Marine Aquaculture 1

PhD. student

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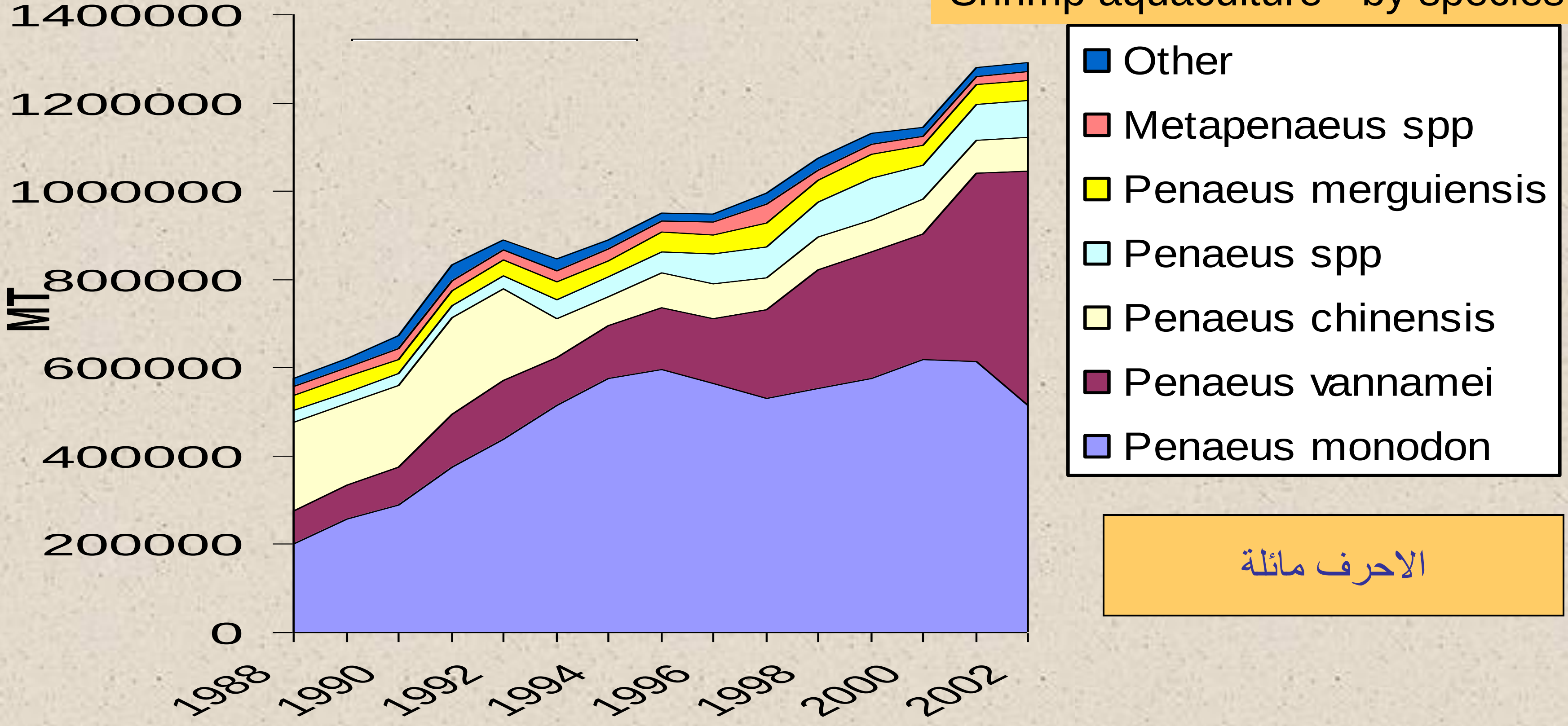
Another extraordinarily important advance was made in the 1960s, when Japanese researchers discovered that rotifers, *Brachionus plicatilis*, previously considered a pest in culture ponds, could be used as a first food for larvae of both freshwater and marine fish species (Hirata 1979). This advance clearly allowed the culture of many more species whose larvae hatched at such a small size that their mouth gapes were insufficient for the ingestion of the larger *Artemia* prey. In retrospect, considering the large number of commercially important marine fish species that have been brought into culture and that rely on rotifers as first food in culture facilities, the debt to those initial Japanese culturists is profound.

