



COURTESY GAFRD

## FISH FOOD

# DEMAND, INNOVATION DRIVE AQUACULTURE GROWTH

BY JOANNE WALBY

**A**lthough aquaculture in Egypt has been around for thousands of years, modern projects typically have been geared toward exports, offering delicacies such as jumbo shrimp and sea cucumbers to customers willing to pay top dollar. But with an estimated gap of 800,000 metric tons between supply and in-country demand, Egypt is poised to expand its aquaculture industry to produce fish as an affordable source of protein for domestic consumption.

Mohamed Osman, chairman of the General Authority for Fish Resources Development (GAFRD), believes aquaculture can provide jobs in poor

rural areas, and this year the agency plans to introduce a program of licensing for small-scale farmers as well as training and technical assistance for those interested in setting up aquaculture projects on the Mediterranean coast. But the government's goal of a 50 percent increase in the wild caught and farmed fish supply by 2017 will require efficient reuse of limited water and land resources.

Aquaculture in Egypt grew 20 percent each year between 1995 and 2005, according to the United Nations Food & Agriculture Organization (FAO), and accounts for about three-quarters of the country's annual seafood production. In 1983, when Law 124 created the

GAFRD to oversee Egypt's fisheries industry, aquaculture made up less than a third of the country's seafood production. Today, the FAO reports that Egypt is the world's largest producer of mullet and second-largest producer of tilapia, far behind China. It is also North Africa's second-largest seafood exporter after Morocco, with 2,012 metric tons a year. However, Egypt is also the region's leading fish importer, at nearly 250,000 metric tons a year, with a third of that coming from Thailand and a third from the Netherlands.

Most fish farms in Egypt are near Kafr Al Sheikh in the Nile Delta, with additional clusters in Fayoum's Lake Qarun, Alexandria, Ismailiya,

Mansoura, Sharqiya and Lake Nasser in Upper Egypt. According to Alaa Eissa, an associate professor at Cairo University's Faculty of Veterinary Medicine specializing in fish diseases, 90 percent of Egypt's aquaculture facilities are earthen pond-based fish farms that utilize a mix of agricultural drainage and irrigation water, as stipulated by Law 12/1984. The remaining 10 percent of aquaculture production comes from floating cages in the Nile and its branches, and the northern lakes of Edku, Borolos, Mariout, Bardawil and Manzala. Total fish production of the northern lakes is estimated to be 172,000 metric tons, a third of which comes from Lake Manzala.

Eissa says the agricultural drainage feeding into these lakes contains chemicals from fertilizers, pesticides and heavy metals, which can cause endocrine disorders that inhibit fish reproduction. He blames such effects as one of the major causes, along with overfishing of juvenile fish and desertification, of the precipitous drop in Lake Manzala's fish production from 450,000 metric tons in 1950 to 46,000 today. Similarly, heavy metals and pesticides in the mud of ponds and lakes are passed on to people who eat so-called "bottom feeder" fish.

Osman, a professor of fish nutrition, said amendments to Law 124, currently waiting to be added to this year's legislative agenda, would ban agricultural drainage into aquaculture projects. Also, he says, the GAFRD is studying the replacement of expensive protein feed made from minced fish remains, with plant matter, such as soy beans, rice bran and corn. He contends that if fish are fed organic plant material, their waste water, or effluent, would contain ammonia and nitrates and be excellent organic fertilizer. "Fish that are fed organic feed are environmentally friendly," he says.

Many aquaculturists who are denied the first use of Nile water for fish production have gotten creative, adding fish to rice fields, an ancient

practice in Asia known as aquaponics. Others are establishing fish farms in the desert, relying on underground water sources that are recycled for multiple uses. One such project in Wadi Al Natroun produces 42 kilograms of fish per cubic meter by cycling well water through tilapia and catfish ponds before using it to irrigate alfalfa. The alfalfa is fed to sheep and goats, whose waste is processed into biogas. Another project in the area produces 20 kilograms of sea bass per cubic meter of water, then uses the effluent to fertilize olive trees.

Besides allowing aquaculture to use fresh water, Osman says, the proposed amendments to Law 124 would require fish farms to be inspected and certified to be free of contaminants. Also, the amended law would allow the expansion of fisheries 200 nautical miles farther offshore into the Economic Exclusivity Zone by providing loans from Nasser Social Bank to modernize fishing fleets with refrigerator units and satellite navigation. Osman says Egypt is also courting aquaculture investors from the Netherlands, Thailand and Vietnam.

