22,307	38,435	10	38,425	2.21
Tunisia	9.9	92,471	30,447	122,918	16,459	106,459	10.75
United Arab Emirates	4.0	97,450	53,756	151,206	33,274	117,933	29.48
Yemen	19.2	159,000	8,689	167,689	26,589	141,100	7.35
TOTAL	295.5	2,549,129	615,105	3,164,234	598,345	2,565,889	8.68

Table 4.b: Fish Supply and Per Capita Consumption by Country - Central Asia 2003

Country	Population (millions) 1	Total Fish Production ⁹ (tonnes) 2	Fish Imports live weight (tonnes) 3	Total Fish Supply live weight (tonnes) 4 (2+3)	Fish Exports live weight (tonnes) 5	Total Fish for Consumption (tonnes) 6 (4-5)	Per Capita Kg/annum 7 (6÷1)
Azerbaijan	8.2	6,937	5,276	12,213	548	11,665	1.42
Kazakhstan	14.9	21,995	44,464	66,459	38,544	27,915	1.87
Kyrgyzstan	5.1	26	5,628	5,654	0	5,654	1.11
Tajikistan	6.3	325	882	1,207	0	1,207	0.19
Turkmenistan	4.9	14,567	659	15,226	131	15,095	3.08
Uzbekistan	25.6	7,112	1,436	8,548	78	8,470	0.33
TOTAL	65	50,962	58,345	109,307	39,301	70,006	1.08

⁸ Net of non-FAO Yearbook species (such as aquatic mammals, aquatic plants, corals and sponges, pearls and shells, reptiles) and of production of fish meal live weight.

⁹ Net of non-FAO Yearbook species (such as aquatic mammals, aquatic plants, corals and sponges, pearls and shells, reptiles) and of production of fish meal live weight.

Table 4.c Fish Supply and Per Capita Consumption by Country - Western Asia 2003

Country	Population (millions) 1	Total Fish Production ¹⁰ (tonnes) 2	Fish Imports live weight (tonnes) 3	Total Fish Supply live weight (tonnes) 4 (2+3)	Fish Exports live weight (tonnes) 5	Total Fish for Consumption (tonnes) 6 (4-5)	Per Capita Kg/annum 7 (6÷1)
Afghanistan	23.9	900	0	900	0	900	0.04
Iran	66.4	400,865	31,220	432,084	18,510	413,574	6.23
Pakistan	148.4	408,904	236	409,140	120,078	289,062	1.95
TOTAL	238.7	810,669	31,455	842,124	138,588	703,536	2.95

Table 4.d: Fish Supply and Per Capita Consumption by Country – Northern Mediterranean 2003

Country	Population (millions) 1	Total Fish Production (tonnes) 2	Fish Imports (tonnes) 3	Total Fish Supply (tonnes) 4 (2+3)	Fish Exports (tonnes) 5	Total Fish for Consumption (tonnes) 6 (4-5)	Per Capita Kg/annum 7 (6÷1)
Cyprus	0.8	3,612	15,062	18,674	695	17,979	22.47
Malta	0.4	2,019	22,861	24,880	1,939	22,941	57.35
Turkey	70.7	544,060	52,553	596,613	64,967	531,646	7.52
TOTAL	71.9	549,691	90,476	640,167	67,601	572,566	7.96

Table 4.e: Fish Supply and Per Capita Consumption by Country – Summary by Sub-Region 2003

Sub-Regions	Population (millions) 1	Total Fish Production (tonnes) 2	Fish Imports (tonnes) 3	Total Fish Supply (tonnes) 4 (2+3)	Fish Exports (tonnes) 5	Total Fish for Consumption (tonnes) 6 (4-5)	Per Capita Kg/annum 7 (6÷1)
Arab Countries	295.5	2,549,129	615,105	3,164,234	598,345	2,565,889	8.68
Central Asia	65	50,962	58,345	109,307	39,301	70,006	1.08
Western Asia	238.7	810,669	31,455	842,124	138,588	703,536	2.95
Northern Med.	71.9	549,691	90,476	640,167	67,601	572,566	7.96
TOTAL	671.1	3,960,451	795,381	4,755,832	843,835	3,911,997	5.83

Source: World Bank, 2003 Population data from World Development Indicators Database.

