



IN THIS ISSUE...

- Tilapia Cage Operators in the Philippines Prepare for Storm 1
- How will Tilapia be Affected by Ghana's Changing Climate? 2
- Goings-On In the Pond 2
- Role of Fish in Food and Nutrition Security Among Women and Preschool Children in Cambodia 6
- AquaFish Student Corner: Graduate Student Profile 8
- PONDerings 9
- AquaFish Alumni Corner: Where are They Now? 10
- Notices of Publication 11
- Upcoming Meetings and Events 12

TILAPIA CAGE OPERATORS IN THE PHILIPPINES PREPARE FOR STORM

By Morgan Chow, AquaFish Innovation Lab



Cage operator feeds juvenile tilapia in newly built steel cages on Lake Taal, Philippines (photo by Morgan Chow).

Jeffrey Bravo spent two days coordinating approximately 100 employees to prepare their tilapia cages on Lake Taal for the approaching typhoon Ruby (Hagupit), which made landfall on December 7, 2014. Jeffrey works as a manager for Feed Mix, a fish feed company that operates more than 70 tilapia cages on Lake Taal in Batangas province, Philippines.

Jeffrey said he was very worried about the destruction that typhoon Ruby could potentially bring to his cages. His fears are not unfounded. Just over one year ago typhoon Glenda destroyed all of Feed Mix's tilapia cages on Lake Taal. As a result, the company switched from bamboo to steel

Cages continued on page 5

HOW WILL TILAPIA BE AFFECTED BY GHANA'S CHANGING CLIMATE?

By Emmanuel Frimpong¹, Gifty Anane-Taabeah², Steve Amisah, Akwasi Ampofo-Yeboah³, and Kwamena Quagrainie⁴

¹Virginia Tech, USA

²Kwame Nkrumah Science and Technology (KNUST), Ghana

³University of Development Studies (UDS), Ghana

⁴Purdue University, USA

Fish consumption in Ghana is the highest in Africa and among the top 2% of countries globally, with a per capita consumption of 18 kg per year, accounting for an estimated 60% of all dietary protein intake. Fish can be found in many dishes in Ghanaian cuisine - fufu, banku, ampesie, umo tuo, red red, tuozafo, kokonte – due in part to the widespread acceptance and relative low cost of fish among animal protein options. It is not a coincidence that Ghanaians consume so much fish. With a coastline of over 500 km long, about one half of Ghana's 26 million people live within 50 km of the coast, and most of those who



After a day of travel, Nile tilapia brood stock from the most remote parts of the Volta River arrive at the Pilot Aquaculture Center (PAC) to begin their conditioning to provide fingerlings for experiments (photo courtesy of Emmanuel Frimpong).

Goings-On In the Pond...



The project titled: "Enhancing the Profitability of Small Aquaculture Farm Operations in Ghana, Kenya, and Tanzania," was completed in December 2014. The project came to a close after four years of work focused on technology adoption involving management of inputs for fish production in sub-Saharan Africa.

Researchers from the University of Michigan are working with partners at the Agriculture and Forestry University in Nepal to produce periphyton to enhance yields in polyculture ponds with carp and small indigenous species. Twelve ponds have been stocked, and harvests will occur in the upcoming months. As periphyton removes nutrients from the water and adds oxygen, it also acts as an additional feed source for fish. The economic value of periphyton enhancement includes the ability to grow fish faster under similar inputs, as well as the ability to reduce feed inputs and achieve similar growth rates.

At Sokoine University of Agriculture, Tanzania, researchers have evaluated invertebrates as potential protein sources in Nile tilapia (*Oreochromis niloticus*) diets. Together with researchers from Purdue, they determined the chemical composition of maggots and earthworms via a proximate analysis and will compare these results with that of fishmeal. These invertebrates were chosen because they are abundant, affordable and have the ability to produce large biomass within a short time because of their short life cycle. With a good quality, affordable feed source, aquaculture productivity and profitability can increase significantly.

Wilfred Jamandre of Central Luzon State University in the Philippines visited Dhaka, Bangladesh, to conduct a value chain analysis of mudcrab. This analysis will contribute to a study led by North Carolina State University to improve nutritional status and livelihoods of marginalized women households in Southwest Bangladesh. Researchers will also apply the value chain analysis to assess the potential for carp-tilapia polyculture.