Shrimp aquaculture - by species



الاحرف مائلة

إنتاج مصايد الأسماك وتربية الأحياء المائية واستخدامه في العالم

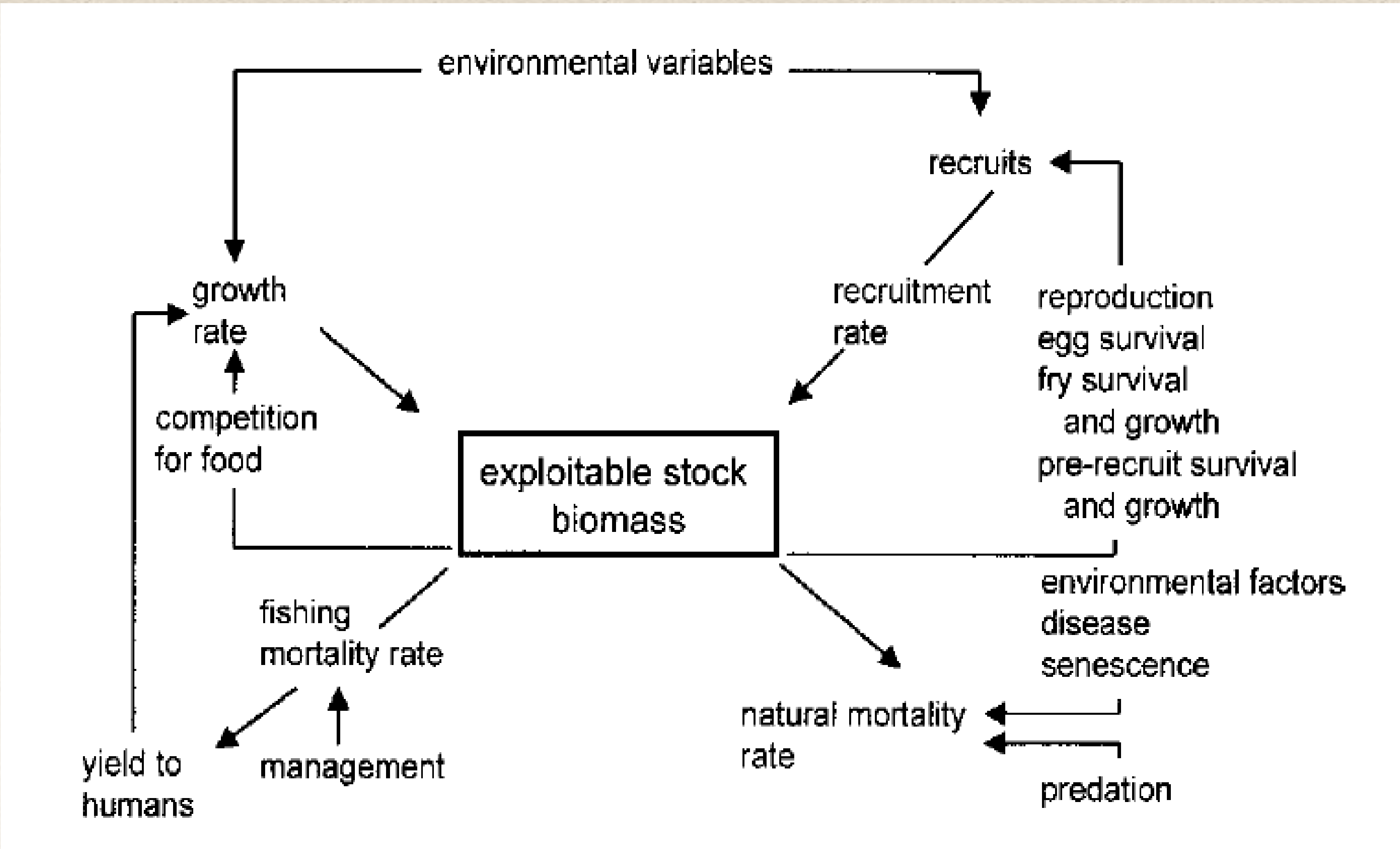
	٢٠٠٢	٢٠٠٣	٢٠٠٤	٢٠٠٥	٢٠٠٦
	(بملايين الأطنان)				
الإنتاج					
المياه الداخلية					
المصايد الطبيعية	٨,٧	٩,٠	٨,٩	٩,٧	١٠,١
تربية الأحياء المائية	٢٤,٠	٢٥,٥	٢٧,٨	٢٩,٦	٣١,٦
مجموع الإنتاج من المياه الداخلية	٣٢,٧	٣٤,٤	٣٦,٧	٣٩,٣	٤١,٧
المياه البحرية					
المصايد الطبيعية	٨٤,٥	٨١,٥	٨٥,٧	٨٤,٥	٨١,٩
تربية الأحياء المائية	١٦,٤	١٧,٢	١٨,١	١٨,٩	٢٠,١
مجموع الإنتاج من المياه البحرية	١٠٠,٩	٩٨,٧	١٠٣,٨	١٠٣,٤	١٠٢,٠
مجموع الإنتاج من المصايد الطبيعية	٩٣,٢	٩٠,٥	٩٤,٦	٩٤,٢	٩٢,٠
مجموع الإنتاج من تربية الأحياء المائية	٤٠,٤	٤٢,٧	٤٥,٩	٤٨,٥	٥١,٧
مجموع الإنتاج من مصايد العالم	١٣٣,٦	١٣٣,٢	١٤٠,٥	١٤٢,٧	١٤٣,٦
الاستخدام					
الاستهلاك البشري	١٠٠,٧	١٠٣,٤	١٠٤,٥	١٠٧,١	١١٠,٤
الاستخدامات غير الغذائية	٣٢,٩	٢٩,٨	٣٦,٠	٣٥,٦	٣٣,٣
السكان (بالمليارات)	٦,٣	٦,٤	٦,٤	٦,٥	٦,٦
نصيب الفرد من إمدادات أسماك الطعام (بالكيلوغرام)	١٦,٠	١٦,٣	١٦,٢	١٦,٤	١٦,٧

