

Prospects of aquaculture development along the Persian Gulf coast of UAE: *Transfer of Australian aquaculture technologies to Middle East*

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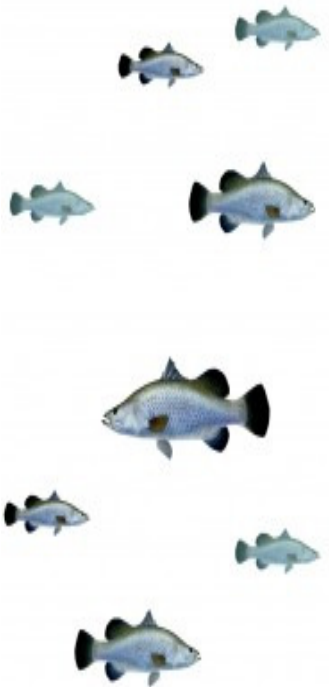
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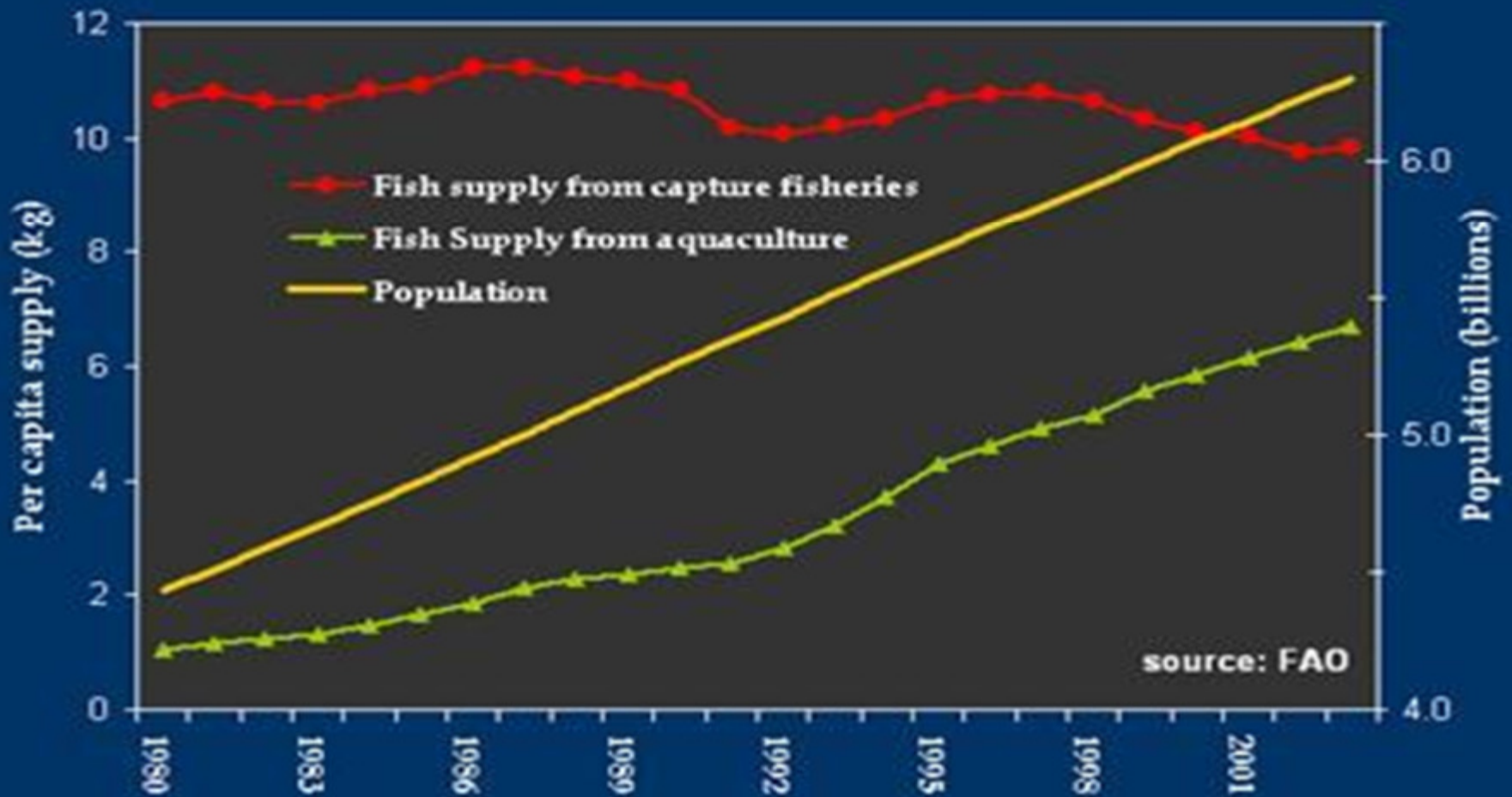


