March 2011

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منظمة الأغذية والزراعة للأمم المتحدة | 联合国粮食及农业组织 | Food and Agriculture Organization of the United Nations | Organisation des Nations Unies pour l'alimentation et l'agriculture | Продовольственная и сельскохозяйственная организация Объединенных Наций | Organización de las Naciones Unidas para la Agricultura y la Alimentación

REGIONAL COMMISSION FOR FISHERIES (RECOFI)

Sixth Session

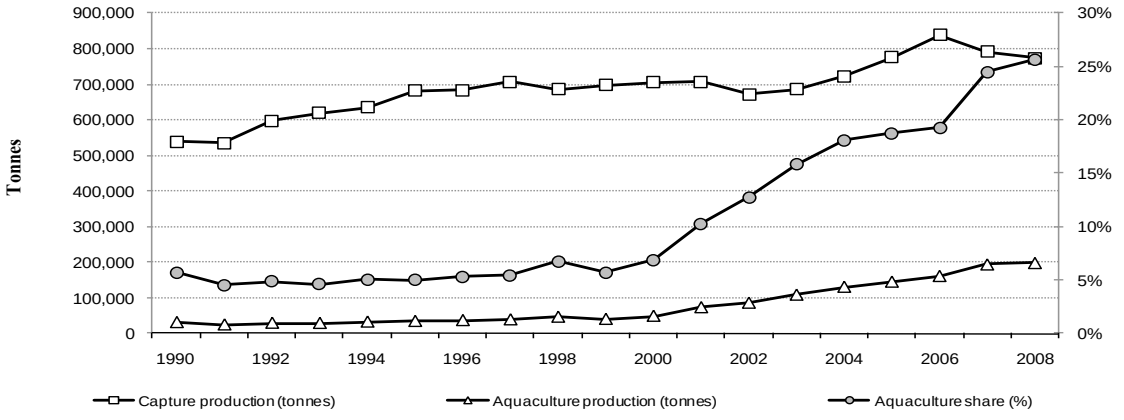
Rome, Italy, 10–12 May 2011

AQUACULTURE IN THE RECOFI AREA

AQUACULTURE PRODUCTION OVERVIEW

1. Aquaculture production in the RECOFI countries[1] has continued to increase slowly but steadily since the reporting at the Fifth session of the Commission (Dubai, United Arab Emirates, 12–14 May 2009). At this session the production statistics reported were up to 2007. In 2007 the total aquaculture production of 194 226 tonnes represented a share of 25 percent of the total fisheries production (or 986 353 tonnes), while in 2008 the share increased by one percent. In 2008 the total recorded aquaculture output in the RECOFI countries, as reported in the FAO statistics, was 198 202 tonnes, i.e. an additional 4 000 tonnes compared to the previous year. Over the last decade the total production from capture fisheries (including marine and inland production) in the region has been relatively constant at around 700 000 tonnes/year. In 2006 the production from capture fisheries reached a record high of 838 382 tonnes which then dropped again in 2007 and in 2008 to 773 000[2] tonnes suggesting a stronger fishing effort in the region and decline of commercial stocks. Thus the aquaculture production share for 2008 indicates an active fish farming sector as shown in Figure 1.

Figure 1: Total fisheries production in the RECOFI countries
(including all marine and inland production)



The growth of aquaculture production in the region is further detailed by country (Table 1), and by ISSCAAP[3] species group and individual species (Table 2 and 3).

[1] The FAO FishStat provides only capture fisheries data for the RECOFI region and not for aquaculture. The production statistics analysed in this document are those reported by the RECOFI Members to FAO and include total marine and inland productions at the country level.

[2] In 2008 capture production for the RECOFI region (i.e. from the Gulf and Oman Sea only) amounted to 652 182 tonnes.

[3] ISSCAAP = International Standard Statistical Classification of Aquatic Animals and Plants.

Table 1: Aquaculture production (tonnes) in the RECOFI region by country (2001–2008)[1]

Country	2001	2002	2003	2004	2005	2006	2007	2008
Iran (Islamic Rep. of)	62 550	76 817	91714	104 330	112 001	129 708	158 789	154 979
Saudi Arabia	8 218	6 744	11 824	11 172	14 375	15 586	18 497	22 253
Iraq	2 000	2 000	2 000	13 947	17 941	14 867	15 810	19 246
Kuwait	195	195	366	375	327	568	348	360
Qatar	1	0	0	0	11	36	36	36
Bahrain	0	3	4	8	3	2	1	2
United Arab Emirates	0	0	2 300	570	570	570	570	1 206
Oman	0	0	352	515	218	146	175	120
TOTAL	**72 964**	**85 759**	**108 560**	**130 917**	**145 446**	**161 483**	**194 226**	**198 202**

Note : 'F' indicates FAO estimate, '…' indicates the data are not available, '-' indicates zero production.

