AQUANEWS

Sustainable Aquaculture and Fisheries for a Secure Future

Feed the Future Innovation Lab for Collaborative Research on Aquaculture & Fisheries

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A happy child with a large carp at the Tri An Reservoir, Vietnam (photo credit Vu Cam Luong).

The Aftermath of Typhoon Haiyan for the Philippines

Tacoloban after Haiyan (photo credit CNN).

On Friday, 8 November 2013, Typhoon Haiyan made landfall, and the Philippines was hit with what has been identified as the largest storm to ever reach land. One of the most powerful storms in record's history, Typhoon Haiyan was recorded as being three and a half times more forceful than Hurricane Katrina. The sheer size of the storm, compounded by the fact that the Philippines is an archipelago composed of roughly 7,100 islands, left the country vulnerable and exposed when the storm hit. According to the Center for Research on the Epidemiology of Disasters, the Philippines' location on the western rim of the Pacific Ocean, the most active area for tropical cyclones, has left it amongst the top five most disaster-hit countries. Haiyan has left the country severely damaged, displacing at least 800,000 people, affecting more than 12 million people, and causing more than 6,000 deaths with roughly1,000 people still missing. A "wall of water," as many are describing the storm surge, was accompanied by sustained winds of 315 km/h (195 mph) and gusts of 275 km/h (170 mph). Waves reached as high as 7.5m (24.6 ft.), amounting to a hurricane stronger than category 5, the highest category on the Saffir-Simpson scale (NASA 2013). The heart of the disaster was felt most severely in the city of Tacloban, Leyte, in the Eastern

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...Philippines continued from page 1

Visayas Region of the Philippines, home to more than 200,000 people and one of the region's major ports. Destruction of the entire city occurred within a matter of hours, as the storm surge broke the sea wall protecting the Tacloban airport and continued to destroy concrete buildings throughout the city. In addition to physical damage done by Haiyan, many relief agencies are concerned with the potential medical disaster resulting from limited food and water supplies, pools of polluted water, and broken down sanitation systems.

Three days after hitting the Philippines, Typhoon Haiyan made landfall in Vietnam on Tuesday 11 November, near the Ha Long Bay in the northern region of the country with sustained winds of up to 140 km/h (85 mph). Approximately 600,000 people were evacuated in the northern provinces of Vietnam before the storm reached land. The storm changed course on Sunday 16 November, and an additional 52,000 people were evacuated. While the storm caused some damage, Vietnam was spared the disaster that fell on the Philippines days earlier. Heavy rains hit the northeast part of the country, creating risks of flooding and landslides in the mountainous areas. Roughly 100 households were damaged. According to the state-managed Vietnam News Agency, five people were killed. After substantially weakening since it first hit in the Philippines, the storm moved from Vietnam to southern China.

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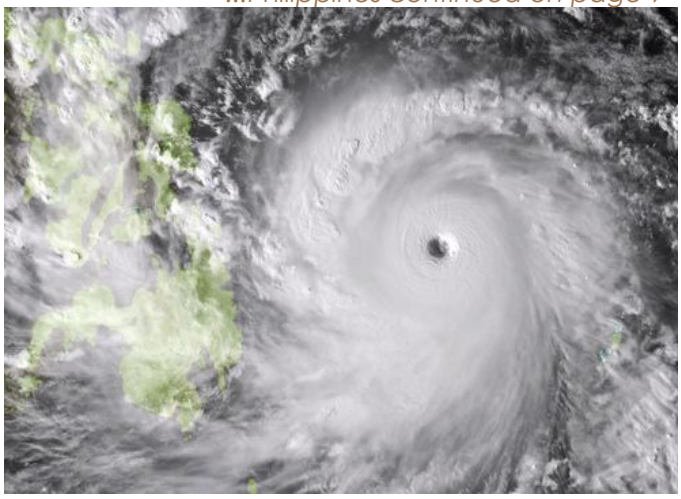

Satellite image o f Haiyan approaching the Philippines (photo credit NASA).

Goings-on in the Pond...