**UNITED ARAB EMIRATES
MINISTRY OF ENVIRONMENT & WATER**



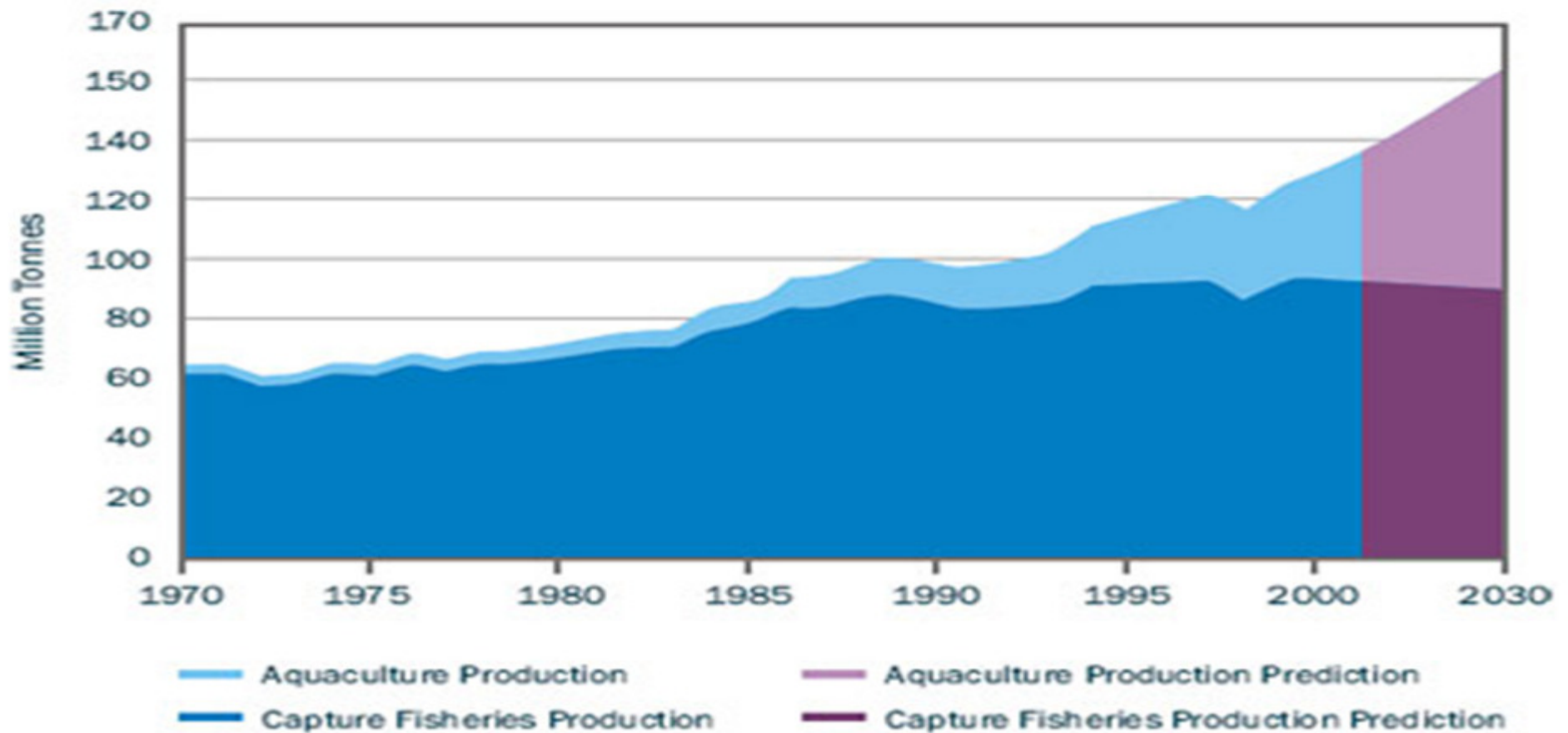
**Australian Government
Department of Agriculture**