Table 2: Aquaculture production (tonnes) in the RECOFI countries by ISSCAAP species groups (2001–2008).

Species	2001	2002	2003	2004	2005	2006	2007	2008
Carps, barbells, cyprinids	44 750	56 801	63 084	77 596	86 266	90 659	111 372	102 042
Tilapias, other cichlids	3 997	2 035	2 782	2 672	3 188	4 374	4 220	4114
Miscellaneous fresh. fishes	25	30	35	30	32	25	46	80
Sturgeons, paddlefishes	-	-	-	-	-	-	-	20
Salmons, trouts, smelts	12 170	16 026	23 138	30 000	34 760	46 275	58 761	62 630
Miscellaneous diadromous	-	-	-	-	-	-	-	18
Miscellaneous coastal fishes	242	227	2 869	2 970	6 091	2 533	2 438	6 650
Tunas, bonitos, billfishes	-	-	-	14	5	32	10	...
Marine fishes not identified	-	-	-	-	-	-	-	-
Freshwater crustaceans	23	30	30	27	268	270	258	278
Shrimps, prawns	11 757	10 610	16 622	17 608	14 836	17 315	17 121	22 370
TOTAL	**72 964**	**85 759**	**108 560**	**130 917**	**145 446**	**161 483**	**194 226**	**198 202**

Note : 'F' indicates FAO estimate, '…' indicates the data are not available, '-' indicates zero production.

2. In the RECOFI countries, marine aquaculture production in 2008 accounted for 10 percent (or 19 697 tonnes) of the total aquaculture production, an increase of two percent from the previous year. From Figure 2 it appears that this aquaculture sub-sector is growing steadily but at a relatively slow pace. If the marine and brackish water production is combined the production in 2008 accounted for 12 percent (or 24 174 tonnes) of the total aquaculture production. Worth noting that the combined sectors show an important and steady increase since the beginning of the 1990s. The production peak in 2003 as shown in Figure 2 was the result of a peak production of two introduced marine finfish species from the Mediterranean Sea (i.e. the gilthead seabream, *Sparus aurata*, and the European seabass, *Dicentrarchus labrax*, or 1 081 tonnes and 763 tonnes, respectively – see Table 3) and of the endemic Sobaity seabream (*Sparidentex hasta*) (967 tonnes). The production of these three species dropped in the subsequent years with only the gilthead seabream reaching a peak production of 1 560 tonnes in 2008 (mainly in cage culture operations). This latter species is currently the only marine finfish actively farmed in cages in the RECOFI area.

3. The United Arab Emirates continues to be the leading country in the RECOFI area with regards to marine aquaculture production. Of the 1 560 tonnes of gilthead seabream produced in 2008 over 68 percent was produced in the United Arab Emirates followed by Saudi Arabia, using imported seed material. The United Arab Emirates also remains the lead aquaculture producer of the endemic Sobaity seabream. However, the cage production of this species dropped considerably from 967 tonnes in 2003 to 141 tonnes in 2008 (as for the European seabass) mainly due to

[1] FAO Fisheries and Aquaculture Statistics and Information Service. 2010 & 2011. Capture production 1950-2009. Aquaculture production 1950-2008. FISHSTAT Plus - Universal software for fishery statistical time series [online or CD-ROM]. Food and Agriculture Organization of the United Nations. Available at: http://www.fao.org/fishery/statistics/software/fishstat

4. sporadic, but increasingly more frequent, adverse environmental issues (mainly outbreaks of harmful algal blooms – HABs) faced by cage farms located off Dibba on the east coast of the United Arab Emirates.

5. The large majority of the marine/brackish water production in the RECOFI countries of the Indian white prawn (*Penaeus indicus*; or 19 793 tonnes in 2008) with the Kingdom of Saudi Arabia (17 912 tonnes; mainly if not exclusively along the coast of the Red Sea) being the top producer while productions have dropped in the Islamic Republic of Iran (from 5 700 to 1 795 tonnes from 2006 to 2008, respectively). The status of marine aquaculture production by RECOFI country is graphically represented in Figure 3.

6. In terms of inland aquaculture, which accounts for 90 percent of the entire regional sector output, the top species produced still remains the rainbow trout (*Oncorhynchus mykiss*) entirely produced in the Islamic Republic of Iran (or 62 630 tonnes). The four carp species cultured in the region, i.e. the silver, common, grass and bighead carps, accounted for about 51 percent (or 102 042 tonnes) of total production in 2008 (a 6 percent drop from 2007).