¹⁰ Net of non-FAO Yearbook species (such as aquatic mammals, aquatic plants, corals and sponges, pearls and shells, reptiles) and of production of fish meal live weight.

Table 5: Populations, Rate of Growth & Per Capita Income - Near East Countries

COUNTRY	Population 2003	Population 2015	Ave. Ann. Growth (%)	Per Capita 2002 (US\$)
Afghanistan	23,900	41,401	2.7	n.a.
Algeria	31,800	38,085	1.5	5,530
Azerbaijan	8,200	9083	0.8	3,010
Bahrain	700	852	1.7	16,190
Cyprus	800	927	0.5	18,560
Djibouti	700	930	2.3	2,040
Egypt	67,600	88,175	2.0	1,393
Iran, I.R	66,400	79,917	1.2	6,690
Iraq	24,700	36,473	2.7	2,350
Jordan	5,300	6,956	2.4	4,180
Kazakhstan	14,900	14,877	0.6	5,630
Kuwait	2,400	3,381	1.7	17,780
Kyrgyzstan	5,100	5,852	n.a.	265
Lebanon	4,500	3,965	1.7	4,600
Libya	5,600	7,018	2.4	3,537
Malta	400	419	0.2	17,710
Mauritania	2,800	3,988	2.7	1,790
Morocco	30,100	36,152	1.6	3,730
Oman	2,600	3,173	2.2	13 000
Pakistan	148,400	193,419	2.4	1,960
Qatar	600	972	1.6	20,550
Saudi Arabia	22,500	30,828	3.0	12,660
Somalia	9,600	10,970	2.9	n.a.
Sudan	33,500	44,035	2.8	1,740
Syria	17,400	23,802	2.4	3,470
Tajikistan	6,300	7,905	1.9	930
Tunisia	9,900	11,140	1.1	6,440
Turkey	70,700	82,640	1.4	6,300
Turkmenistan	4,900	5,498	1.6	4,780
United Arab Emirates	4 000	5,588	1.4	24,030
Uzbekistan	25,600	30,651	1.6	1,640
Yemen	19,200	28,480	3.3	800
Total	671,100	857,552	1.9	6,880

n.a. – not available

Table 5.a: Populations, Rate of Growth & Per Capita Income - Arab Countries

COUNTRY	Population 2003	Population 2015	Ave. Ann. Growth (%)	Per Capita 2002 (US\$)
Algeria	31,800	38,085	1.5	5,530
Bahrain	700	852	1.7	16,190
Djibouti	700	930	2.3	2,040
Egypt	67,600	88,175	2.0	1,393
Iraq	24,700	36,473	2.7	2,350
Jordan	5,300	6,956	2.4	4,180
Kuwait	2,400	3,381	1.7	17,780
Lebanon	4,500	3,965	1.7	4,600
Libya	5,600	7,018	2.4	3,537
Mauritania	2,800	3,988	2.7	1,790
Morocco	30,100	36,152	1.6	3,730
Oman	2,600	3,173	2.2	13 000
Qatar	600	972	1.6	20,550
Saudi Arabia	22,500	30,828	3.0	12,660
Somalia	9,600	10,970	2.9	n.a.
Sudan	33,500	44,035	2.8	1,740
Syria	17,400	23,802	2.4	3,470
Tunisia	9,900	11,140	1.1	6,440
United Arab Emirates	4 000	5,588	1.4	24,030
Yemen	19,200	28,480	3.3	800
Total	297,503	386,978	2.17	7,296

Table 5.b: Populations, Rate of Growth & Per Capita Income – Countries in Central Asia

