

# Turning water-borne waste nutrients into a cash crop

AN aquaculture process that combines the rearing of finfish, shellfish and seaweed is likely to boost earnings for farmers as well as having positive spin-offs for the environment around sea cages, reports Gery Flynn.

Integrated Multi-Trophic Aquaculture, or IMTA, is still a relatively new concept in the west but in Asia it is a centuries-old tradition.

Declan Hanniffy, a researcher at the Irish Seaweed Centre, who is studying IMTA describes it as the ultimate example of recycling.

"IMTA combines fed aquaculture like finfish or shrimp, with organic extractive aquaculture such as shellfish and inorganic extractive aquaculture such as seaweed. The idea is that waste products from finfish are a food resource for the extractive shellfish and seaweed aquaculture industries."

## Natural cleansers

In practice, according to Hanniffy, this means that certain shellfish and seaweeds are positioned close to finfish cages and actually mop up the dissolved and water-borne waste nutrients and then turn them into a valuable and saleable second crop. This process manages to rid the environment of nutrient build-up.

Hanniffy reveals that seaweeds grown in nutrient-rich waters can remove up to 90% of the nitrogen and 60% of the phosphorus, while filter-feeding shellfish remove large amounts of particulate organic matter, such as feed waste and faeces. "Despite improvements in recent years, for each tonne of farmed salmon produced, about 35kg of nitrogen and 7kg of phosphorus is released into the environment as uneaten feed, undigested feed and faeces. These can lead to problems such as eutrophication, where algal blooms may develop and cause dead zones," Hanniffy explains.



● Seaweeds located close to finfish cages mop up the dissolved and water-borne waste nutrients and turn them into a saleable second crop.

"IMTA alleviates the environmental load from finfish aquaculture by recycling nutrients into extractive aquaculture systems. This method of nutrient recycling is environmentally-friendly, and provides a balanced ecosystem approach to aquaculture as well as a cost effective means for reaching effluent regulation compliance," he declares.

He says that Canadian studies show that the integration of extractive aquaculture systems leads to mutual benefits of the co-cultured species.

"Mussels grown close to salmon cages in Canada were found to be 50% bigger than a control sample 1km away; while kelp grown in proximity to the salmon cages had 46% greater biomass than the control samples. The salmon benefit from improved water quality," he explains.

Despite the fact that the only

IMTA systems in operation in Europe today are all still at R&D and demonstration level, in land-based systems or at sea, Hanniffy is quick to point out that Asian fish farmers — who already account for two-thirds of the world's aquaculture production — have been practising it for centuries: "The civilisations most successful at developing integrated aquaculture systems are the ones that treat waste as a valuable resource," he says.

"And since the late '80s and early '90s, Israel, Canada and Chile have developed IMTA systems, integrating fish, mussels, abalone and seaweed."

A review by Dr Thierry Chopin published in 2001 shows that the rapid development of intensive fed aquaculture (e.g. finfish and shrimp) throughout the world is associated with concerns about the environmental impact of such

"often monospecific practices".

This, writes Chopin, is especially the case where activities

are "highly geographically concentrated or located in sub-optimal sites whose assimilative

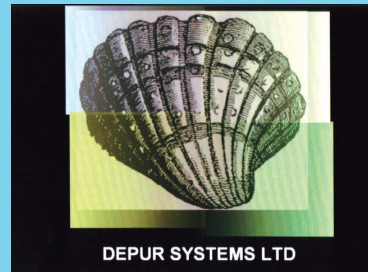
capacity is poorly understood and, consequently, prone to being exceeded."

## Balanced ecosystem

The review calls on the aquaculture industry "to develop innovative and responsible practices that optimize its efficiency and create diversification, while ensuring the remediation of the consequences of its activities to maintain the health of coastal waters."

It declares that a balanced ecosystem approach provides nutrient bioremediation capability, mutual benefits to the co-cultured organisms, economic diversification by producing other value-added marine crops, and increased profitability per cultivation unit for the aquaculture industry.

"By adopting integrated [multi-trophic] practices, the aquaculture industry should find increasing environmental, economic, and social acceptability and become a full and sustainable partner within the development of integrated coastal management frameworks," the review states.



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● Seaweeds grown in nutrient-rich waters remove up to 90% of nitrogen and 60% of phosphorus build-up.