AquaFish Management Team presented current work at Oregon State University's annual University Day on 19 September 2013 at the CH2M HILL Alumni Center. New faculty and students learned about AquaFish projects, and general information on aquaculture and international work. Visitors to the booth were invited to play a computer game based around aquaculture and fisheries trivia.

The AquaFish 7th Annual Report was recently completed and released to the general public on the AquaFish website with updated information on Aquafish projects and country involvement. The report can be found at www.aquafishcrsp.oregonstate.edu/Documents/Uploads/FileManager/AquaFish_Annual_Report_FINAL_31Oct13.pdf

AquaFish Innovation Lab Implementation Plan for 2013-2015 work has been completed and is available on the AquaFish website. www.aquafishcrsp.oregonstate.edu/publications.php

The 2009-2011 Technical Report Investigations Volumes 1 and 2 are completed and available on the AquaFish website with up-to-date information on projects within the major focus areas.

AquaFish Annual Meeting and the Aquaculture America 2014 are set to be held back to back in Seattle, Washington 8-12 February 2014. The AquaFish Innovation Lab will also be running a day-long special session on Tuesday 11 February 2013 entitled "Low-Cost Feed and Input Solutions for Sustainable Small-Scale Aquaculture in Developing Countries". This will be chaired by AquaFish Director, Dr. Hillary Egna with AquaFish Research and Communications Manager Jenna Borberg serving as Co-chair.

Asia Regional Meeting was held on 9-10 December 2013 at the Inland Fisheries Research and Development Institute in Phnom Penh, Cambodia. Potential synergies for projects in Bangladesh, Nepal, Cambodia, Vietnam, Burma, China, and the Philippines were discussed. There was a shared focus on gender, human nutrition, USAID's mission of interaction and general outreach, capacity building, technology development, impact assessment, and outreach. More information to come in the Spring issue of AquaNews.

AquaFish Transitions... Washington, D.C. Orientation

The AquaFish Phase II Orientation meeting was held on 23-24 September 2013 in Washington, D.C., at the Kellogg Conference Room at the Association of Public and Land-grant Universities (APLU). As meeting chair, Dr. Hillary Egna ran the meeting with help from organizers including Joyce Turk, Harry Rea, Shivaun Leonard, and Patty Heublein. The meeting was hosted for the five AquaFish Phase II core research projects. Representing each of the projects were the five US Lead Project PIs: Russell Borski (North Carolina State University), Jim Diana (University of Michigan), Bob Pomeroy (UConn-Avery Point), Joe Molnar (Auburn), and Kwamena Quagrainie (Purdue). In addition were the five Host Country Project PIs: Steve Amisah from KNUST, Ghana; Chheng Phen from IFReDI, Cambodia; Theodora Hyuha from Makerere University, Uganda; Madhav Shrestha from Agriculture and Forestry University, Nepal; and Md. Wahab from Agricultural University, Bangladesh.

Individuals from USAID were invited to make presentations on the newly formed Innovation Labs regarding Monitoring and Evaluation, Human and Institutional Capacity Development (HICD), Gender, Nutrition, and the USAID Environmental Strategy. USAID was very pleased to be able to share expertise in these areas, and gave valuable presentations and guidance that were very successful and well received by participants. The information from the meeting has been shared with the rest of the AquaFish community.

The first day of the recent Phase II orientation meeting was spent going through USAID Indicators and the Feed the Future Monitoring System (FTFMS) for each major project, as well as creating project plans for capacity building, outreach, and training. Sophia van der Bijl from Monitoring and Evaluation at USAID covered the Indicators and FTFMS, while Clara Cohen, the Senior Science Policy Advisor from USAID discussed USAID HICD policies. A working

AquaFish Orientation meeting participants. Back row (left to right): Russell Borski, Ford Evans, Jim Diana, Shivaun Leonard, Kwamena Quagrainie, Chheng Phen, Joe Molnar; middle row (left to right): Md. Wahab, Madhav Shrestha, Harry Rea, Stephanie Ichien, Bob Pomeroy, and Joyce Turk; seated (left to right): Theodora Hyuha, Steve Amisah, and Hillary Egna.(Photo courtesy of Kat Goetting.)

lunch was spent discussing the topics from the morning session amongst participants and presenters, with particular attention to project-level FTFMS indicators.