Environment continued on page 3....

...Environment continued from page 2.



In Binaba, after a successful day of work, the AquaFish research crew poses with two fishermen (on right) who helped with tilapia sampling. Crew from left to right: Francis Adjei (PAC), Iris Fynn (Virginia Tech), Akwasi Ampofo-Yeboah (UDS), Emmanuel Frimpong (Virginia Tech), and Gifty Anane-Taabeah Attu (KNUST) (photo courtesy of Emmanuel Frimpong).

are 'landlocked' live within the Volta River basin, which drains two-thirds of the land area of Ghana. The Volta River and lake are home to diverse fish populations, including a variety of cichlids. One can easily find five to six species of cichlids naturally occurring in a single location in the Volta, all of which are exploited locally for food. Of the cichlids in Ghana, the Nile tilapia (*Oreochromis niloticus*) is the most widely distributed and most utilized fish species in both capture fisheries and aquaculture.

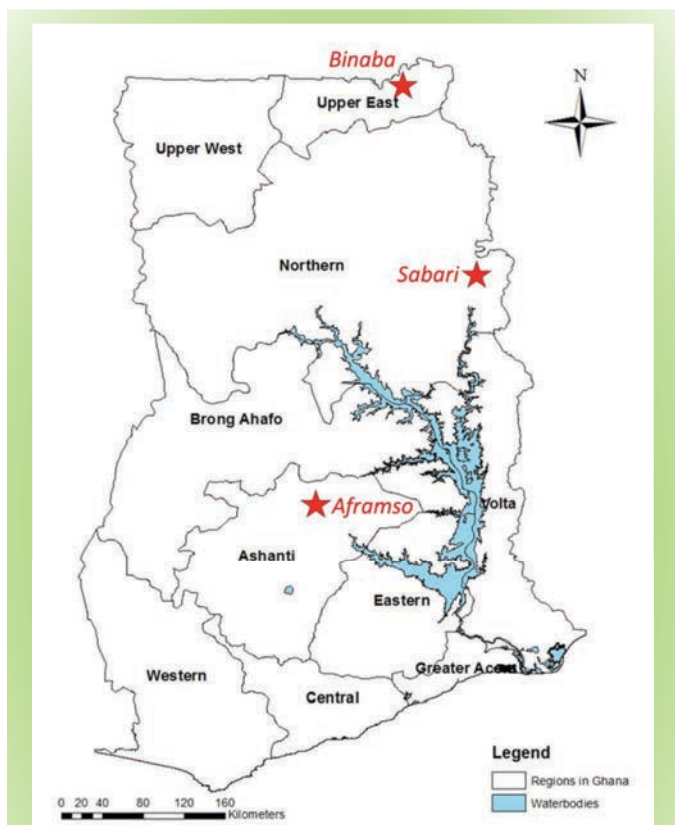
Although Ghana is one of the world's biggest consumers of fish, it is among the worst in managing its fisheries resources. Overdependence on wild fish capture, overfishing and destructive fishing practices, excessive importation of fish, and a tepid development of the domestic aquaculture sector have characterized

the country's fisheries management for several decades. Over the last two decades, marine catches, which constitute about 80% of domestic production, have been on the decline. Inland fisheries production has stagnated over the same period while the total contribution of aquaculture to domestic production has only marginally increased to about 5%. As a result, nearly 50% of all fish consumed in Ghana are imported.

There have been recent government initiatives to accelerate aquaculture development in Ghana, however, the threat of a changing climate could curtail growth. These climate changes are predicted to make the southern parts of the country warmer, and the estuarine and near coastal freshwaters more saline. Over 95% of aquaculture in Ghana occurs in the south. The future environmental conditions could threaten both

Environment continued on page 4....

....Environment continued from page 3.



Map of Ghana showing the three sites (red stars) where Nile tilapia brood stocks have been collected to study adaptations to future climate and environmental conditions (map courtesy of Emmanuel Frimpong).

inland fisheries and aquaculture production. However, there is a ray of hope: the climate of the warmer, northern parts of the Volta basin in Ghana is similar to that predicted for the south under future environmental conditions. This could mean that tilapia currently inhabiting the north may be better adapted to the warmer environment of future years.

