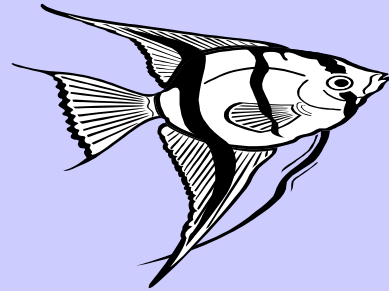


TOWARDS A SUSTAINABLE MARICULTURE INDUSTRY IN MALAYSIA



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DEFINITION OF
AQUACULTURE AND
MARICULTURE

**AQUACULTURE IS GENERALLY
DEFINED AS INTENSIVE-REARING OF
AQUATIC ORGANISMS**

**IN ORDER TO GET GREATER
PRODUCTION FOR
ECONOMIC AND
GASTRONOMIC PURPOSES**

**MARICULTURE REFERS TO
INTENSIVE PRACTICE OF CULTURED
ORGANISMS
EITHER IN SALTWATER OR
BRACKISHWATER**

MARICULTURE
PRODUCTION
IS BIGGER THAN
FRESHWATER
CULTURE
PRODUCTION

(contributed by cockle)

FISHERIES STATUS

**MALAYSIA IS A NET
IMPORTER OF FISH IN TERMS
OF QUANTITY BUT NET
EXPORTER IN TERM OF HIGH
VALUE FISH AND FISH
PRODUCTS**

THIRD NATIONAL AGRICULTURE POLICY (NAP3), 1998-2010.

- MALAYSIA WILL CONCENTRATE ON HIGH VALUE SPECIES
- AQUACULTURE INDUSTRY SHOULD MOVE AWAY FROM SMALL SCALE TO THE MEDIUM AND LARGE-SCALE OPERATION
- AQUACULTURE WILL INCREASE THE FISHERIES SUPPLY FROM 10% (1995) TO 30% BY 2010

WHY SUSTAINABLE ENVIRONMENT IS ESSENTIAL?

- IMPROPER PRACTICE CAUSES ENVIRONMENTAL DEGRADATION (MANGROVE AND CORAL REEF AREAS)
- POLLUTION CAUSES DISEASE OUTBREAKS IN MARICULTURE SPECIES WHICH LEAD TO GREAT LOSS TO THE INDUSTRY
- EXOTIC SPECIES / GENETIC MANIPULATED SPECIES INTRODUCTION ALTERS BIODIVERSITY

ISSUES AND PROBLEMS

- ENVIRONMENTAL DEGRADATION
- POLLUTION
- INTRODUCTION OF EXOTIC SPECIES/GENETIC MANIPULATED SPECIES

1. ENVIRONMENTAL DEGRADATION

- **DESTRUCTION OF MANGROVE**
- **DESTRUCTION OF CORAL REEF**
(KEY HABITATS FOR FISH/MARINE ORGANISMS)

THE IMPORTANCE OF MANGROVE

- BREEDING AND NURSERY GROUNDS,
PROTECTS SHORELINE FROM BIG
OCEAN WAVES, PROVIDES SHELTER
& HABITAT FOR MARINE LIFE

CONTINUE...

- MALAYSIA HAS UTILIZED 1% OF MANGROVE AREA FOR SHRIMP FARMING.
- ONE OF THE MAJOR THRUST MARICULTURE PRACTICE IN NAP3 (IMPLIES THAT MORE MANGROVE AREA MIGHT BE OPENED)
- *Penaeus monodon* ACCOUNTED FOR 90% OF BRACKISHWATER AND VALUE

RECCOMENDATIONS

- USE OF NON-MANGROVES AREA (eg: CHINA AND SAUDI ARABIA)
- SILVOFISHERIES
- COP OF PRACTICE OF AQUACULTURE FOR SHRIMP FARMING ONLY? (FINFISH?)