COUNTRY	Population 2003	Population 2015	Ave. Ann. Growth (%)	Per Capita 2002 (US\$)
Azerbaijan	8,200	9083	0.8	3,010
Kazakhstan	14,900	14,877	0.6	5,630
Kyrgyzstan	5,100	5,852	n.a.	265
Tajikistan	6,300	7,905	1.9	930
Turkmenistan	4,900	5,498	1.6	4,780
Uzbekistan	25,600	30,651	1.6	1,640
Total	67,003	75,881	1.7	2,709

Table 5.c: Populations, Rate of Growth & Per Capita Income – Countries of Western Asia

COUNTRY	Population 2003	Population 2015	Ave. Ann. Growth (%)	Per Capita 2002 (US\$)
Afghanistan	23,900	41,401	2.7	n.a.
Iran, I.R	66,400	79,917	1.2	6,690
Pakistan	148,400	193,419	2.4	1,960
Total	240,703	316,752	2.1	4,325

Table 5.d: Populations, Rate of Growth & Per Capita Income – Countries of Northern Mediterranean

COUNTRY	Population 2003	Population 2015	Ave. Ann. Growth (%)	Per Capita 2002 (US\$)
Cyprus	800	927	0.5	18,560
Malta	400	419	0.2	17,710
Turkey	70,700	82,640	1.4	6,300
Total	73,903	86,001	0.7	14,190

Table 5.e Populations, Rate of Growth & Per Capita Income – Summary Near East Region

COUNTRY	Population 2003	Population 2015	Ave. Ann. Growth (%)	Per Capita 2002 (US\$)
Arab Countries	297,503	486,978	2.17	7,296
Central Asia	67,003	75,881	1.7	2,709
Western Asia	240,703	316,752	2.1	4,325
Northern Med.	73,903	86,001	0.7	14,190
Total	681,115	967,627	1.67	7,130

Source: Population Division of the Department of Economics & Social Affairs of the United Nations Secretariat, World Population Prospects

Table 6: Fish Trade by Country-Near East Region - 2003

Country	Export		Import	
	Quantity – net weight (Tonnes)	Value (US\$1 000)	Quantity – net weight (Tonnes)	Value (US\$1 000)
Afghanistan	0	0	0	0
Algeria	1,755	6,454	21,805	16,563
Azerbaijan	568	4,169	4,228	2,136
Bahrain	7,202	11,595	3,358	6,880
Cyprus	609	4,737	17,557	37,254
Djibouti	160	791	224	798
Egypt	3,133	3,052	177,817	110,119
Iran (I.R.)	17,541	80,573	90,958	68,999
Iraq	17	97	1,897	2,660
Jordan	871	1,522	21,008	29,254
Kazakhstan	31,010	21,536	33,574	14,304
Kuwait	259	1,487	15,277	40,822
Kyrgyzstan	0	0	5,744	2,444
Lebanon	183	725	19,924	46,195
Libya	2,221	10,476	19,722	40,628
Malta	1,824	18,780	19,535	23,400
Mauritania	43,416	103,360	14,606	6,051
Morocco	328,476	988,649	21,974	20,904
Oman	52,175	79,980	10,356	10,643
Pakistan	95,815	136,952	535	400
Qatar	2,136	1,642	3,248	5,230
Saudi Arabia	10,451	27,157	99,596	136,070
Somalia	2,578	3,394	142	392
Sudan	1,629	533	157	324
Syria	15	79	21,416	106,338
Tajikistan	0	0	576	377
Tunisia	14,659	105,039	28,207	36,201
Turkey	47,459	148,837	70,257	45,566
Turkmenistan	114	20	370	424
UAE	25,056	69,278	44,247	105,424
Uzbekistan	48	11	1,311	1,159
Yemen	26,792	56,701	4,469	4,612
TOTAL	718,172	1,887,626	774,095	922,571