This AquaFish project includes personnel from Purdue University and Virginia Tech University in the US, and Kwame Nkrumah University of Science and Technology and University for Development Studies in Ghana. Researchers are leading the identification of adapted local populations of Nile tilapia for future aquaculture, using a combination of experimental, field, and genetic studies.

Researchers, with the help of local fishers, are collecting Nile tilapia from across the latitudinal range of the Volta basin in Ghana and exposing them to slightly elevated temperatures and salinity and depressed dissolved oxygen levels in laboratory settings. This testing will help identify which populations grow best under these predicted future climate and environmental conditions. Genetic differentiation among the populations in the desirable traits will be quantified. Juvenile fish for the laboratory studies at KNUST will be bred from brood stock collected from the different locations with the help of local fishers. Broodstock from all selected sites are currently being held at the Pilot Aquaculture Center (PAC) of the Ministry of Fisheries and Aquaculture Development and being conditioned for spawning.

The active involvement of PAC in this project helps promote capacity building and supports ownership of the results of this vital research by the Ministry. It is hoped that the results of this study will evolve into a selective breeding program at PAC that will make the best sub-strain identified in this research available to farmers to help tilapia production keep pace with the changing climate.

In addition, the local fishing communities have embraced the project mission and have demonstrated great enthusiasm in working with AquaFish scientists to prepare for environmental changes that they reckon are already being experienced. Ghana harbors a treasure of tilapia genetic resources that may hold the key to food security in the future, and AquaFish is proactively intervening to unlock this potential to enhance tilapia production in Ghana.



....Cages continued from page 1.

cages to buffer against losses from future typhoons. Jeffrey was hopeful that the steel cages would be better equipped to withstand strong winds and turbulent waters brought on by typhoons which occur roughly 20 times per year. The steel cages require fewer regular repairs than bamboo, their cheaper counterpart. Thankfully, this time the typhoon slowed before making landfall and all the cages remained in-tact.

Jeffrey received a Bachelor's degree in Fisheries Science from Central Luzon State University (CLSU) in Nueva Ecija, Philippines. As a CLSU Fisheries student, Jeffrey was under the instruction of long-time AquaFish partner, Dr. Remedios Bolivar. Jeffrey enjoys his career in aquaculture, and hopes to one day start his own feed company. He credits his studies at CLSU for giving him the skills necessary to be a successful manager at Feed Mix.

Feed Mix is based on an employee profit-sharing model where employees receive 50% of the net profits of the tilapia harvest. Jeffrey believes that this model inspires dedication from employees, and also provides a fair income.

The cages are divided according to four growth stages: primers, starters, grow-out, and finishers. Because of this rotation, fish can be more densely stocked than if stocked all together. According to Jeffrey, most of the tilapia is sold to markets in Manila for roughly 85 PhP (2 USD) per kilo, while some is exported to the U.S.

Although tilapia cage culture can be very profitable in Lake Taal, it is not an easy venture. There are four permits that all farmers are required to obtain before they are allowed to operate tilapia culture on the lake. These permits must be granted by four separate entities: the Barangay (neighborhood unit); the Municipality; the Province; and the National Coast Guard. The total permit costs amount to roughly 9,000 PhP (200 USD) per year. This investment is worth it to many farmers as they can harvest up to 150,000 tilapia per growing cycle -- roughly 8-9 months. However, the permitting process is becoming increasingly competitive and the government only allows two cages per person. In fact, the number of cages on the lake is rapidly approaching the legal limit, and the government has become much more selective with permit approval in recent years. Because of these restrictions, developing partnerships and applying management skills, such as those utilized by Jeffrey Bravo, are crucial to successful aquaculture enterprises on Taal Lake.

Jeffrey Bravo is just one example of a successful CLSU Aquaculture graduate. Since the inception of the aquaculture program at CLSU, AquaFish has supported 29 Master's and Ph.D. students' research projects and 42 Bachelor's degrees at CLSU. The program has grown tremendously in recent decades. And according to CLSU's Vice President, Dr. Teri Abella, CLSU is the only state university in the Philippines with a Fisheries/Aquaculture program that has maintained high enrollment numbers over the last decade.