THE IMPORTANCE OF CORAL REEF ECOSYSTEM

- **BREEDING AND NURSERY GROUNDS, PROTECTS THE SHORELINE AGAINST THE BIG OCEAN WAVES, PHARMACEUTICAL POTENTIAL.**
- **SOURCE OF LIVE FISH FOR SABAH “CAGE CULTURE” (NAPOLEON WRASSE)**
- **THREATENED BY DESTRUCTIVE FISHING METHOD (CYANIDE & BOMBING).**

Continue...

- MANY OTHER EDIBLE CORAL SPECIES ARE AWAITING FOR FURTHER RESEARCH IN SEED PROPAGATION (NATURAL BROODSTOCK).

SOLUTIONS

- TOTALLY PROTECTION FOR NAPOLEON WRASSE FISHING (INDONESIA HAS IMPLEMENTED THE REGULATION)
- GAZZETE KEY AREAS AS MARINE PARKS (SABAH HAS GAZZETED 38 ISLANDS)
- BETTER ENFORCEMENT

2.AQUACULTURE POLLUTION

- MARICULTURE EFFLUENTS:
UNEATEN FEED PLUS VARIOUS
CHEMICAL INPUTS, ALL
CONTRIBUTE TO POLLUTION IN
BRACKISHWATER PONDS AND CAGE
CULTURE.

CHEMICAL EFFLUENT

- CHEMICALS ARE WIDELY USED IN MARINE CULTURE :
- PREVENTION AND TREATMENT OF DISEASE (IN THE FORM OF FEED ADDICTIVES, DISINFECTANTS, PESTICIDES)
- WATER TREATMENT.

CONTINUE....

COMMON CHEMICALS

- LIME
- SAPONIN (TEASEED CAKE)
- CALCIUM HIPOCHLORIDE
- SODIUM HIPOCHLORIDE
- **MALACHITE GREEN (CARCINOGENIC)**
- FORMALIN
- CUPRUM SULPHATE

CONTINUE...

- NO NATIONAL STANDARDS FOR CHEMICAL DOSAGES, ALWAYS REFERS TO FOOD AND DRUG ADMINISTRATION (FDA), USA.
- USE OF MALACHITE GREEN IN MALAYSIA (0.1 ppm) BELOW THE EPA PRESCRIPTION (50 $\mu\text{g}/\text{l}$) - SAFE.

RECCOMENDATIONS

- FDA GUIDELINES MAY BE ONLY SUITABLE FOR TEMPERATE COUNTRIES - RESEARCH ON THE DOSAGE EFFECTIVENESS AND TOXICITY PERIOD SHOULD BE DONE ACCORDING TO PHYSICOCHEMICAL DIFFERENCES.
- INCLUDE TYPES AND DOSAGE IN COP.

ANTIBIOTIC RESIDUES

- PROBLEM: LOW DOSAGE CAUSES PRODUCING RESISTANT STRAIN IN BACTERIA.

ANTIBIOTICS

- OXYTETRACYCLINE
- OXALIC ACID
- FURAZOLIDONE

FURAZOLIDONE

- PARTIALLY BANNED
- BANNED FOR HUSBANDRY PRACTICE BUT STILL AVAILABLE FOR AQUACULTURE PRACTICES.
- FDA HAS ALREADY BANNED FURAZOLIDONE IN AQUACULTURE

NITROFURANS

- CAUSES DEFORMATION IN MARINE LIFE LARVAE
- RESPONSIBLE FOR PRODUCING RESISTANT STRAIN IN THAILAND AND PHILIPPINE (CHOO, 1999)
- JAPANESE GOVERNMENT ENFORCED A MAXIMUM DETECTABLE LEVEL OF < 0.1 PPM IN IMPORTED PRAWNS

DOUBLE STANDARDS

- NO RESTRICTION OR CONTROL ON THE SALE OR USE OF DRUGS IN ANIMALS.
- VETERINARY DEPT. STILL ALLOWS USE OF SOME ANTIBIOTICS IN LIVESTOCK (HOW ABOUT FISH?).
- THE FOOD REGULATIONS (AMENDMENTS) 1998 PROHIBITS THE PRESENCE OF ANTIBIOTICS IN MEAT, MEAT PRODUCTS AND MILK (Third World Network, 1999) (HOW ABOUT FISH?)