Growing Population, Stagnant Capture Fishery, Growing Aquaculture



Fish Production & Prediction

WORLD FISH PRODUCTION



Source: FAO

Persian Gulf coast & Arabia Sea

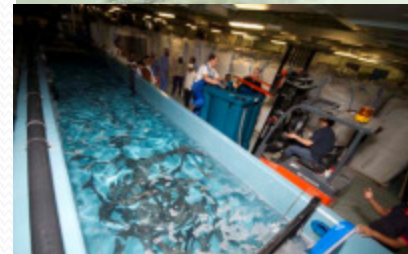


UAE WATERS



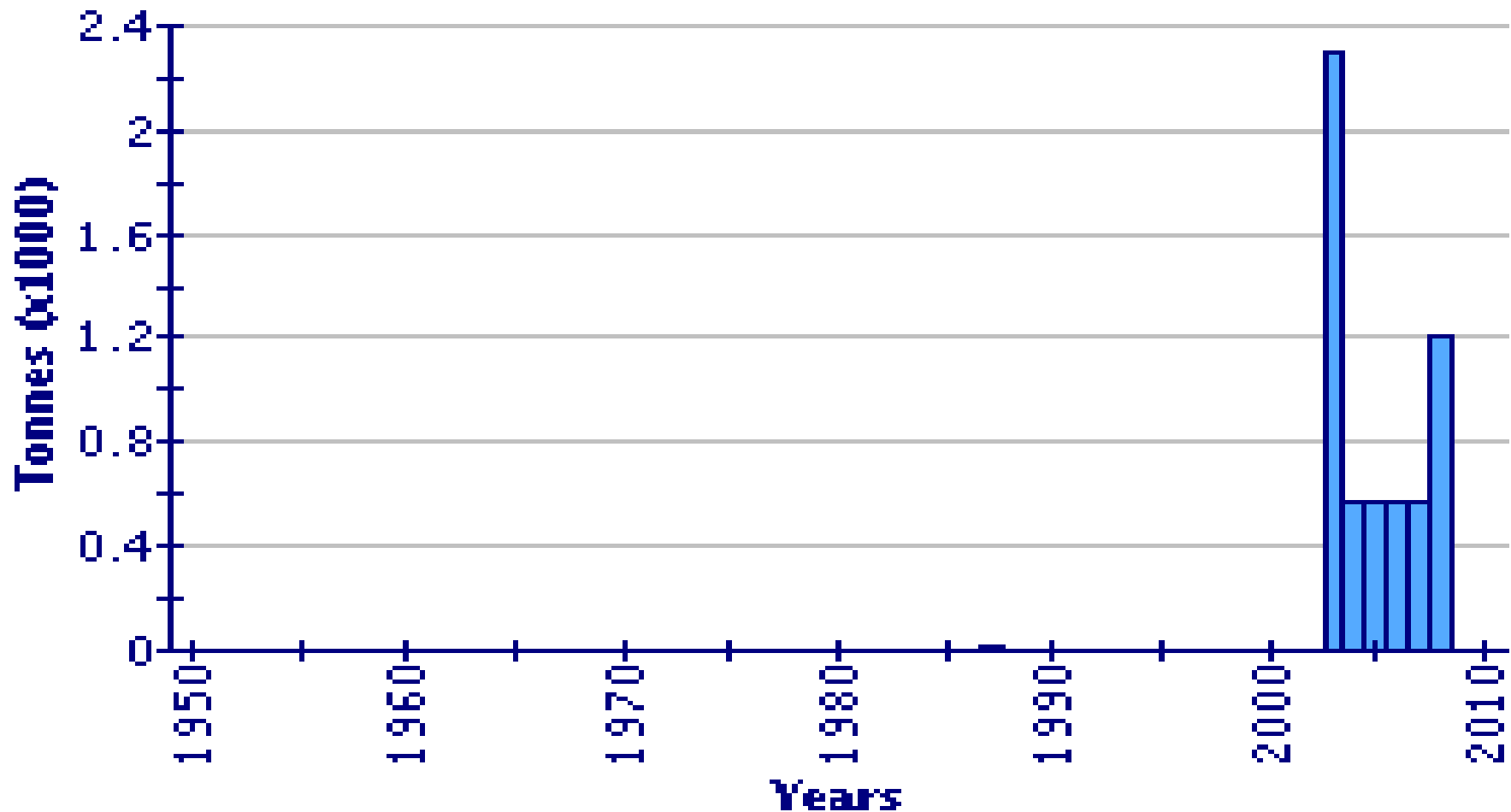
STRANGE in UAE

- **Golf Courses in desert**
- **Sky slope in a shopping mall**
- **Black Russian caviar from sturgeon farming**
- **Coldwater Norwegian salmon farming in hot desert (World's largest RAS in Abu Dhabi)**



Aquaculture Production in UAE (from 1950)

(FAO Fishery Statistic)



Fisheries Statistics UAE

- 2/3 rd. of UAE's territorial waters lie in Abu Dhabi
- Number of fishing boats rose to 6300 in 2012 from 1065 in 1976
- 20 % decline in fish stocks from 1970s level
- Hamour, brown spotted reef (cod) grouper, (*Epinephelus chlorostigma*) (a white fish used extensively in the traditional cuisine of Gulf)
- Fishery stocks now stand at just 10% of 1970s levels.
- UAE population 200,000 in 1970 rose to 8 millions in 2015
- Fish consumption, 209,000 tones
- Fish catch, 80,000 tones
- Fish import, 152,000 tones
- Fish export, 23000 tones



Why Aquaculture in UAE?