Tilapia cages on Lake Taal, Philippines (photo credit Morgan Chow).

ROLE OF FISH IN FOOD AND NUTRITION SECURITY AMONG WOMEN AND PRESCHOOL CHILDREN IN CAMBODIA

By Touch Bunthang¹, So Nam¹, Chheng Phen¹, and Robert Pomeroy²

¹Inland Fisheries Research and Development Institute, Phnom Penh, Cambodia

²University of Connecticut, Department of Agricultural and Resource Economics, Groton, Connecticut, USA



edible insects, snakes, and turtles, is at least 60,000-100,000 tons per year. More than six million people (approximately 45% of the total population) are involved in fisheries and fisheries-related activities, and fish and rice are an integral part of the nation's staple food for daily consumption.

To address this rapidly growing fisheries industry, while also ensuring food security and the sustainable development of aquatic resource management, AquaFish-supported



Fish harvesting (left) and household fish processing (right) at "Dai" fishery in Tonle Sap River, Cambodia (photo courtesy of Robert Pomeroy).

About 86% of Cambodia's land area is within the Mekong River catchment, and the fish produced from the river system contain high levels of minerals and nutrients for human nutritional needs. This has contributed to Cambodia being ranked fourth in global inland fisheries production (approximately 400,000 tons/year) after China, India, and Bangladesh. Cambodia's coastal area also has high potential for fisheries production (approximately 100,000 tons/year).

The total freshwater and marine capture fisheries production is estimated at about 500,000 tons per year, with an economic value of US \$1.2 – 1.6 billion, which contributes approximately 12% to the total gross domestic product (GDP). The catch of other aquatic animals (OAAs), such as shrimps, crabs, snails, frogs, freshwater

researchers at the University of Connecticut and the Inland Fisheries Research and Development Institute (IFReDI) in Cambodia are examining ways to address household nutrition through farming nutrient-dense fish species. The study focuses on women and children's health and commonly consumed fish species by evaluating the current consumption status, the contribution of fish to energy, and nutrient intake levels of women and preschool children. Stung Treng province (Upstream Mekong River), Prey Veng province (Downstream Mekong River), and Kampong Thom province (Tonle Sap Area) were the three sites selected for the study.

According to the surveys collected as part of the study, the top three most commonly consumed species by these populations are:

Cambodia continued on page 7....

....Cambodia continued from page 6.

Siamese mud carp (*Cirrhinus* sp.), snakehead (*Channa striata*) and yellow eyed silver barb (*Hypsibarbus pierrei*) or catfish (*Mystus* sp.). Overall, women and children consumed more than 30 different species of fish and OAAs. Results showed that women's average daily fish consumption is 145.3 g/person/day, while preschool children consume 53g/person/day, accounting for 17% and 11%, respectively, of their total diets.

When the contribution of fish to total energy was calculated for these commonly consumed species, researchers found that fish provides a majority of the major nutrients

in both women and preschool children's diets (see Table 1 below).

Researchers plan to conduct a series of consultations as well as a final workshop on key findings. The study provides the baseline information for policy recommendations to protect future stocks of nutritionally valuable fish species for vulnerable populations in Cambodia. Information from this study will inform more than 300 fisheries and aquaculture households throughout Cambodia on the current status and projected future changes of valuable fish stocks. These actions will help ensure that household nutritional benefits from small-scale ponds are preserved.

Table 1: Contribution of fish as a percent of total nutrient intake from animal food sources of women and preschool children in Cambodia.

	Protein	Energy	Fat	Iron	Zinc	Calcium	Vitamin A
Women	80%	69.7%	54%	74.5%	44.6%	82.9%	87.4%
Preschool Children	78%	72.1%	60%	57.1%	44.1%	92.8%	56.1%



Conducting food and nutrition consumption surveys among women and preschoolers in June 2014 in Prey Veng province (left) and in Stung Treng province (right) (photo courtesy of Robert Pomeroy).