ملاحظة: باستثناء النباتات المائية.

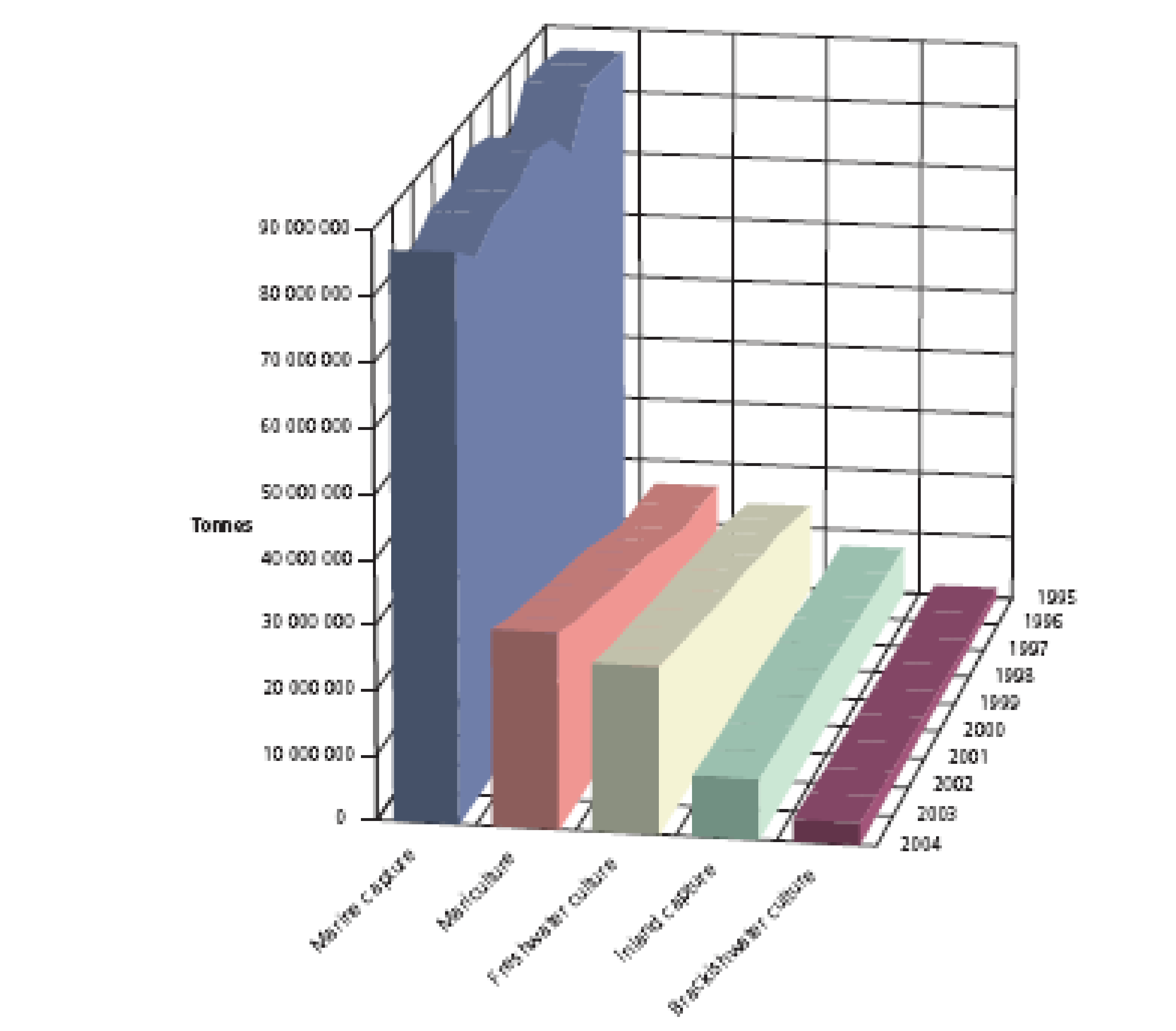
As the 1970s saw the beginning of commercial production of several marine finfish and penaeid shrimp species, this decade is also noteworthy for the discovery that live feeds vary significantly in quality One event of the 1970s played a major role in the development of marine aquaculture, especially stock enhancement: the establishment of exclusive economic zones (EEZs). This event convinced the Japanese that they needed to become self-sufficient in seafood production, because they could no longer fish at will in the coastal waters of many nations and because they saw that an interruption of supplies on an international scale was a real possibility.

The last quarter of the twentieth century saw the explosion of marine aquaculture, both shrimp and fish.

Research on other fish species in various areas of the world has led to large-scale aquaculture production of gilthead sea bream (*Sparus aurata*) and sea bass (*Dicentrarchus labrax*) in the Mediterranean region, Asian sea bass (*Lates calcarifer*) in the Indo-West Pacific region, turbot in western Europe and olive flounder (*Paralichthys olivaceus*) in east Asia, among other species a variety of species is still undergoing commercial growing pains, for example, Atlantic halibut (*Hippoglossus hippoglossus*), several groupers (*Epinephelus* spp.) and cod