The second day started with a close up look at USAID gender strategies, led by Krista Jacobs, the Gender and Youth Advisor from USAID, and a review of project-level gender integration plans. After a working lunch, Maura Mack, the Nutrition Advisor for the USAID Bureau of Food Security (BFS) discussed nutrition goals and ways for projects to link with other organizations to better achieve these goals. At the end of the day, Steve Fondriest, the USAID Agricultural Development Officer and the Agriculture Bureau Environmental Officer for BFS, explained USAID's environmental strategy with a focus on specific policies relevant to fisheries and aquaculture. Meetings were held each morning between project PIs and the Managment Team to discuss Phase II details. Overall, the meeting was a great experience for the subcontractors, USAID, and the AquaFish Management Team. "I think the workshop is a model that other programs should emulate," said Clara Cohen, the Senior Science Policy Advisor in the Bureau of Food Security at USAID – the leading body for the U.S. Government's Feed the Future Initiative, www.feedthefuture.gov

ISTA 9 AND ISTA 10

Ninth and Tenth International Symposia on Tilapia in Aquaculture
Better Science, Better Fish, Better Life

By Kevin Fitzsimmons, University of Arizona

The Ninth International Symposium on Tilapia in Aquaculture (ISTA 9), sponsored in part by the AquaFish Innovation Lab was held in Shanghai, China, 21-24 April 2011. The location decision recognized the fact that China is the world's largest producer, consumer and exporter of tilapia products. The rapid expansion of tilapia farming and consumption has been smoothly integrated into Chinese aquaculture.

The Shanghai Ocean University, at the new campus south of the Shanghai-Pudong International Airport in the master planned suburb of Lingang-Shanghai, was the venue for the conference and provided excellent facilities for simultaneous translations, concurrent sessions, and a trade show. ISTA 9 was held in conjunction with the Ninth Asian Fisheries Society meeting and the Ninth Asian Fisheries and Aquaculture Forum (9AFAF). The meetings were dedicated in honor of our dear colleague, the late Dr. Yang Yi, who had originally suggested this arrangement prior to his passing in 2009. Also during this meeting, Narayan Pandit was honored with the Yang Yi- Young Scientist Award, established in 2009 in remembrance of Dr. Yang Yi.

From the first ISTA, with only several dozen participants, the ISTAs in Brazil, the Philippines, Mexico, Egypt, and China have each drawn between 600 and 900 attendees. Hundreds of thousands of jobs have been created in the farming, processing, and selling of almost 4,000,000 mt. of tilapia products per year. This enormous quantity of fish has been produced in many of the world's poorest nations, providing high quality seafood to people, as well as the most highly developed markets. This fact was reflected in the diversity of attendees and presentations from 40 different countries at ISTA 9.

Dr. Charles Ngugi, an AquaFish Regional Center of Excellence (RCE) Coordinator, presents at ISTA 10. (Photo courtesy of Dr. Hillary Egna.)

The ISTA 9 technical sessions included 62 presentations, each with a corresponding paper that was published in the conference proceedings. Dr. Hillary Egna, the AquaFish Innovation Lab Director, organized and chaired a day-long session on Friday 22 April 2011, which showcased AquaFish work from the 20 host countries in Asia, Africa, and Latin America. Papers on genetics, nutrition, fish health, processing and food safety, best management practices, marketing and value added products, certification programs, and regional reviews were included in the proceedings. Copies of the ISTA 9 proceedings are available from the World Aquaculture Society on-line bookstore (www.was.org), as well as at http://cals.arizona.edu/azaqua/ista/ISTA9/PDF's/. All of the papers are in English and some have Chinese translations of the abstracts. The keynote address was given by Kevin Fitzsimmons, titled "Why Tilapia is Becoming the Most Important Food Fish on the Planet".

