



## Letter from the Director

Aloha,

Last week, CTSA held its first event on the island of Kaua`i at the Kaua`i Community College (KCC). The workshop, titled "Aquaponics on Kaua`i: Logistics and Economics of Small and Large Scale Production" was co-sponsored by the Office of Continuing Education and Training at KCC. Presenters included Dr. Harry Ako and Clyde Tamaru of UHM CTAHR, and CTSA IAC member and KCC aquaponics educator Bernie Tsao.



*Bernie Tsao, Clyde Tamaru, Harry Ako*

For those unfamiliar with the technology, the first hour of the workshop featured a brief introduction to aquaponics and the relevant classes offered by Kaua`i Community College. For more advanced practitioners, the rest of the workshop focused on the feasibility of commercial

production, with Dr. Ako and Dr. Tamaru sharing results from their CTSA-funded projects. At the end of the day, participants completed an evaluation survey, and I was pleased to hear that they learned a lot and felt that attending the workshop was a worthy use of their time.

While both backyard and commercial aquaponics systems can help to provide communities with fresh fish and vegetables for local consumption, commercial farming can go one step farther and create an industry and local jobs. It is CTSA's mission to support the commercial development of aquaculture, and a majority of people in our region are expressing interest in this particular form of aquaculture.

We look forward to more opportunities to share the results of our projects, and introduce other aquaculture ventures on Kaua`i in the future! As always, please let us know if you have any questions, comments, or concerns.

Mahalo,

*Cheng-Sheng Lee*

Executive Director, CTSA

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## Quick Links

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[www.oceanicinstitute.org](http://www.oceanicinstitute.org)

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## Watch Episode 4 of "Aquaponics in Hawaii Conference" Online!

In last month's e-notes, we shared links to watch episodes 1-3 of the "Aquaponics in Hawaii Conference," presented by CTAHR and co-sponsored by CTSA, online at 'Olelo Community Media's Video-on-demand website. Episode 4 of the series has been released and is available at the following link:

### Episode 4: Aquaponics in the Community

[Click here to watch](#)

[http://olelo.granicus.com/MediaPlayer.php?view\\_id=30&clip\\_id=35179](http://olelo.granicus.com/MediaPlayer.php?view_id=30&clip_id=35179)

#### Just a reminder...

[Click here to watch](#) Episode 1: Commercial Aquaponics in Hawaii

[Click here to watch](#) Episode 2: Urban Garden Aquaponics

[Click here to watch](#) Episode 3: CTAHR Aquaponics Research

## Pacific Island Spotlight: Aquaculture in Palau

*by Meredith Brooks, with excerpts from reports submitted by Miguel DeLos Santos.*

Palau is famous for its beautiful natural attractions, including vibrant and diverse reef and ocean ecosystems. However, like most of its neighbors in the Western Pacific, the island nation is suffering from the effects of overfishing and other environmental imbalances. Fortunately, Palau is capitalizing on opportunities to create sustainable solutions to these problems. Aquaculture is one budding solution that can help the country secure a local food supply, preserve its natural resources, and enhance its economy.



Palau's geographic location, less than 1,000 miles from the Philippines, affords it several advantages that can lead to a robust aquaculture industry, including close proximity to large, established markets. In addition, there is also an overwhelming need for more aquaculture products in the local market for both residents and the growing tourism industry. Furthermore, a recent change in government administration has resulted in a focused effort to protect the valuable wild fish stocks and unique ecosystems of

Palau, and conservation and resource management organizations are realizing the significant benefits that can result from responsible aquaculture. Considering these factors, foreign countries including the United States, Japan, and Taiwan, have invested in the development of aquaculture infrastructure, including a state-of-the-art hatchery. However, the hatchery is yet to be used to its full potential.