Table 6.a: Fish Trade by Country - Arab Countries 2003

Country	Export		Import	
	Quantity – net weight (Tonnes)	Value (US\$ 1 000)	Quantity – net weight (Tonnes)	Value (US\$1 000)
Algeria	1,755	6,454	21,805	16,563
Bahrain	7,202	11,595	3,358	6,880
Djibouti	160	791	224	798
Egypt	3,133	3,052	177,817	110,119
Iraq	17	97	1,897	2,660
Jordan	871	1,522	21,008	29,254
Kuwait	259	1,487	15,277	40,822
Lebanon	183	725	19,924	46,195
Libya	2,221	10,476	19,722	40,628
Mauritania	43,416	103,360	14,606	6,051
Morocco	328,476	988,649	21,974	20,904
Oman	52,175	79,980	10,356	10,643
Qatar	2,136	1,642	3,248	5,230
Saudi Arabia	10,451	27,157	99,596	136,070
Somalia	2,578	3,394	142	392
Sudan	1,629	533	157	324
Syria	15	79	21,416	106,338
Tunisia	14,659	105,039	28,207	36,201
UAE	25,056	69,278	44,247	105,424
Yemen	26,792	56,701	4,469	4,612
TOTAL	523,184	1,472,011	529,450	726,108

**Table 6.b: Fish Trade by Country - Countries in Central Asia
2003**

Country	Export		Import	
	Quantity – net weight (Tonnes)	Value (US\$1 000)	Quantity – net weight (Tonnes)	Value (US\$1 000)
Azerbaijan	568	4,169	4,228	2,136
Kazakhstan	31,010	21,536	33,574	14,304
Kyrgyzstan	0	0	5,744	2,444
Tajikistan	0	0	576	377
Turkmenistan	114	20	370	424
Uzbekistan	48	11	1,311	1,159
TOTAL	31,740	25,736	45,803	20,844

**Table 6.c: Fish Trade by Country – Countries in Western Asia
2003**

Country	Export		Import	
	Quantity – net weight (Tonnes)	Value (US\$1 000)	Quantity – net weight (Tonnes)	Value (US\$1 000)
Afghanistan	0	0	0	0
Iran (I.R.)	17,541	80,573	90,958	68,999
Pakistan	95,815	136,952	535	400
TOTAL	113,356	217,525	91,493	69,399

**Table 6.d: Fish Trade by Country – Countries in Northern
Mediterranean 2003**

Country	Export		Import	
	Quantity – net weight (Tonnes)	Value (US\$1 000)	Quantity – net weight (Tonnes)	Value (US\$1 000)
Cyprus	609	4,737	17,557	37,254
Malta	1,824	18,780	19,535	23,400
Turkey	47,459	148,837	70,257	45,566
TOTAL	49,892	172,354	107,349	106,220

**Table 6.e: Fish Trade by Country – Summary by Sub-Region
2003**

Sub-Regions	Export		Import	
	Quantity – net weight (Tonnes)	Value (US\$1 000)	Quantity – net weight (Tonnes)	Value (US\$1 000)
Arab Countries	523,184	1,472,011	529,450	726,108
Central Asia	31,740	25,736	45,803	20,844
Western Asia	113,356	217,525	91,493	69,399
Northern Med.	49,892	172,354	107,349	106,220
TOTAL	718,172	1,887,626	774,095	922,571

Source: FAO Fisheries Statistics for 2003.