Table 3: Aquaculture production (tonnes) in the RECOFI countries by individual species (2001–2008)

Species (English name)	Species (Scientific name)	2001	2002	2003	2004	2005	2006	2007	2008
Rainbow trout	*Oncorhynchus mykiss*	12 170	16 026	23 138	30 000	34 760	46 275	58 761	62 630
Silver carp	*H. molitrix*	26 285	33 977	37 872	38 148	43 128	43 615	54 594	50 723
Common carp	*Cyprinus carpio*	11 915	15 700	17 271	25 062	26 699	30 542	36 316	32 283
Indian white prawn	*Penaeus indicus*	11757	10 610	16 622	17 608	14 836	17 315	17 121	19 793
Grass carp	*C. idellus*	4 135	3 836	4 276	11 116	12 769	12 629	15 599	14 652
Bighead carp	*H. nobilis*	2 415	3 288	3 665	3 270	3 670	3 873	4 863	4 384
Nile tilapia	*Oreochromis niloticus*	3 934	1 870	2 602	2 552	3 103	3 995	3 935	4 009
Whiteleg shrimp	*Penaeus vannamei*	-	-	-	-	-	...	...	2 577
Gilthead seabream	*Sparus aurata*	43	43	1 081	650	512	315	325	1 560
Giant river prawn	*M. rosenbergii*	23	30	30	27	268	270	258	278
Sobaity seabream	*Sparidentex hasta*	55	58	967	296	192	191	191	141
Sabaki tilapia	*Oreochromis spilurus*	63	165	180	120	85	379	285	105
North African catfish	*Clarias gariepinus*	25	30	35	30	32	25	46	80
Barramundi	*Lates calcarifer*	-	-	-	-	-	-	-	18
Flathead grey mullet	*Mugil cephalus*	35	20	22	18	...	...	12	10
Orange-spot. grouper	*Epinephelus coioides*	3	3	...	...	...	...	-	1
Blue tilapia	*Oreochromis aureus*	-	-	-	-	-	-	-	-
European seabass	*Dicentrarchus labrax*	...	...	763	217	218	190	190	-
Goldlined seabream	*Rhabdosargus sarba*	0	0	0	-	-	-	-	-
Greasy grouper	*Epinephelus tauvina*	0	0	0	-	-	-	-	-
Green tiger prawn	*Penaeus semisulcatus*	0	0	0	-	-	-	-	-
White-spot. spinefoot	*Siganus canaliculatus*	1	0	1	1	1	1	-	-
Yellowfin seabream	*Acanthopagrus latus*	0	0	0	13	0	0	-	-
Bluespot mullet	*Valamugil seheli*	...	...	...	...	10	30	...	...
Giant tiger prawn	*Penaeus monodon*	...	...	...	...	...	...	...	...
Goldsilk seabream	*Acanthopagrus berda*	78	78	...	...	...	...	-	...
Mangrove red snapper	*L. argentimaculatus*	...	...	...	1	-	-	-	...
Yellowfin tuna	*Thunnus albacares*	-	-	-	14	5	32	10	...
Others	---	27	25	35	1 774	5 158	1 806	1 720	4 958
TOTAL		**72 964**	**85 759**	**108 560**	**130 917**	**145 446**	**161 483**	**194 226**	**198 202**

Note : 'F' indicates FAO estimate, '…' indicates the data are not available, '-' indicates zero production.

7. The farmed production of other marine finfish species in the region is still very low, not only due to the difficulties with identifying suitable and available culture sites, but also due to the difficulties in sourcing supplies of the juvenile commercial species. Considerable interest exists in the region in farming several species of groupers, particularly the orange-spotted grouper (*Ephinephelus coicoides*), but little success has been so far achieved by the existing and active state aquaculture research institutions (e.g. in Bahrain, Kuwait and Saudi Arabia) in the mass production of fish juveniles. Research on several species of groupers and other commercially valuable finfish species

is ongoing in both state and private facilities (e.g. the work being conducted by the National Prawn Company – NPC – in Saudi Arabia on the greater amberjack, *Seriola dumerilii*.

8. In addition to the work focused on marine finfish species some of the countries in the region are increasingly placing attention to alternate aquaculture species other than finfish, including echinoderms – sea cucumbers and sea urchins (e.g. the sandfish *Holothuria scabra*) and gastropods (e.g. the Omani abalone *Haliotis mariae*). So far little attention has been channeled by the region on molluscan bivalve species although some countries realize that this group of marine organisms offer an opportunity to expand the output of the sector.