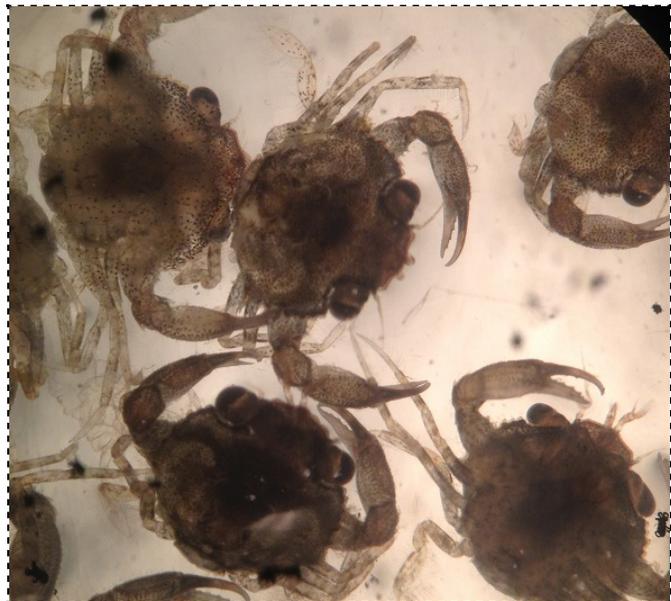
Milkfish is the major aquaculture commodity in the country, with five existing commercial farms producing fish for food or bait for tuna fishing, yet farmers must import their fry from overseas. This unsustainable practice is costly and risky, considering the possibility for a biosecurity issue. If Palau is able to produce fry and seedstock from its hatchery, it can limit the need for importation and potentially start a new export market.

Mangrove crabs are another species in need of a local seedstock source. These culturally important crustaceans have been overharvested, and the demand for them is exceeding what is available in the wild. Mangrove crabs are currently being cultured on two small-scale farms in Palau. There is an increasing interest in farming them, but the absence of a source for seedstock is a major barrier to further development. Two ongoing CTSA projects at the Palau Community College are seeking to establish local hatchery technology for mangrove crabs and rabbitfish, a popular fish that has also

been overfished in the region. The depleted stocks of these two species have not driven away their well-established markets, and actions must be taken to create a secure supply. The mangrove crab project, which began in November 2012, has resulted in the successful spawning and initial larval rearing of crablets - the following is an excerpt from a recent project report:

*On November 01, 2012, five wild-caught female mangrove crabs with average carapace length of about 5 inches and average body weight of 1052.65g were purchased from local fishermen. The crabs were stocked in two separate 1ton capacity fiberglass broodstock tanks. One tank was provided with sand substrate while the other had no substrate. Each of the tanks were supplied with continuous flowing seawater and mild aeration. The broodstock were fed frozen fish meat at the rate of 20% biomass everyday. On December 9, 2012, one of the crabs in the tank with substrate spawned naturally and was transferred to an incubation tank to allow embryonic development and hatching. After 10 days of incubation, the eggs hatched and a total of 14.7 million active and healthy zoea larvae were collected. About 2.4 million zoea were stocked in six separate larval rearing tanks to test the effect of tank colors on the survival rate of the larvae. On January 9, 2013, another batch of spawning was observed in the broodstock tank with substrate. This time two of the crabs spawned naturally. One of those crabs was the same crab that spawned in December 2012. After 10 days of incubation, a total of 7.6 million and 18.58 million zoea were harvested from each crab respectively. Due to a shortage of artemia cysts, the larval rearing trial was postponed and the newly hatched larvae were instead released to the ocean as part of the project's restocking efforts (reported on the January 2013 issue of Regional e-Notes).*

*With the success in the spawning of mangrove crab broodstock held in captivity on December 9, 2012, preliminary larval rearing trials were conducted to test the effect of tank colors on the survival rate of mangrove crab larvae was conducted. It was observed that survival rate was slightly higher in yellow tanks compared to black tanks. After conducting preliminary runs on the effects of tank colors in the larval rearing of mangrove crabs, the PI plans to implement a comparative study on the survival rate of the larvae following the Philippine technology vis-à-vis the technique used in Kosrae. Small-scale experiments to determine the effects of salinity and different feeding regimes using 80L tanks will be conducted this coming spawning period.*



*Close up view of crablets.*

The second ongoing CTSA project is to establish Rabbitfish aquaculture in the country. According to Palau Community College Cooperative Research and Extension director Thomas Taro, local stakeholders have expressed interest in farming rabbitfish in ponds and cages. "The development of hatchery techniques for rabbitfish is important in order to encourage interested farmers to go into commercial farming in the future," stated Mr. Taro. "In addition, it is also valuable to have seeds for stock enhancement in the natural waters." The following is an excerpt from a recent project report:

