

# Contact Us

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## COPPER IN AQUACULTURE

*"Promoting copper in Africa"*

# Background to Copper in Aquaculture



Marine and freshwater aquaculture operations are increasingly looking to new technologies in order to address the impacts of biofouling.

Biofouling is the undesirable growth and accumulation of micro-organisms, plants, algae, animals on immersed surfaces and structures.

## Impacts of biofouling include:

- Reduced water flow through the cage/net
- Accumulation of waste products
- Decreased water quality
- Decreased cage/net durability and floatation
- Increased susceptibility of animals to disease
- Increased operational costs for cleaning



## Traditional Cages/Nets

Traditional polymer nets can become biofouled within weeks and require frequent changes, cleaning, and/or use antifouling paint. If these mitigating measures are not applied then aperture occlusion can create unfavourable conditions for fish with significant impacts on production.



# Summary

The trial results have shown:

- Bio-fouling is negligible
- Higher growth rate of fish
- Fish are in a better condition (greater weight for a given length)
- Higher yields
- Protection against predators
- Lower maintenance requirements (no need to clean or replace nets)
- Reduced labour requirement
- Reduced operational costs



# Way Forward

A platform has now been set for copper cages to form part of experiments in fully-functional, commercial aquaculture operations to verify the findings and further quantify the financial benefit towards operational costs.

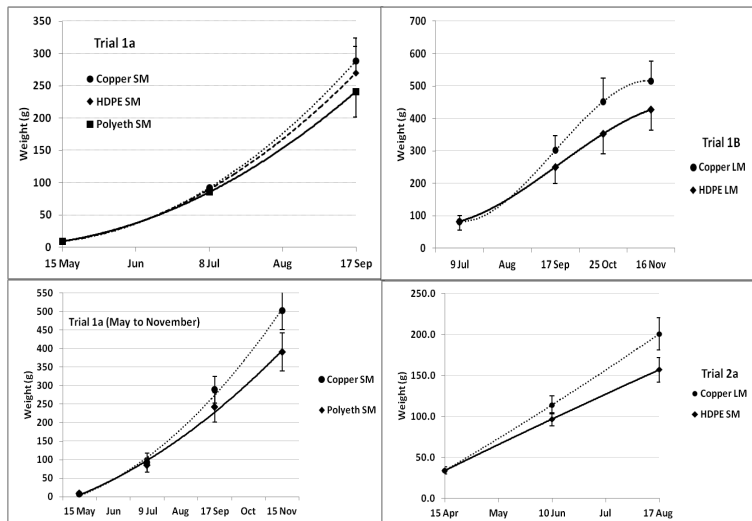




# Applications in Africa – Cahora Bassa

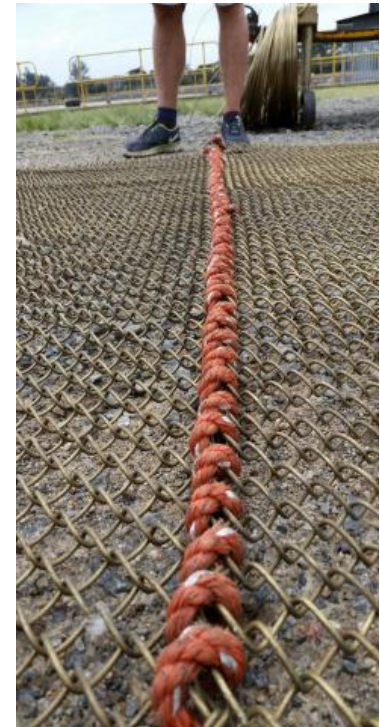
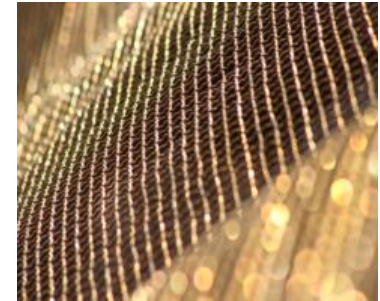
Study examined the comparative efficacy of copper alloy cages for farming of Nile tilapia in Lake Cahora Bassa.