Factors governing exploitable stock biomass



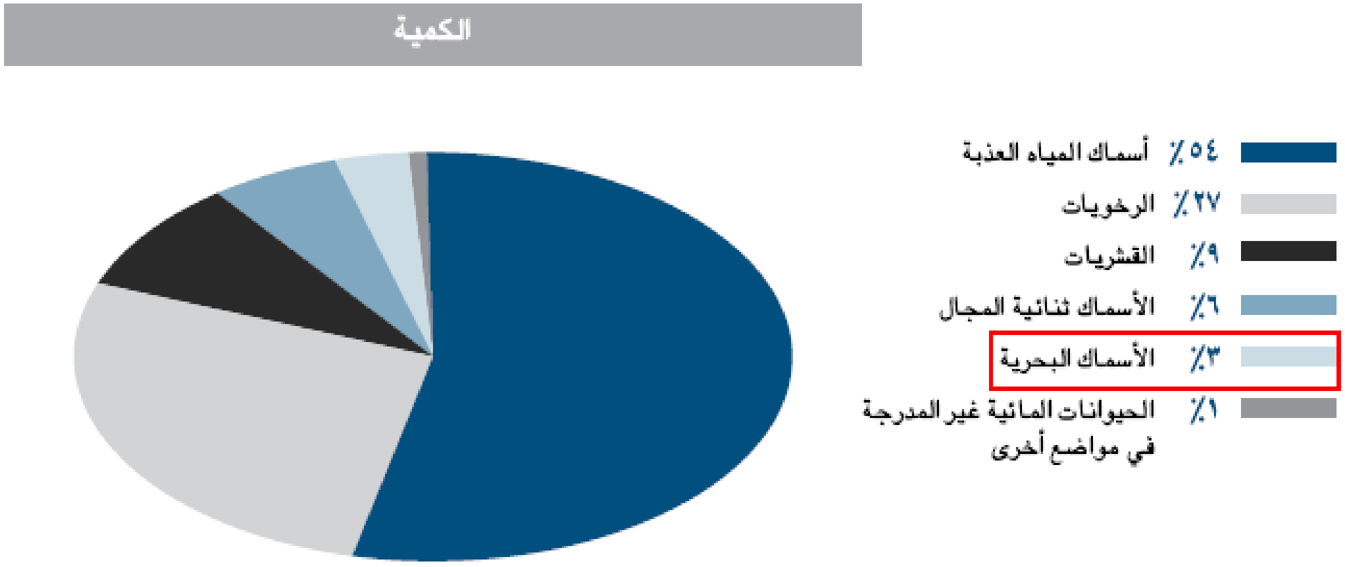
Production trends by environment in the fisheries sector 1995-2004

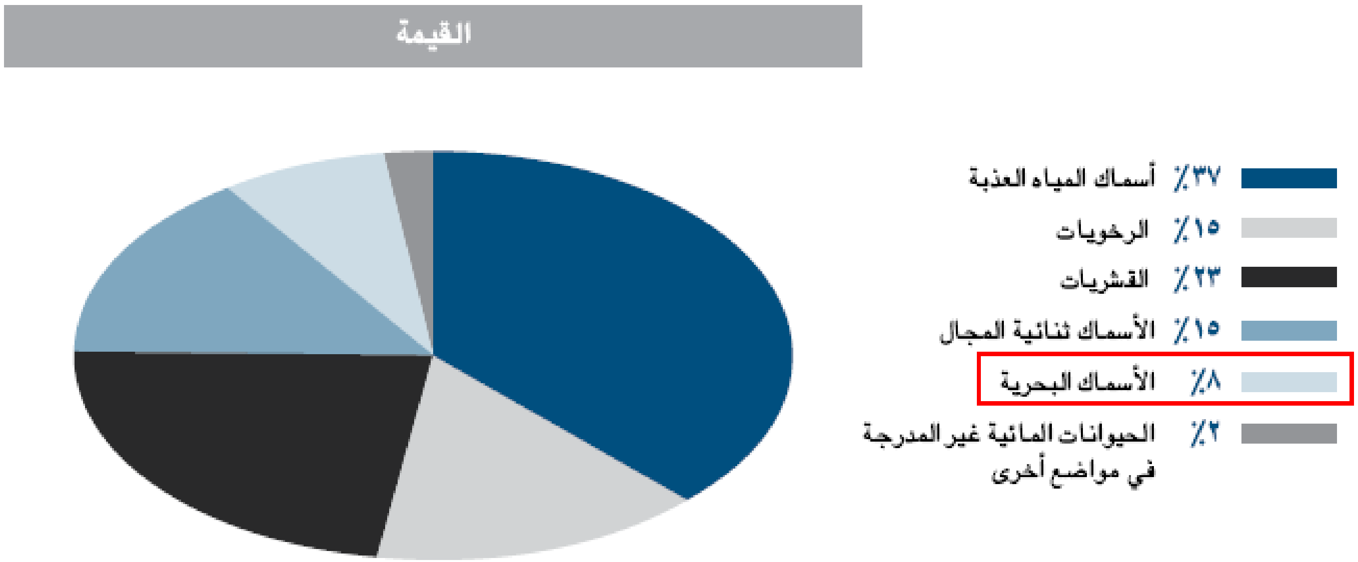
Marine Aquaculture Today and in the Future