Figure 3: Summary Fish Trade by Sub-Region 2003

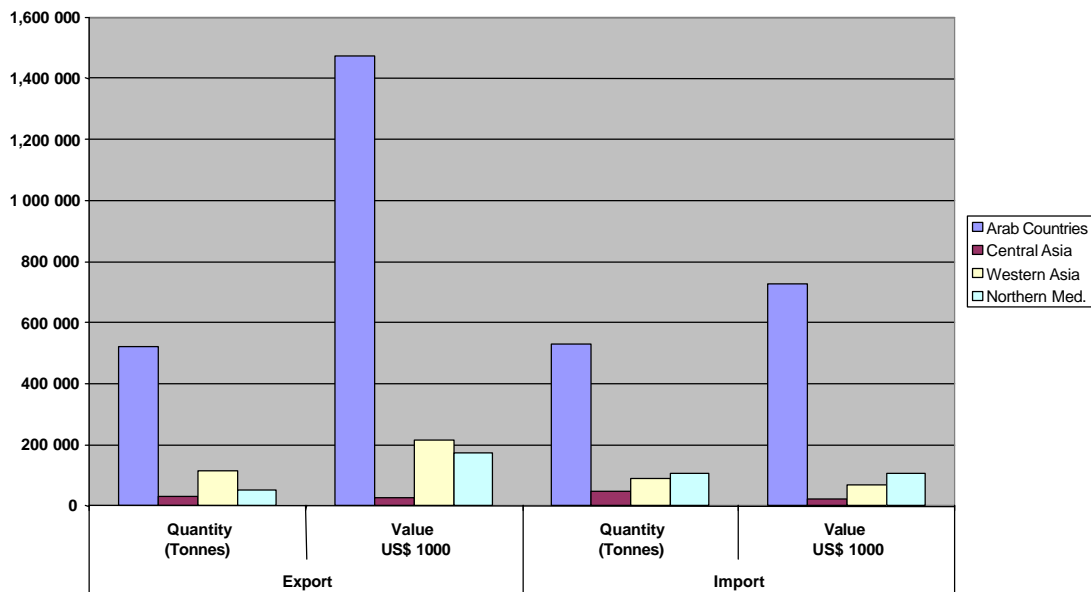


Table 7: Population and Projected Fish Demand by Country in Near East Region

Country	2003			2015		
	Population (millions) 1	Total Fish Supply (tonnes) 2	Per Capita Kg/annum 3	Projected Population (millions) 4	Ave. Ann. Growth (%) 5	Projected Fish Demand (tonnes) 6 (4x3)
Afghanistan	23.9	900	0.04	41.4	2.70	1,559
Algeria	31.8	165,725	5.2	38.1	1.50	198,558
Azerbaijan	8.2	11,665	1.4	9.1	0.80	12,945
Bahrain	0.7	10,741	15.3	0.9	1.70	13,810
Cyprus	0.8	17,979	22.5	0.9	0.50	20,226
Djibouti	0.7	156	0.2	0.9	2.30	201
Egypt	67.6	1,075,242	15.9	88.2	2.00	1,402,904
Iran	66.4	413,574	6.2	79.9	1.20	497,659
Iraq	24.7	25,216	1.0	36.5	2.70	37,262
Jordan	5.3	21,604	4.1	7.0	2.40	28,534
Kazakhstan	14.9	27,915	1.9	14.9	0.60	27,915
Kuwait	2.4	26,057	10.9	3.4	1.70	36,915
Kyrgyzstan	5.1	5,654	1.1	5.9	n.a.	6,541
Lebanon	4.5	27,947	6.2	4.0	1.70	24,842
Libya	5.6	66,414	11.9	7.0	2.40	83,018
Malta	0.4	22,941	57.4	0.4	0.20	22,941
Mauritania	2.8	43,828	15.7	4.0	2.70	62,611
Morocco	30.1	367,714	12.2	36.2	1.60	442,234
Oman	2.6	95,527	36.7	3.2	2.20	117,572
Pakistan	148.4	289,062	1.9	193.4	2.40	376,715
Qatar	0.6	12,871	21.5	1.0	1.60	21,452
Saudi Arabia	22.5	149,297	6.6	30.8	3.00	204,371
Somalia	9.6	15,444	1.6	11.0	2.90	17,696
Sudan	33.5	58,190	1.7	44.0	2.80	76,428
Syria	17.4	38,425	2.2	23.8	2.40	52,558
Tajikistan	6.3	1,207	0.2	7.9	1.90	1,513
Tunisia	9.9	106,459	10.8	11.1	1.10	119,363
Turkey	70.7	531,646	7.5	82.6	1.40	621,131
Turkmenistan	4.9	15,095	3.1	5.5	1.60	16,943
United Arab Emirates	4	117,933	29.5	5.6	1.40	165,106
Uzbekistan	25.6	8,470	0.3	30.7	1.60	10,158
Yemen	19.2	141,100	7.3	28.5	3.30	209,445
TOTAL	671	3,911,997	5.83	857.8	1.90	4,931,126