AQUAFISH STUDENT CORNER

GRADUATE STUDENT PROFILE: SUBHASH JHA

By Morgan Chow, AquaFish Innovation Lab



Subhash Jha (photo courtesy of Subhash Jha).

The culture of cold-water species in Nepal has yet to reach its full potential. To date, only a few indigenous species have been cultured, partially due to the lack of expertise in this type of aquaculture. Additionally, technologies that are developed do not often reach farmers, which limits the impact and influence of research. As a result, coldwater aquaculture in Nepal remains under-developed, with large potential for growth.

Sahar (*Tor putitora*), a cold-water fish species endemic to Nepal, is a popular game fish that has potential for aquaculture due to its ability to tolerate a wide range of temperatures. Cultivating sahar could help curtail declines in wild populations that have resulted from overfishing and habitat alterations. Sahar has high economic value, fetching sale prices almost double that of the more commonly cultivated carps and tilapia species. Due to its predatory feeding habits, sahar is also a good candidate for co-culture with tilapia and could help control unwanted reproduction

which stunts growth, thereby increasing pond productivity, harvest, and income for farmers. Promoting sahar aquaculture development in Nepal could assist in conservation of this species while also providing livelihood opportunities and food security to the people of Nepal.

Subhash Jha, originally from Janakpur, Nepal, developed an interest in aquaculture at a very young age. He remembers many ponds in his village that remained unused, despite their potential to provide food and income. When he learned about pond aquaculture, he could not understand why no one had been farming the ponds in his village. After receiving a Bachelor's in Agriculture from the Institute of Agriculture and Animal Science (formerly Tribhuvan University) in 2013, Subhash's fascination with pond aquaculture persisted. Today, Subhash is an AquaFish-supported Master's student in Aquaculture at the Agriculture and Forestry University (AFU) in Chitwan, Nepal.

Subhash's Master's research aims to help ameliorate the under-development of



Subhash sorts newly hatched sahar fry after successfully breeding the fish artificially at an aquaculture research facility in Chitwan, Nepal (photo courtesy of Subhash Jha).

Graduate continued on page 9....

....Graduate continued from page 8.

AQUAFISH STUDENT CORNER



Subhash and his project leader, Jay Dev Bista, AquaFish Project Host Country Co-PI (photo courtesy of Subhash Jha).

aquaculture and threatened populations of sahar. By studying the spawning behavior of sahar, Subhash and researchers at AFU hope to improve sahar breeding techniques and increase sahar seed production to aid restocking efforts in natural water bodies and make sahar widely available for culture in Nepal. This research is an extension of previous AquaFish work that was done in Pokhara on sahar breeding and production to increase availability of sahar fry for culture.

In conjunction with Subhash's research, a workshop will be held to disseminate these newly developed sahar seed production technologies to promote sahar culture and mitigate the declining natural populations of sahar in the rivers and lakes of Nepal. Subhash's interest in conservation goes beyond the scope of his Master's project, and he hopes to one day develop a hatchery and training center to continue aquaculture development in Nepal.



PONDERINGS...

Big Boy came
Carrying a mermaid
On his shoulders
And the mermaid
Had her tail
Curved
Beneath his arm.

Being a fisher boy,
He'd found a fish
To carry—
Half fish,
Half girl
To marry.

-Langston Hughes



Tilapia cages in the Philippines (photo credit Morgan Chow).



AQUAFISH ALUMNI CORNER

WHERE ARE THEY NOW?:

SUNILA RAI

By Morgan Chow, AquaFish Innovation Lab

Polyculture is an agricultural practice in which multiple species are cultivated in one space. In aquaculture, polyculture can produce benefits to the small-scale farmer, such as lower feed costs and the ability to grow a higher diversity of species in a small area. In rural Nepal, small-scale, semi-intensive pond culture is common, but managing increasing productivity in these systems remains challenging. Polyculture was the focus of Dr. Sunila Rai's Master's research at the Asian Institute of Technology (AIT) in Khlong Luang, Thailand. Her work offers a method for increased productivity in ponds that can address pond management issues in her home country of Nepal.