*Collection of wild caught rabbitfish broodstock was conducted in February 2013. A local fisherman was contacted to catch the broodstock using tidal set net and two consecutive fishing trips were done. However, a total of only 23 fish were collected; these fish were brought to the hatchery for conditioning in a controlled tank condition. These fish were subsequently combined with the existing broodstock and the total number of rabbitfish available is about 120, which were*

split into two separate broodstock tanks. The rabbitfish inside the first tank were fed with commercial shrimp feeds while the other tank was fed with commercial milkfish feeds. Spawning was monitored after the feeds became available, but as of May 27, 2013, no spawning was recorded. In preparation for a larval rearing trial using copepods as alternative live feed organism, Dr. Chatham Callan of the Oceanic Institute traveled to Palau in the end of May. The purpose of Dr. Callan's visit was to assist the PI in setting up a mass culture system for copepods in the tank conditions. A prototype design for a copepod production system was set-up, and initial runs for *Parvocalanus* and local *Acartia* copepods were demonstrated.



Palau Aquaculture Farm

Each project also emphasizes the development of a skilled local workforce, which is the most essential component of a truly sustainable aquaculture industry. Although foreign experts can and do often help to establish industries, the outcome will ultimately lie in the hands of the local people. The Palau Aquaculture Cooperative Association (PACA) is a group of farmers and stakeholders that, together with partners like CTSA, is working hard to create opportunities for such development.

CTSA has a vested interest in helping to establish a thriving aquaculture industry in Palau. With the capacity to conduct aquaculture, established

markets, existing infrastructure, and a desire for increased protection of natural resources, all of the elements for a successful industry exist in the island nation. The key is to connect these elements to create a sustainable and economically viable alternative (or supplement) to current commercial fishing practices.

## AquaClip ~ Aquaponics Association Conference

From [worldwire.presscentre.com](http://worldwire.presscentre.com), 8/29/13

With news spreading that 56 percent of fish tested off the coast off Japan this June were contaminated with radioactive isotopes from the Fukushima nuclear plant disaster, fish lovers can look to aquaponics as an alternative option for raising their own fish at home that are safe to eat and provide an ongoing source of protein.

Aquaponics - the growing of fish and plants together in recirculating systems - has been taking off across the U.S. by home and commercial-scale farmers who have found the technique to produce significantly more produce than conventional soil-based growing techniques while using up to 90 percent less water.

People wanting to learn how to grow their own local food with aquaponics or start an aquaponics business, can hear from 30 experts at the 2013 Aquaponics Association National Conference in Tucson, AZ from September 20-22.

"Aquaponic systems work for home and community-scale production," says JD Sawyer, founder of Colorado Aquaponics, a Denver-based company that runs a neighborhood-scale aquaponics farm located in a Denver "food desert."

"Aquaponics provides an ongoing local food source, income generation, and increased sustainability,"

adds Sawyer, who offers aquaponic educational programs for people and groups who want to take charge of their own food production.

Featured speakers at the 2013 Aquaponics Association National Conference include Virginia farmer Joel Salatin, author of eight books, including *The Sheer Ecstasy of Being A Lunatic Farmer* and *Folks*, and *This Ain't Normal*; Max Meyers, Ecological Designer, Permaculture Teacher, and Executive Director of the Mendocino Ecological Learning Center in California and Nor Cal Aquaponics; James R. Hollyer, Project Manager and Farm Food Safety Coach, College of Tropical Agriculture, University of Hawaii at Manoa; and Gene Giacomelli, Professor of Ag and Biosystems Engineering and Director of the Controlled Environment Agriculture Center (CEAC) at the University of Arizona, Tucson.

[Click here to read the full article.](#)

The Center for Tropical and Subtropical Aquaculture (CTSA) is one of five regional aquaculture centers in the United States established and funded by the U.S. Department of Agriculture's National Institute of Food and Agriculture (NIFA) under grants 2007-38500-18471, 2008-38500-19435, and 2010-38500-20948. The regional aquaculture centers integrate individual and institutional expertise and resources in support of commercial aquaculture development. CTSA was established in 1986 and is jointly administered by the Oceanic Institute and the University of Hawaii.

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Center for Tropical and Subtropical Aquaculture | 41-202 Kalaniana'ole Highway | Waimanalo | HI | 96795