Figure 2: Total aquaculture production in RECOFI countries

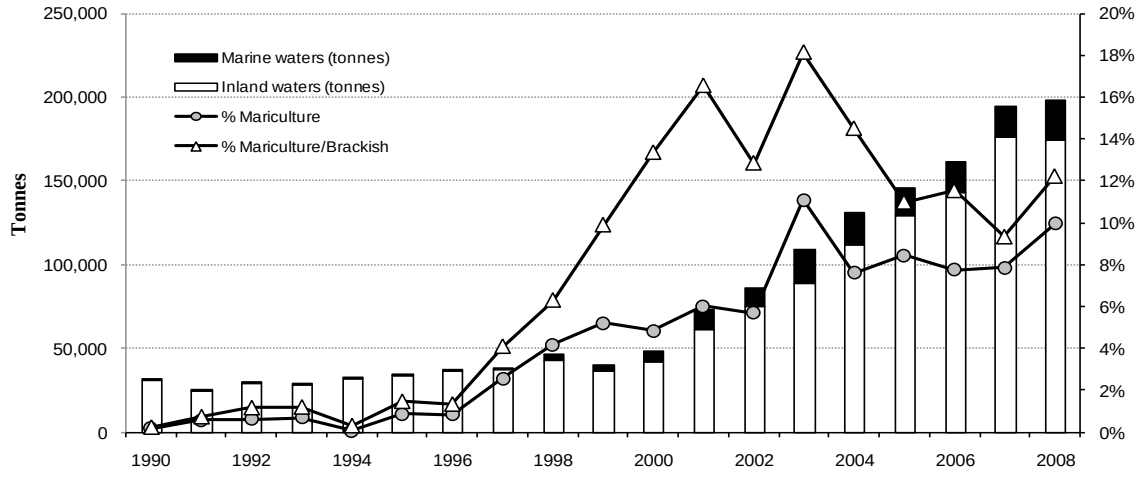
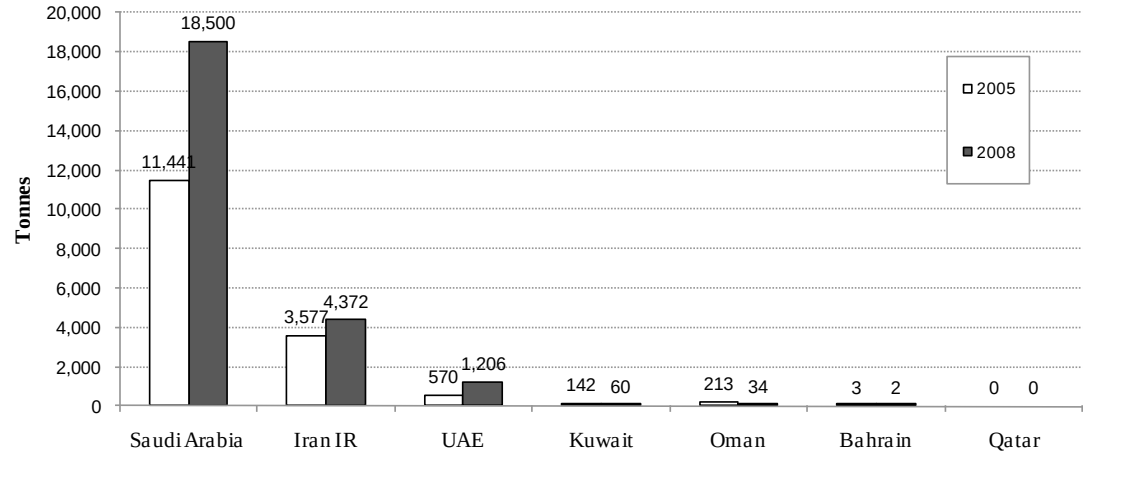


Figure 3: Marine and brackish water aquaculture in RECOFI countries



DEVELOPMENT OPPORTUNITIES

9. The most common factor driving the growth of aquaculture in the region has been, and probably will continue to be, the need to increase the domestic food supply, partly because the wild catch may be unstable or decreasing particularly for some commercial species. From within the sector, technical and organization progress, and improvements in infrastructure, are also important driving forces. Suitable funding (government and/or private), investment, and an organized legal framework (including effective certification and licensing) are still crucial to support aquaculture development across the region.

10. Following the implementation of regional activities, meetings and discussion groups under the *aegis* of the RECOFI Working Group on Aquaculture (WGA) and other national and regional organizations it is evident that addressing production technology issues, marketing and processing, bio-security issues (animal health and diseases), and policies and regulations still require substantial attention at both national and regional levels to ensure a continued and sustainable growth of the aquaculture sector.