- Import driven food dependence
- Highly diverse population with high seafood consumption (an opportunity)
- High tourist inflow (an opportunity)
- Lower income disparity among the population further fueling the local seafood needs.
- Limited agriculture potential due to desert land , lack of water, too high temperatures & unsuitable soils
- Open sea suitable for aquaculture & less polluted
- Aquaculture production only 172 tones



Image Credit: Abdul Rahman/Gulf News

Potential finfish species for coastal aquaculture in UAE



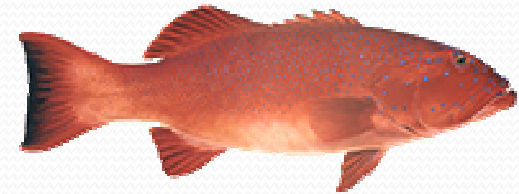
Barramundi
Asian sea bass
(*Lates calcarifer*)



Yellowtail catfish
(*Pangasius pangasius*)



Cobia
(*Rachycentron canadum*)



Coral Trout (Grouper)
(*Plectropomus leopardus*)



Mangrove Jack (red) Snapper
(*Lutjanus argentimaculatus*)



Red Hybrid Tilapia

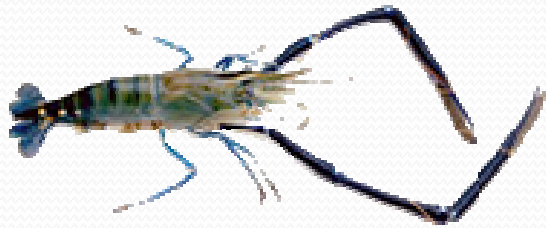


Sobaity bream (*Sparidentex hasta*)

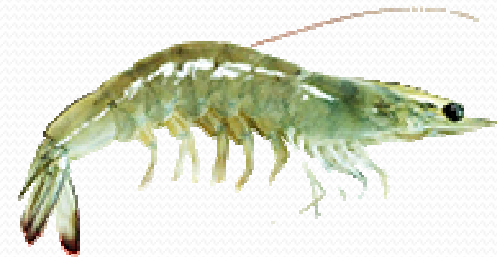


Threadfin Bream
(*Nemipterus randalli*)

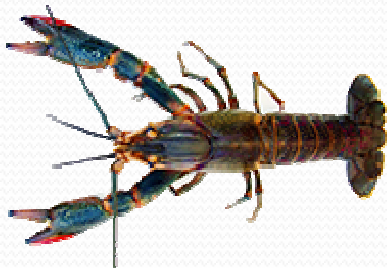
Potential crustacean species for coastal aquaculture in UAE



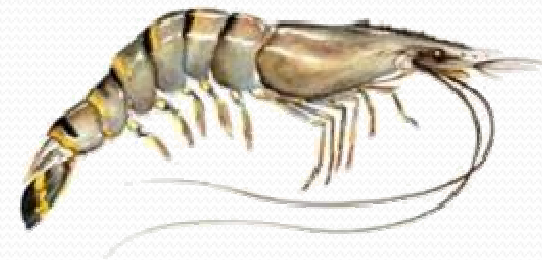
Freshwater Prawn
Macrobrachium rosenbergii



Whiteleg shrimp
Litopenaeus vannamei

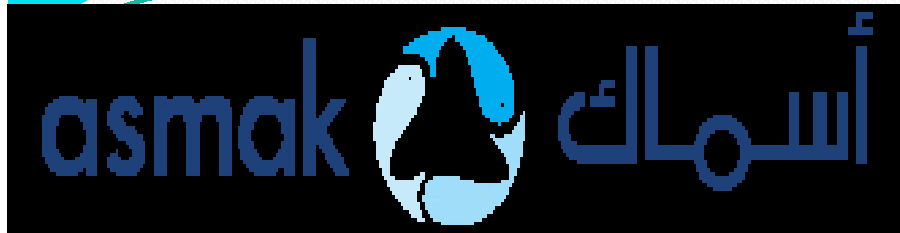


Redclaw Lobster (crayfish)
Cherax quadricarinatus



Giant tiger prawn
Penaeus monodon,

Key Aquaculture Actors in UAE



UNITED ARAB EMIRATES
MINISTRY OF ENVIRONMENT & WATER



Mubarak Marine LLC

Al Jaraf Fisheries



Arabian Bin Salem group

Marine Resources Research Centre
(MRRC), Umm Al Qaiwain



Dubai Deira Fish Market





Salmon farming in Abu Dhabi

- Salmon farming in chilled onshore pools
- Land-based Recirculation Aquaculture System (RSA in Dalma Island, Abu Dhabi)
- First onshore fish farm in Middle East
- Farm on an area of 500,000 square meters which essentially takes sea water, chills it and then re-uses it
- Farm equipped with chilled on shore pools to maintain the sea water temperature at below 13 degree Celsius in order for the salmon to survive
- A challenge to keeping water at a temperature of 13 degrees Celsius in a region where sea water temperatures can rise up to 40 degrees.
- Scandinavian technology harnessed by M/S Asmak
- Production capacity 4000 tons per year
- No threat from elevated temperatures or high tide or wave action being land based and less harmful to wild fish
- Cost USD 27 Million