Sunila remained at the AIT to pursue a Ph.D. in Technical Science under the advisory of long-time AquaFish partner Dr. Yang Yi. Her doctoral research examined the use of rice straw as a substrate for periphyton-based fish culture. Periphyton, a community of algae, cyanobacteria, heterotrophic microbes, and detritus, is an important food source for many cultured fish species. Rice straw offers a viable option for small-scale fish farmers to grow periphyton since it is inexpensive and widely available in many parts of southeast Asia. Sunila's research found that rice straw produced high growth rates for all fish species tested, and therefore has the potential to increase production in rural aquaculture systems.

Sunila's work in graduate school laid the foundation for her promotion as an Associate Professor and Deputy Director



Sunila Rai at one of her pond sites (photo courtesy of Sunila Rai).

of Research at the Institute of Agriculture and Animal Science at the Agriculture and Forestry University in Nepal, and since then has advised many Masters' students in their own research. According to Sunila, working with AquaFish gave her valuable international exposure in the field, which improved her personal capacity and self-confidence in her abilities as a scientist.

Sunila's decision to pursue higher education originated from a desire to enhance her knowledge of aquaculture and fisheries, as few Nepalese women are involved in aquaculture. Not only has Sunila made great contributions to aquaculture science, but she has also done a significant amount of work to increase women's participation in aquaculture and fisheries in Nepal. Sunila said that her most enjoyable experiences throughout her career have been her work with women fish farmers of various ages. In particular, Sunila helped establish two women-run fish farmer cooperatives.



Notices of Publication

Notices of Publication announce recently published work carried out under AquaFish sponsorship. To receive a full copy of a publication, please contact the author(s) directly. All past and present Notices of Publication can be found on the AquaFish website at: aquafishcsp.oregonstate.edu/nop.php

Prolactin is a major inhibitor of hepatic Leptin A synthesis and secretion: Studies using a homologous Leptin A ELISA in the tilapia (14-337).

Jonathan D. Douros, David A. Baltzegar, Jason P. Breves, Darren T. Lerner, Andre P. Seale, and and E. Gordon Grau, and Russell J. Borski.

The present study identifies regulatory interactions between leptin A (LepA) and the pituitary hormone prolactin (PRL). In order to measure tilapia (*Oreochromis mossambicus*) LepA, an enzyme-linked immuno- sorbent assay (ELISA) utilizing a rabbit polyclonal antibody specific to tilapia LepA was first developed. The antibody shows strong cross reactivity to recombinant tilapia LepA (rtLepA), and a corresponding 16 kDa protein in both tilapia and striped bass plasma, but not to recombinant human leptin (rhLep). The assay has a linear detection range of 0.25–1000 nM, with intra- and interassay variability of 9% and 16%, respectively. Plasma LepA levels measured in tilapia ranged from 0.8 to 3.9 nM, similar to that found for other vertebrates. Hypophysectomy (Hx) increased circulating LepA and lepa mRNA levels in the liver, the dominant source of hormone production. Administration of ovine PRL (oPRL, 5 lg/g BW) to Hx fish restored circulating LepA and hepatic lepa mRNA levels to those of control fish. Additionally, oPRL reduced lepa mRNA levels in a dose-dependent fashion in cultured hepatocytes following an 18 h incubation. Previous work in our lab indicates that rhLep stimulates PRL release in vitro from tilapia pituitaries. Here, both rtLepA and rhLep (0.5 lg/g BW) increased mRNA expression of tilapia prolactin mRNAs (prl1, prl2) in the pituitary

in vivo. These results demonstrate that LepA enhances pituitary prolactin synthesis and release, while PRL in turn inhibits hepatic leptin secretion and synthesis in teleosts. We postulate this regulatory interaction may be necessary for mobilizing energy reserves during acute hyperosmotic adaptation.

This abstract was excerpted from the original paper, which was published in the General and Comparative Endocrinology (2014), 207: 86-93.

The value of pig manure as a source of nutrients for semi-intensive culture of Nile tilapia in ponds (a review) (14-338).

Christopher L. Brown, Tingbao Yang, Kevin Fitzsimmons, and Remedios B. Bolivar.