Aquaculture makes up more than 35% of the total 92.6 million tones of fisheries products consumed by humans. Marine aquaculture has been growing by about 0.9 million tones per year in recent years, while the growth of freshwater aquaculture has been closer to 1.1 million tones per year. In 1998, the last year for which full statistics are available, aquaculture production of purely marine fish was 781,000 t, thus lagging behind crustaceans, mostly shrimp (1,564,000 t), and diadromous fish, mostly salmonids (1,909,000 t), and far behind freshwater fish, mostly carp (17,355,000 t)

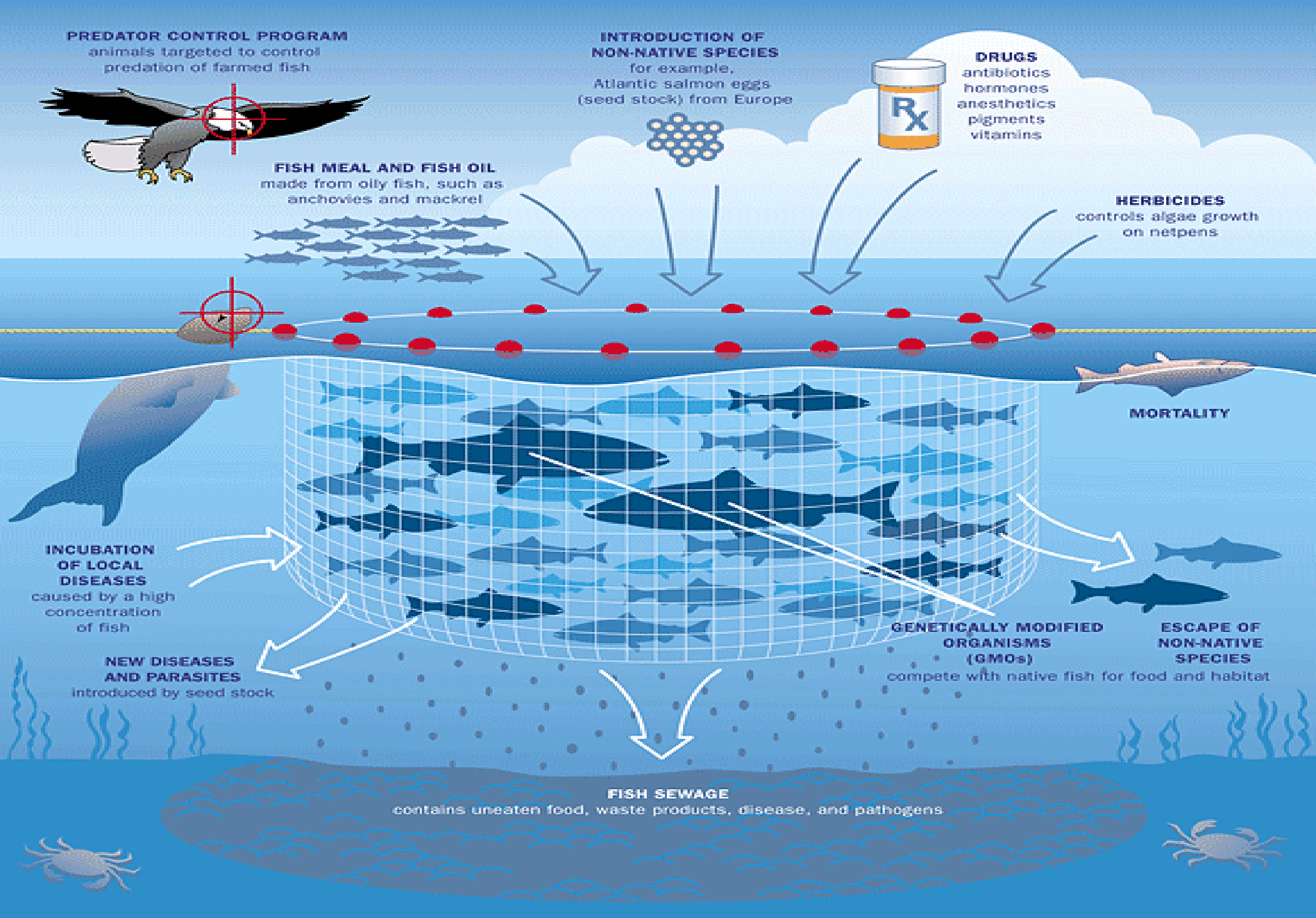
The major research endeavours in marine hatchery aquaculture today can be divided into three broad categories: 1-Improving reliability of production for existing species, 2- Development of culture methods for new species, 3- Maximizing the survival probability in the wild for hatchery-reared fish in stock enhancement programmes. Production reliability is being improved by several strategies. Selective breeding programmes for both fast growth and disease resistance should result in improved hatchery production in future years and those for improved flesh quality should ultimately yield a better product going to market. Improved management of microbial ecology in hatchery tanks through better husbandry, use of probiotics, etc., should also help production reliability. Development of vaccines, delivered by injection to older juveniles and by immersion to younger juveniles, should likewise aid in the minimization of disease problems. Finally, the search for replacements for live feed proceeds apace as the world-wide availability of *Artemia* remains a question (see below) and the culture of algae and rotifers continues to be a labour-intensive requirement for marine hatcheries.