Salmon Farming UAE



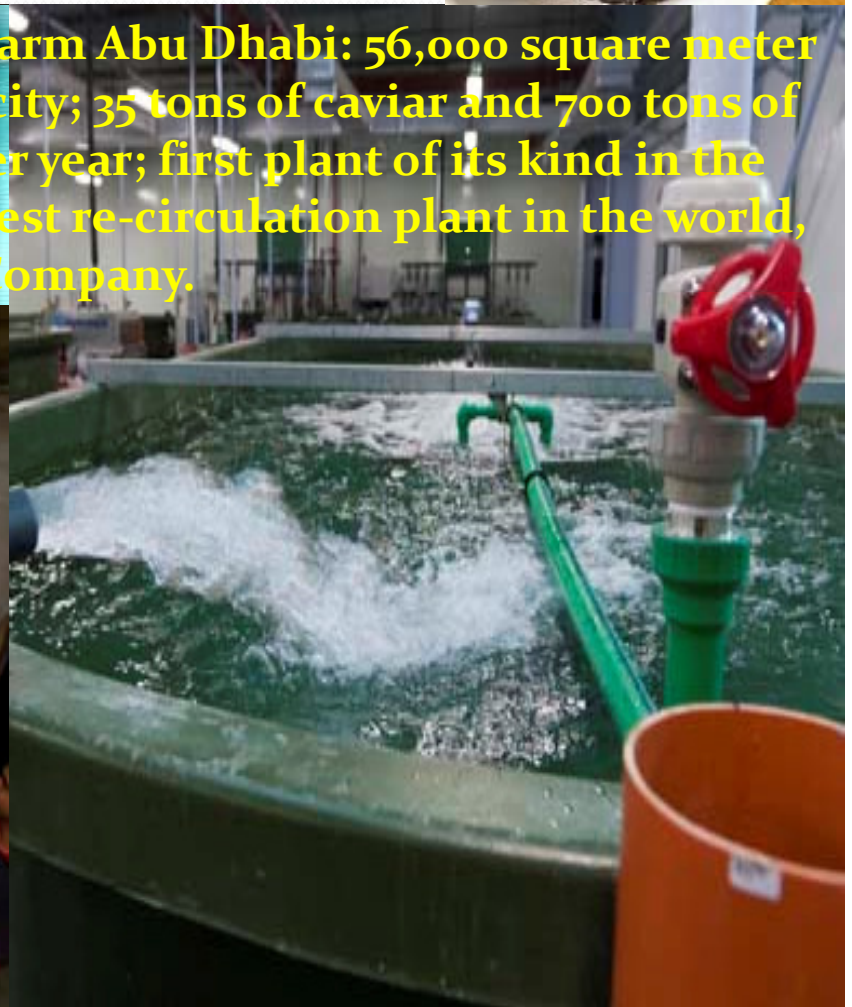
Fish From Desert

Sturgeon Farming, Abu Dhabi (Black Caviar)

Arabian Bin Salem group



Siberian Caviar Farm Abu Dhabi: 56,000 square meter production capacity; 35 tons of caviar and 700 tons of sturgeon meat per year; first plant of its kind in the Middle East; largest re-circulation plant in the world, by Royal Caviar Company.



Sturgeon Hatchlings

(Emirates Aquatechnologies, Mussafah, Abu Dhabi)

(Caviar factory for Expo 2020)



World's Largest RAS (Yasa Black Caviar, Abu Dhabi)



Marine Resources Research Centre (MRRC)

Umm Al Qaiwain.

- Fish breeding, fingerling production and stocking
- Enhancement of marine resources through release of fish fingerlings, mangrove cultivation



Marine Resources Research Centre (MRRC)

Umm Al Qaiwain.

- Transfer & development of aquaculture technology (cage culture in Diba, UAE)
- Fishing regulations to protect marine environment
- Fish biological studies & fisheries statistical surveys.
- Interaction with fishermen co-operative societies
- Tilapia culture in agriculture irrigation tanks
- Press & scientific publications
- Marine aquarium for public education & display
- Linkages & co-operation



Potential Aquaculture Methods

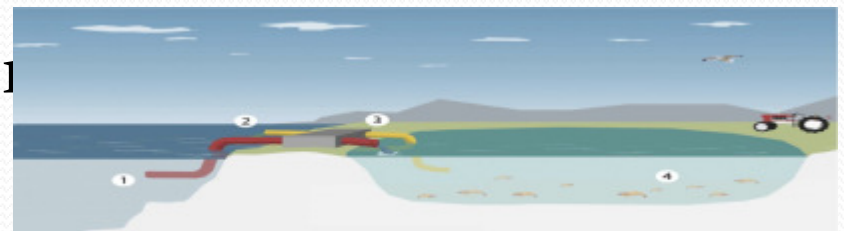
- **Open Aquaculture Systems:**
Sea-cage (active feeding)
- **Open Aquaculture Systems:**
Sticks, ropes, racks, & cages
(passive feeding)
- **Semi-closed Aquaculture System**
- **Closed Aquaculture Systems**