Continue.....

- COP FOR AQUACULTURE RECOMMENDS THAT ONLY “APPROVED” ANTIBIOTICS ARE USED. (WHAT ARE THE APPROVED ANTIBIOTICS?)
- COP ALSO SUGGESTS SOME TIPS FOR DISEASE PREVENTION - eg.: QUARANTINE OF BROODSTOCK, “FOOT BATH”.

RECOMMENDATIONS

- LIST OF APPROVED ANTIBIOTICS SHOULD BE INCLUDED IN COP.
- PHARMACOKINETIC RESEARCH SHOULD BE CARRIED OUT ACCORDING TO THE TROPICAL CLIMATE CONDITIONS (CHOO, 1999) - DOSAGE EFFECTIVENESS AND WITHDRAWAL TIME.

HYPERNUTRICATION AND EUTROPHICATION

- PROBLEM IS CAUSED BY IMPROPER FEEDING MANAGEMENT WHICH WILL RESULT IN EUTROPHICATION IN CULTURE PONDS AND COASTAL AREA.
- EUTROPHICATION WILL LEAD TO HARMFUL ALGAE BLOOM AND PUTRID WATERS IN COASTAL AREAS.

RECCOMENDATIONS

- NAP3 SUGGESTS FOCUSSING ON FORMULATED FEED BASED ON LOCAL AGROPRODUCTS.
- DEVELOP RESEARCH IN FOOD BINDER AND PALATABILITY.
- FARMERS SHOULD BE EDUCATED ON PROPER FEEDING TECHNIQUE.
- FISH FEEDING BEHAVIOUR STUDY TO UNDERSTAND FEEDING PROBLEMS

3. INTRODUCTION OF EXOTIC SPECIES/GENE MANIPULATED SPECIES

- PROBLEMS: ALTERATION IN BIODIVERSITY, GENE POOL CONTAMINATION, DISEASE AND COMPETITION WITH NATIVE SPECIES.

DOCUMENTED CASES

- *Crassostrea gigas* AFFECTED THE *C. commercialis* AND *Saccostrea commercialis* IN AUSTRALIA.
- SALMON FARMING IN BRITISH COLUMBIA - ESCAPED ATLANTIC SALMON REPRODUCED IN THE WILD
- NORWAY SALMON FARM: MONOGENEAN PARASITE, *Gyrodactylus salaris* in SALMON PARR WAS PROBABLY INTRODUCED BY ATLANTIC SALMON FROM SWEDEN

THE PRECAUTIONARY
APPROACH IS A KEY
CONCEPT IN CONVENTION
OF BIODIVERSITY (CBD
1994) AND FAO CODE OF
CONDUCT FOR
RESPONSIBLE FISHERIES
(CCRF)

RECOMMENDATION

SINCE THERE ARE MANY
MARINE SPECIES WHICH HAVE
POTENTIAL FOR CULTURE,
GENETIC AND SEED
PROPAGATION RESEARCH
SHOULD BE FOCUSSED ON OUR
OWN RESOURCES

KEY SUGGESTIONS

- ZONING FOR MARICULTURE SITES
- APPLY ECOLABELLING CONCEPT
- ADAPT SILVOFISHERIES CONCEPT FOR SMALL-SCALE FARMING
- MAKE TREATMENT/SEDIMENTATION POND MANDATORY
- MAKE EIA REPORT COMPULSORY FOR FARMS SMALLER THAN 50 HECTARES

CONCLUSION

WHILE MALAYSIA IS DEVELOPING THE TECHNOLOGY FOR MARICULTURE AND ENVIRONMENTAL MITIGATION, THE SERIOUS ENVIRONMENTAL PROBLEMS THAT WILL ARISE FROM INTENSIVE AND EXTENSIVE MARICULTURE WILL LEAD TO THE FAILURE OF THE INDUSTRY AND THE NAP3 TARGETS WILL NOT BE MET.