الإنتاج العالمي من تربية الأحياء المائية: مجموعات الأصناف الرئيسية في عام ٢٠٠٦





Environmental Risks of Marine Aquaculture



Small-Scale Marine Finfish Hatchery

What is a small-scale marine fin fish hatchery?

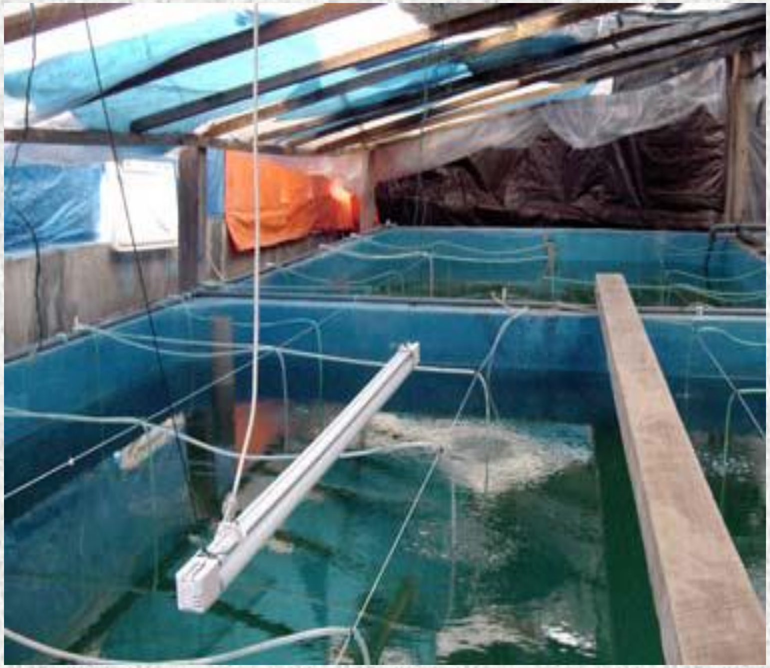
'small-scale' hatcheries as those where the capital costs and technologies are accessible at relatively low cost, and which focus on the hatchery (larval rearing) and nursery aspects of fingerling production. Small-scale hatcheries do not hold broodstock – instead they purchase fertilized eggs or newly hatched larvae from larger hatcheries.

Some marine finfish species commonly produced in small-scale hatcheries are:

- Milkfish *Chanos chanos*
- Barramundi / Asian seabass *Lates calcarifer*
- Humpback / polkadot grouper *Cromileptes altivelis*
- Tiger grouper *Epinephelus fuscoguttatus*
- Green / orange-spotted grouper *Epinephelus coioides*
- Snappers *Lutjanus* spp.

A typical small-scale hatchery unit consists of the following features:

- 2 indoor larval rearing tanks with 10 m^3 capacity
- 1 sand filter (8–10 m^3)
- outdoor live food production tanks (2–3 units each of microalgae and zooplankton tanks, with 10 m^3 and 5 m^3 capacity, respectively)
- flow-through water supply system with regular water exchange



Interior view of a small-scale hatchery showing larval rearing tanks

Concrete blocks being used to construct rearing tanks for a small hatchery