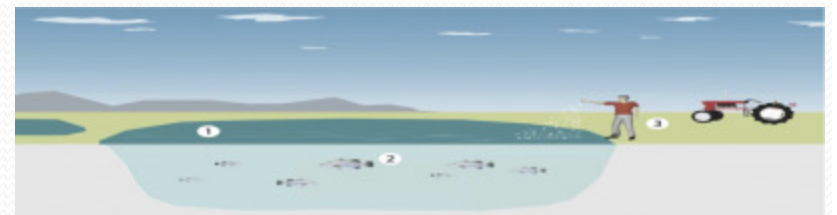
1. The cage is moored to the ocean floor 2. Fishmeal based feeds are added to the cages 3. Buoyant tubes keep the cages afloat 4. Fish faeces and waste fall through the cages



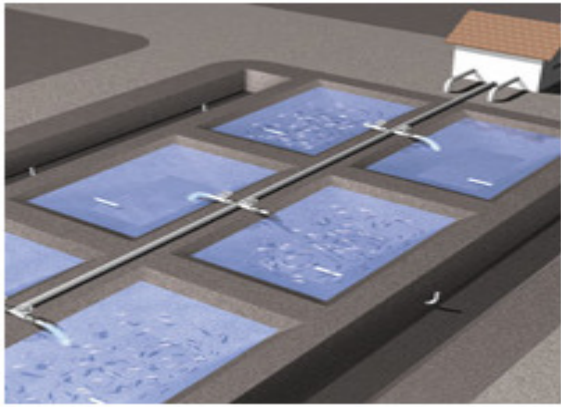
1. Mussels or oysters are grown on racks or in cages 2. Nutrients are taken from the water 3. Passive systems occur in estuaries as well as open ocean



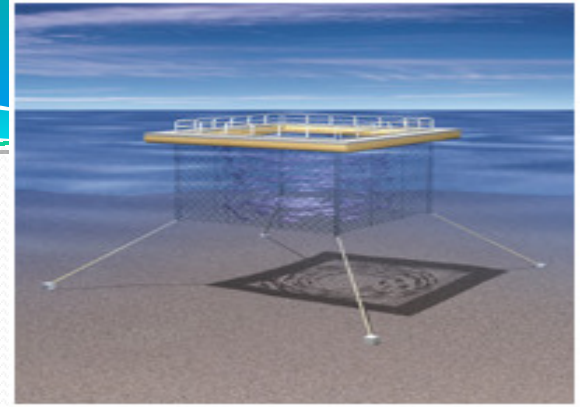
1. Inlet for ocean water 2. Outlet for waste water 3. Pump 4. Prawns are often cultivated using this method.



1. The pond or tank exists in a closed system 2. Species including barramundi are grown using this system 3. Feed is added