Source: 1. 2003 Population data from World Development Indicators Database.
2. 2015 Population Projections from Population Division of the Department of Economics & Social Affairs of the United Nations Secretariat, World Population Prospects.

3. Fisheries Data from FAO Fisheries Statistics – 2005.

4. Discrepancies in computed calculations due to computer rounding.

Table 7.a: Projected Fish Demand in Arab Countries

Country	2003			2015	
	Population (millions) 1	Total Fish Supply (tonnes) 2	Per Capita Kg/annum 3	Projected Population (millions) 4	Projected Fish Demand (tonnes) 5 (4*3)
Algeria	31.8	165,725	5.2	38.1	198,558
Bahrain	0.7	10,741	15.3	0.9	13,810
Djibouti	0.7	156	0.2	0.9	201
Egypt	67.6	1,075,242	15.9	88.2	1,402,904
Iraq	24.7	25,216	1.0	36.5	37,262
Jordan	5.3	21,604	4.1	7.0	28,534
Kuwait	2.4	26,057	10.9	3.4	36,915
Lebanon	4.5	27,947	6.2	4.0	24,842
Libya	5.6	66,414	11.9	7.0	83,018
Mauritania	2.8	43,828	15.7	4.0	62,611
Morocco	30.1	367,714	12.2	36.2	442,234
Oman	2.6	95,527	36.7	3.2	117,572
Qatar	0.6	12,871	21.5	1.0	21,452
Saudi Arabia	22.5	149,297	6.6	30.8	204,371
Somalia	9.6	15,444	1.6	11.0	17,696
Sudan	33.5	58,190	1.7	44.0	76,428
Syria	17.4	38,425	2.2	23.8	52,558
Tunisia	9.9	106,459	10.8	11.1	119,363
United Arab Emirates	4.0	117,933	29.5	5.6	165,106
Yemen	19.2	141,100	7.3	28.5	209,445
TOTAL	295.5	2,565,889	8.68	385.2	3,314,879

Table 7.b: Proposed Fish Demand in Central Asia

Country	2003			2015	
	Population (millions) 1	Total Fish Supply (tonnes) 2	Per Capita Kg/annum 3	Projected Population (millions) 4	Projected Fish Demand (tonnes) 5 (4*3)
Azerbaijan	8.2	11665	1.4	9.1	12,945
Kazakhstan	14.9	27,915	1.9	14.9	27,915
Kyrgyzstan	5.1	5,654	1.1	5.9	6,541
Tajikistan	6.3	1,207	0.2	7.9	1,513
Turkmenistan	4.9	15,095	3.1	5.5	16,943
Uzbekistan	25.6	8,470	0.3	30.7	10,158
TOTAL	65	70,006	1.08	74	76,015

Table 7.c: Projected Fish Demand in Western Asia

Country	2003			2015	
	Population (millions) 1	Total Fish Supply (tonnes) 2	Per Capita Kg/annum 3	Projected Population (millions) 4	Projected Fish Demand (tonnes) 5 (4*3)
Afghanistan	23.9	900	0.04	41.4	1,559
Iran	66.4	413,574	6.2	79.9	497,659
Pakistan	148.4	289,062	1.9	193.4	376,715
TOTAL	238.7	703,536	2.95	314.7	875,934