Beyond water restrictions, another major obstacle to growth is a shortage of fertilized fish eggs, or seeds, required for aquaculture. In the wild, seeds and juvenile populations are often decimated by trawlers fishing illegally off Egypt's coast line, according to Eissa. To combat this shortage, since 1998 the number of hatcheries in Egypt has increased from 16 to 300, producing mainly tilapia seeds. These seeds are then turned into fish meal that is used in feed for intensive aquaculture projects. International prices for fish meal have increased in recent years, reaching as much as LE 6,000 per ton in Egypt.

The FAO report on Egypt notes that recent investment in aquaculture has centered on the application of modern technologies and is attracting investors with science backgrounds.

Speaking at a recent conference in Cairo for agricultural investment, James Greenberg, a specialist in aquaculture development, said, "the industry is increasingly driven by technology, the market and regulations, whereas previously it was production-driven." Greenberg is chairman of DevCorp, an international joint stock company headquartered in Bahrain and a majority shareholder in Aquafarms Corporation, which has been operating fish farms in Gulf countries for 15 years. Greenberg says that given Egypt's limited supply of fresh water, the largest growth potential is in marine, or saltwater, aquaculture, which today has only 8 percent of global aquaculture production.

One such proposed project is New Nile Co.'s 50,000-hectare, \$550 million agriculture project mixed with aquaculture elements on the Red Sea north of Hurghada. Unveiled in December at American University in Cairo, New Nile Co. is a partnership of Energy Allied International, the

### Advertorial

#### Shawarbi & Associates Tax Professional & Business Consultants



- Tax Preparation & filing for Individuals & Businesses (Federal, State, & Local) for US Citizens and Resident Alien living Abroad".
- Internal Revenue Service appeals and audits, delinquent tax returns and IRS representation.
- Business formation in the United States at competitive and affordable rates.
- Financial system advisory services.
- Full Accounting services.

Please call for a free Consultation:  
0143888889 or 0143888887 Heliopolis, Cairo-Egypt  
718.360.5963 Brooklyn, New York, USA  
727.388.7109 Tampa, Florida, USA  
Email: [info@shawarbi.com](mailto:info@shawarbi.com)

Visit our Website: [www.shawarbi.com](http://www.shawarbi.com)



COURTESY NEW NILE CO.

ARTIST'S RENDERING OF A SEAWATER AGRICULTURE AND AQUACULTURE PROJECT PROPOSED FOR THE RED SEA

Seawater Foundation and Global Seawater Inc. New Nile Co. touts itself as a vertically integrated project with seafood processing and packaging facilities that could generate 6,500 jobs and potentially thousands more in indirect services. The plan calls for trenches to bring seawater inland and pump it to aquaculture ponds. Ammonia and nitrite-rich effluent from the ponds would be used to irrigate fields of a saltwater plant, *salicornia*, that yields vegetable oil suitable for biofuel production, specifically jet fuel. The remaining high protein cake could be used for animal or human consumption. Thereafter, the seawater would be filtered through a mangrove forest, eventually yielding salt.

Tamer Nassar, regional vice president of Energy Allied International, suggests one possible aquaculture product could be sea cucumbers, native to the Red Sea but overexploited in the past decade. Sea cucumbers are a delicacy in Asia, where they sell for about

\$55 per kilogram. He estimates the farm would produce 20,000 metric tons of seafood annually. The chairman of the Seawater Foundation, Carl Hodges, is an atmospheric scientist who says he has spent 40 years researching and developing saltwater agriculture.

Though New Nile Co. is still in its early phases of acquiring land and attracting investors, Necla Demir, an AUC assistant professor of food chemistry who specializes in fish processing and packaging, says this type of project is promising because in addition to using saltwater for aquaculture, it has a training component and would provide employment opportunities for local people.

Eissa and other aquaculture experts note that Egypt lacks technical expertise in aquaculture, producing only a handful of graduate students in fisheries each year. Osman says that starting this fall, a department for postgraduate fisheries studies will be established at Suez Canal University and

that other universities are establishing undergraduate and graduate aquaculture programs. But so far, with funding for scientific research cut in half in recent years, these students have little lab and practical experience. Even Cairo University's fish diseases and management department lacks a fish pond, and faculty report having to sometimes buy fish themselves for dissection class.

Egypt is not alone in its growing appetite for seafood. According to FAO projections, in order to keep up with demand, global aquaculture production will need to increase by 30 million metric tons by 2050. However, environmental and biodiversity concerns, and balancing demands for water and land resources will need to be addressed. Stressing the importance of environmental sustainability in the design of aquaculture projects, Greenberg says "if you're not an environmentalist first and an aquaculturist second, you'll go bankrupt." ■