11. Limited availability of suitable sites for new aquaculture activities is problem in the region, due to shortage of land, insufficient freshwater, insufficient tidal fluctuation for land-based culture, and few marine sites suitable and available for existing systems. Further challenges for some countries, particularly those with a developing aquaculture sector, is adequate supply of finfish fry/fingerlings and reliance on imported fish feed. Furthermore, there is recognition that more research is needed to identify local endemic species particularly of finfish that are suitable for aquaculture in order also to avoid the introduction of exotic species to ensure customer acceptability of the products produced.

12. **Policy and institutional aspects –** Effective policies, legal frameworks and institutions are necessary prerequisites for the development of aquaculture by the private sector (both within the region and foreign. Many countries in the region still lack in-depth regulations focused on governing the aquaculture sector, from licensing procedures, environmental impact assessment and monitoring requirements, to site selection procedures. The need to strengthen institutional aspects regulating the industry was taken by the WGA on several meetings including at workshops on aquatic animal health (Jeddah, Saudi Arabia, 6–10 April 2008)[1] and on cage aquaculture development (Muscat, Oman, 25–26 January 2009)[2].

13. **Aquaculture zoning –** In view of the different physical characteristics of the coastline in the region, the potential for developing a significant aquaculture industry will differ between the countries. The need for proper site identification and aquaculture zoning will certainly help reduce conflicts of interest among the different and potential users of the coastal and marine environment.

14. The need for adequate coastal zoning was recognized and endorsed by all of the RECOFI countries. In May 2009 a joint WGA and WGFM regional workshop on spatial planning for marine capture fisheries and aquaculture was held in Doha, Qatar. The main outcome of this workshop, i.e. the drafting of a draft regional strategy for implementing spatial planning in by marine capture fisheries and aquaculture, will be presented at the sixth session of the Commission. It is noted that some of the countries in the region, notably the Sultanate of Oman, have advanced considerably in aquaculture zoning. An opportunity now exists at the regional level to join forces to address issues that are common for spatial planning and to strengthen regional cooperation for the implementation of the proposed strategy.

15. **Aquaculture licensing and the environment –** The need to focus on issues related to proper site selection and environmental protection is well understood in the region and endorsed by the Commission. A regional action to develop common environmental protocols is lagging behind. This may require a Member country in the region to spearhead the initiative and to promote the drafting of tailored environmental impact assessment regulations for the aquaculture sector preferably incorporated in the licensing procedures. Comprehensive aquaculture monitoring plans are need for the region, supervised by trained personnel.

16. **Aquaculture technologies –** The RECOFI WGA "Regional technical workshop on sustainable marine cage aquaculture development" in 2009 was organized in view of the growing interest of this aquaculture subsector across the region. The adoption of this farming technology among the countries in the region may certainly vary depending on the availability of suitable physical sites where to establish cage farms. For example the northwestern shores of the Gulf have limited suitable farming sites characterized by shallow waters, highly fluctuating salinity and temperature levels and inadequate sea currents. There certainly is a need to introduce alternative farming technologies such as recirculation systems (including aquaponics) in view of the prevailing geographical conditions and limitations, particularly in some of the countries, of specific natural resources. It is however important to recognize that seed

[1] FAO/Regional Commission for Fisheries. Report of the Regional Technical Workshop on Aquatic Animal Health. Jeddah, Kingdom of Saudi Arabia, 6–10 April 2008. FAO Fisheries and Aquaculture Report. No. 876. Rome, FAO. 2009. 119p.

[2] See RECOFI/V/2009/Inf.7 - FAO/Regional Commission for Fisheries. Report of the Regional Technical Workshop on Sustainable Marine Cage Aquaculture Development. Muscat, Sultanate of Oman, 25–26 January 2009. *FAO Fisheries and Aquaculture Report.* No. 892. Rome, FAO. 2009. 135p.

supply of commercial finfish species is one of the obstacles in the growth of the sector with only few existing hatcheries mainly operated by the public sector (e.g. Bahrain).

17. **Aquaculture information flow –** The need to ensure adequate information flow among the Member countries has been strongly endorsed by the Commission. One visible output resulting from such endorsement has been the establishment of the Regional Aquaculture Information System (RAIS). This system is brining under one common roof data, technical information, expertise contacts and ongoing research efforts that can be openly consulted by all stakeholders in the sector in and outside the region. All RECOFI countries are increasingly making use of this communication tool but its full potential in has yet to be fully realized.

SUGGESTED ACTION BY THE COMMISSION

18. The Commission is invited to consider the issues raised and discussed above in view of the next intersessional work plan proposed by the Working Group on Aquaculture.