Table 7.d: Projected Fish Demand in Northern Mediterranean

Country	2003			2015	
	Population (millions) 1	Total Fish Supply (tonnes) 2	Per Capita Kg/annum 3	Projected Population (millions) 4	Projected Fish Demand (tonnes) 5 (4*3)
Cyprus	0.8	17,979	22.5	0.9	20,226
Malta	0.4	22,941	57.4	0.4	22,941
Turkey	70.7	531,646	7.5	82.6	621,131
TOTAL	71.9	572,566	7.96	83.9	664,298

Table 7.e: Summary Projected Fish Demand by Sub-Region

Sub-Regions	2003			2015	
	Population (millions) 1	Total Fish Supply (tonnes) 2	Per Capita Kg/annum 3	Projected Population (millions) 4	Projected Fish Demand (tonnes) 5 (4*3)
Arab Countries	295.5	2,565,889	8.68	385.2	3,314,879
Central Asia	65.0	70,006	1.08	74.0	76,015
Western Asia	238.7	703,536	2.95	314.7	875,934
Northern Med.	71.9	572,566	7.96	83.9	664,298
TOTAL	671.1	3,911,997	5.83	857.8	4,931,126

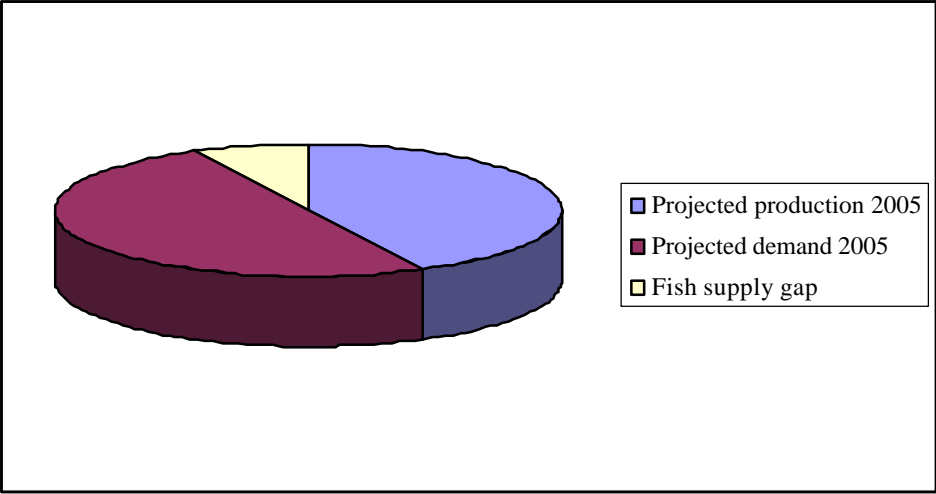
Table 8: Projected Fish Production, Demand and Supply Gap per Sub-Region – 2015

Country	Av. Annual Production Growth % (2000-2003) 1	Projected Production for human consumption 2015 (tonnes) 2	Projected Population 2015 (millions) 3	Projected Fish Demand for human consumption 2015 (tonnes) 4	Per Capita Kg/annum 2003 5	Projected Fish Supply Gap 2015 (tonnes) 6 (2-4)
Arab Countries	4%	2,781,549	385.2	3,314,879	8.68	-533,329
Central Asia	-3%	22,561	74.0	76,015	1.08	-53,455
Western Asia	0.3%	916,382	314.7	875,934	2.95	40,449
North Mediterranean	-5%	475,401	83.9	664,298	7.96	-188,897
TOTAL	1%	4,195,893	857.8	4,931,126	5.83	-735,233

Source: Computer calculations based on actual FAO Fisheries Statistics of four-year average growth in production of FAO Yearbook species for consumption (2000-2003), Projected Population and projected *per capita* consumption (given).

Note: Discrepancies in calculations due to rounding.

Figure 4: Projected Fish Production, Demand and Supply Gap per Country - Near East Region 2015



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