- Fish in copper cages outperformed fish in all other cages by significant margins.
- SGR copper 12.6% per day > polymer (average)
- Yield copper 8-36% > polymer
- Cleaning – ALL polymer nets at regular intervals; no cleaning of copper
- No predator (tigerfish, crocodile) attacks



## Why Copper Alloys?

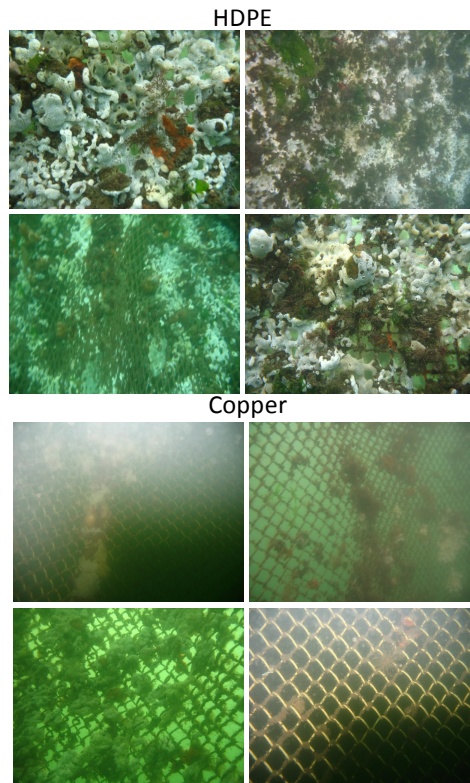
- Easy to fabricate
- 100% recyclable
- Strong, durable
- Improved water flow through cages
- Improved dissolved oxygen levels
- Reduced parasite loads
- Higher yield as a consequence of lower mortality (no stressful net changes; no stress from predators)
- Reduced infections
- Lower FCR
- The material is strong and predators cannot cause damage thereby reducing fish losses due to predation and rate of escape of fish from cages
- Lower maintenance: no net changes; no net cleaning
- Avoid need for predator net; avoid antibiotics
- Reduced environmental impact: can be made from recycled materials; can be recycled after use; no nets to dispose of
- Potential for consumer market positioning as more environmentally appropriate fish production



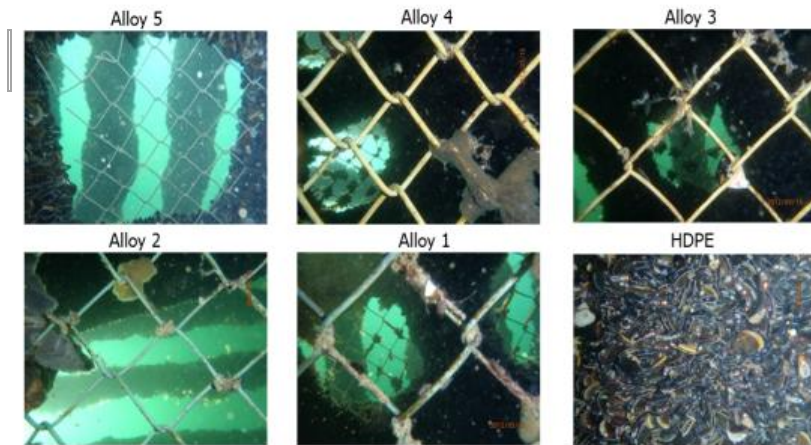
# Applications in Africa – Richards Bay

Study examined the comparative efficacy of copper alloy cages for farming of Nile tilapia in Lake Cahora Bassa. First ever successful construction and deployment of a copper cage in marine environment in South Africa. Critical first step in demonstrating application of copper alloy nets in South African marine environments.

- Biofouling on HDPE cage present all over the cage, on the sides and at the bottom
- Biofouling very difficult and time-consuming to remove
- Minimal biofouling on copper cage
- Recorded only at the sides of the net at shallower depths
- Cleaned only once during experiment
- Biofouling could be removed by simply brushing the net by hand
- Costs model demonstrated that operational costs of copper would be lower in high biofouling environments.



# Applications in Africa – Saldanha, Pemba, Seychelles



The experiment was designed to assess the antifouling efficacy of five different alloys in comparison to nylon and polyethylene netting material, which are commonly used in finfish cage culture. The results (aperture occlusion, succession and species composition, gravimetric data and the pictorial record) clearly illustrated the beneficial antifouling properties of copper alloy mesh materials.