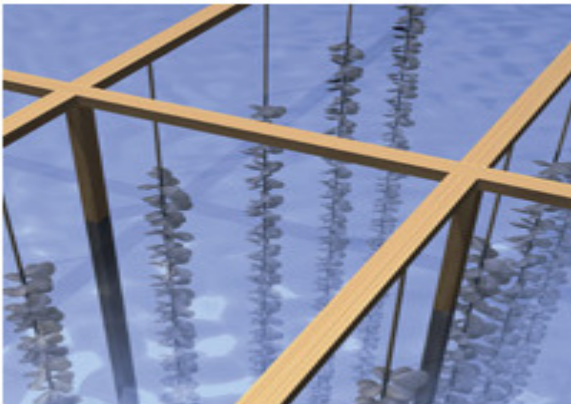
Ponds



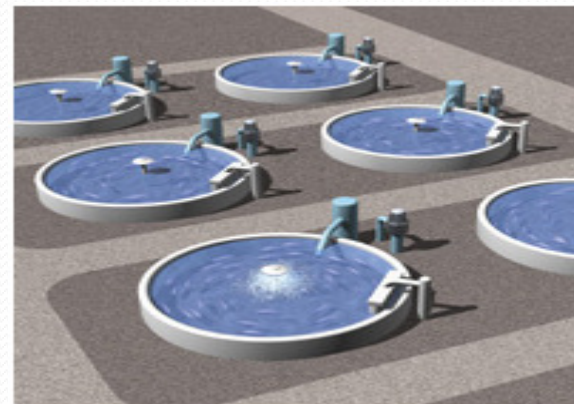
Open-net pen systems

Potential Aquaculture Methods

Suspended-aquaculture



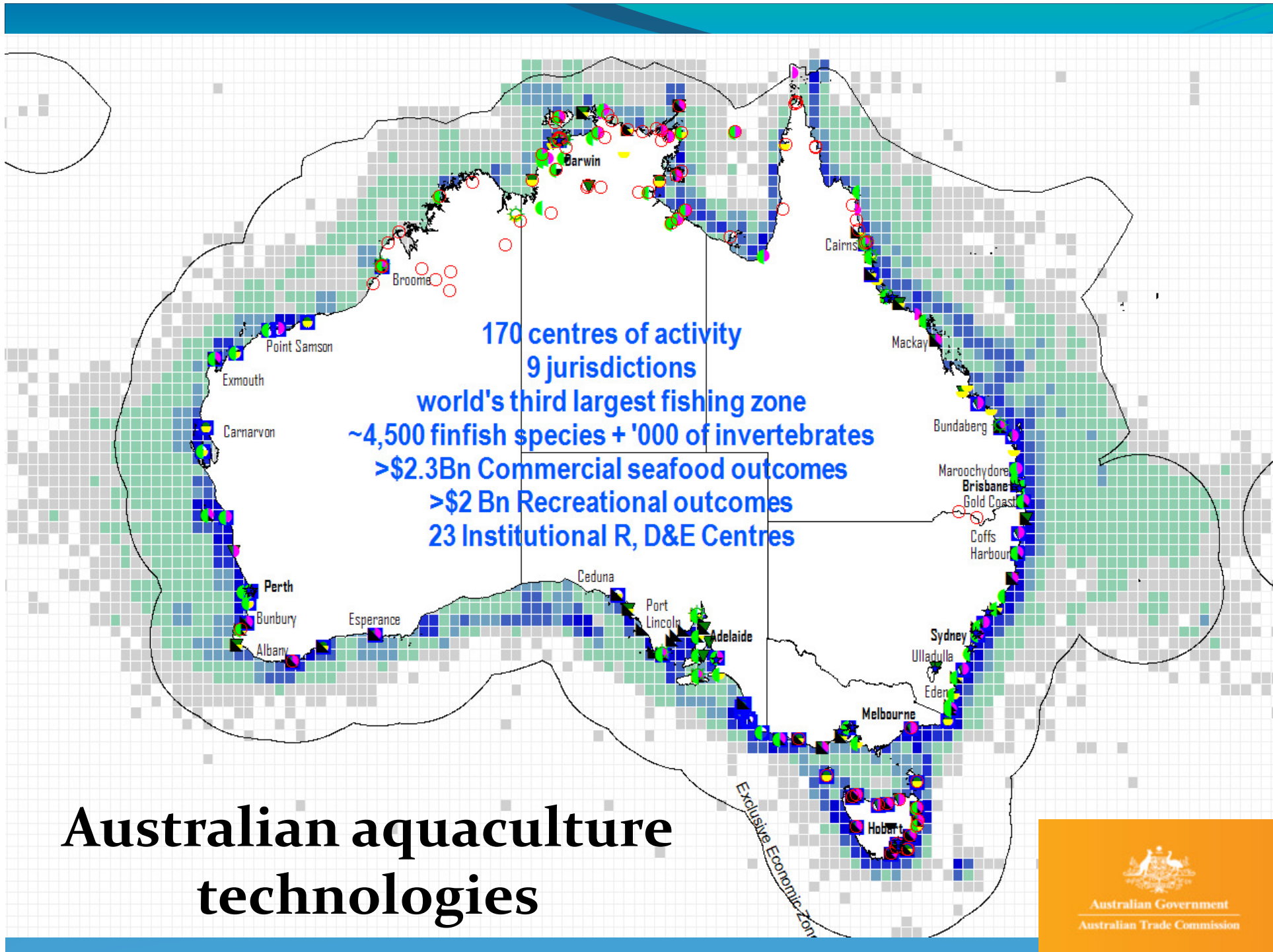
Recirculation systems



Scope of Aquaculture in UAE

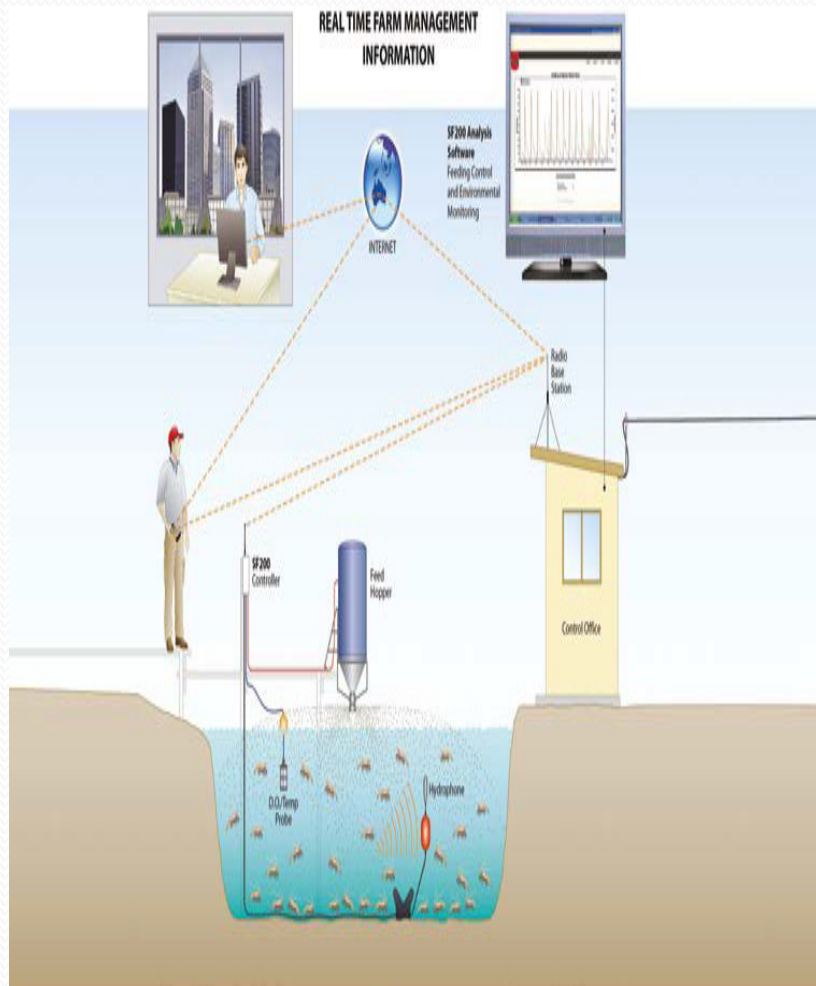
- Barramundi and bream in cages
- Cobia in deep cages
- Crab grow-out in ponds,
- Barramundi and other species in coastal ponds
- Shrimp in ponds,
- Oysters and mussels in shallow coastal locations





Australian aquaculture technologies

Australian Farm Management Systems for UAE



Australian Fishing Boats for UAE



Technologies for Tilapia?



Outdoors tilapia farming



Tilapia Cages for UAE

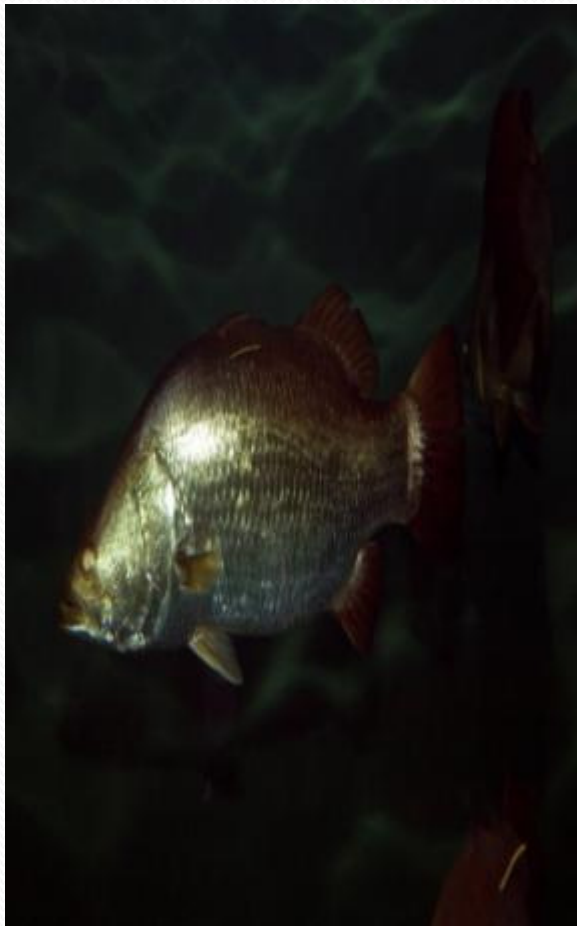


Sea Bass cages for UAE?



Barramundi for UAE

Iconic Australian Table Fish



Australian Barramundi fingerlings for UAE



Australian Government
Australian Trade Commission

MainStream BARRAMUNDI

Recommendations & Conclusions

- Persian Gulf coast of UAE has tremendous potential for marine cage aquaculture
- Transfer of appropriate marine cage farming technologies from Australia & other countries recommended
- International investment, technical assistance & training required
- Training & diversion of local fishermen towards aquaculture
- Promotion of sustainable aquaculture through pollution control, fish & mangrove replantation



Let us transfer Australian sea-cage aquaculture technologies to UAE