Growing global needs for food call for substantial increases in protein production in coming years, and for diligent conservation efforts. Manures from farm animals have been viewed both as a resource and as a waste product, but they are critically important sources of nutrients for organic and integrated farming and for traditional Asian aquaculture. Given constraints on livestock production and capture fisheries, careful development of the aquaculture industry is a necessity. The production volume and market share of tilapia are advancing extremely rapidly, and so too is the proliferation of misinformation and controversy. Culture and feeding practices differ widely, but feeding is usually recognized as the single largest cost to producers. Traditional Asian integrated farming practices involve the use of manures and other farm wastes to promote algae and zooplankton production, serving as a sole or supplemental nutrient source to the food chain that supports tilapia growout. Tilapia also ingest manures. The efficient use of nutrients from manures can have multiple benefits to integrated terrestrial agriculture and aquaculture, as long as product safety and quality are not compromised. With efficient use, handling of manures is simplified, fish production costs are reduced, fish nutrition can be improved,

Notices of Publication continued on page 11....

....Notices of Publication continued from page 10.

and potentially polluting materials are cycled constructively on integrated farms. Consumer and press reactions to the use of farm manures in food production can be highly polarized. Published responses cover a range of extremes, from enthusiastic endorsement to volatile reactions and outright rejection; in some areas this practice is considered to be more of a "PR (Public Relations) problem" than a health hazard. The perception in online public media that tilapia coming from ponds fertilized with manure are heavily contaminated with pathogens has not been supported by evidence. The perspectives of farmers in two major tilapia production areas (China and the Philippines) are included.

This abstract was excerpted from the original paper, which was published in *Agricultural Sciences* (2014), 5: 1182-1193.



AquaFish partners and workshop participants visit a pond in Tanzania (photo courtesy of AquaFish Innovation Lab).



Upcoming Meetings and Events...

The AquaFish Innovation Lab is proud to support workshops and meetings designed to facilitate increased knowledge and communication in aquaculture. Upcoming meetings and workshops include...

2nd International Symposium on Aquaculture and Fisheries Education (ISAFE2)

22-24 April 2015

Shanghai, China

<http://isafe2.shou.edu.cn/>

World Aquaculture 2015

26-30 May 2015

Jeju Island, South Korea

www.was.org/eventCalendar.aspx

People and the Sea VIII

24-26 June 2015

Amsterdam, The Netherlands

www.openchannels.org/conferences/mare-academic-conference-2015-people-and-sea-viii



For more meeting and employment opportunities visit our Education & Employment Opportunities network database online, EdOpNet, at aquafishcrsp.oregonstate.edu/edop.php

AquaFish Innovation Lab
Oregon State University
Corvallis OR 97331 USA
aquafish.oregonstate.edu



USAID
FROM THE AMERICAN PEOPLE



AQUAFISH
INNOVATION LAB

AQUAFISH INNOVATION LAB CONTACT INFORMATION

AquaFish Innovation Lab and Aquaculture publications can be accessed online at aquafishcrsp.oregonstate.edu/publications.php

Aquanews is available on-line at <http://aquafishcrsp.oregonstate.edu/aquanews.php>. Past issues may also be accessed online at aquafishcrsp.oregonstate.edu/AquaNewsArchives.php

Your comments, stories, student profiles, and photos are always welcome! Send information to aquafish@oregonstate.edu (please include "Aquanews" in the subject line).

Director: Dr. Hillary S. Egna
Aquanews Editors: Kat Goetting and Ford Evans
AquaNews Assistant Editors: Morgan Chow and Caleb Price

Aquanews is published by the AquaFish Innovation Lab, Oregon State University, Corvallis OR 97331, USA. aquafish@oregonstate.edu

The contents of this newsletter are copyright of the AquaFish Innovation Lab © 2014. All rights reserved, including mechanical and electronic reproduction.

Mention of trade names or commercial products does not constitute endorsement or recommendation for use on the part of USAID or the AquaFish Innovation Lab.

AquaFish Innovation Lab activities are funded by Grant No. EPP-A-00-06-00012-00 from the United States Agency for International Development (USAID), and by participating US and Host Country institutions.

Oregon State University is an Affirmative Action/ Equal Opportunity Employer.