The Tilapia International Foundation presented the Reverand Jan Heijne Award recognizing exceptional career service in support of poverty alleviation through tilapia aquaculture, to Dr. Li Sifa from Shanghai Ocean University.

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Named for Reverend Heinje, who organized and supported several tilapia farming projects in developing countries with his congregation in the Netherlands, the award is presented at every ISTA symposium. Following tradition, the Consul from the Netherlands to the host country (China in this case) presented the award. Dr. Li is widely recognized as the father of the tilapia industry across China. He was instrumental in importing improved varieties of tilapia, training government fisheries and aquaculture specialists in tilapia culture, and still advises many of the farmers, hatchery managers, and processing plants. His graduate students are now scattered across the country leading aquaculture R&D centers. Since tilapia farming in China has raised tens of thousands of families from poverty to a middle class lifestyle, the award was richly deserved.

Shanghai Ocean University was the ISTA host for the ISTA 9 symposium. The AquaFish CRSP, China Aquatic Products Processing and Marketing Association, Aquaculture without Frontiers, American Soybean Association, World Fish Center, World Aquaculture Society, American Tilapia Association, US-Agency for International Development, Intervet-Schering-Plough, Tilapia International Foundation, and the Global Aquaculture Alliance provided additional support.

ISTA 10

The Tenth International Symposium on Tilapia in Aquaculture (ISTA 10) was held in Jerusalem Israel, 6-10 October 2013. The location was selected to recognize the many contributions of Israeli scientists and farmers around the world, and to commemorate the 30-year anniversary of the first ISTA held in Nazareth. The rapid expansion of tilapia farming and consumption had much of its genesis with the domestication of tilapia in Israel. The large number of tourists visiting the country and trying tilapia (also known as St. Peter's fish) for the first time generated a high demand for tilapia in Israel. The meeting was co-hosted by several Israeli aquaculture groups including Aqua Moaf, Moaf Madan, Moaf Engineering Systems, Ranaan Fish Feeds, and Zemach Feed Mill. Additionally, the AquaFish Innovation Lab was a Gold Sponsor.

Mr. Yair Shamir, Israeli Minister of Agriculture & Rural Development and Mr. Nayon Bilijo, Ghanaian Minister of Fisheries and Aquaculture Development, opened the Symposium and participated in the events of the first day with participants from more than 40 countries. Three days of presentations were followed by a final day of field trips to tilapia farms in the Bet She'an Valley, feed mills, and a tilapia luncheon with pilgrims at a Jordan River baptism site.

Berta Levavi-Sivan (second from right) accepts AquaFish awards for two of her students at ISTA 10 with (left to right) Drs. Kevin Fitzsimmons, Gideon Hulata, and Hillary Egna. (Photo courtesy of Dr. Hillary Egna.)

The US – Israel Bi-national Agriculture Research and Development Fund (BARD) provided funds for a pre-conference workshop on tilapia endocrinology, which provided travel support for some presenters. Michal Shpilman, one of the AquaFish Best Presentation Award recipients, and Berta Levavi-Sivan, presented on tilapia leptin and leptin receptor. This was the first detailed description of leptin, which plays a critical role in reproduction and regulation of food intake and energy expenditure. Two leptins and one leptin receptor were described along with details on the base pair lengths of the cDNA. Information was provided on the three dimensional structures and details on the proteins.

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Other advances were described by:

Andre Seale - The effects of steady-state and tidally-changing rearing salinities on osmoregulation in the Mozambique tilapia.

Luiz Renato de França - Spermatogonial stem cell physiology, niche and transplantation in fish

Ishwar Parhar – Neuropeptide Kiss2 - A novel regulator of reproduction in tilapia

Moses Inbaraj - Sexual dimorphism in the tilapia *Oreochromis mossambicus* brain at the levels of steroids and its synthetic pathway

AquaFish awarded posters and papers presented by students and other participants according to the quality of the abstract, originality and motivation, contribution to the field, and the quality of science. The winners were:

- Jakob Biran (Israel)--Best Student Presentation: A novel neuropeptide is involved in the regulation of gonadotropin release in the tilapia (*Oreochromis niloticus*)
- Michal Shpilman (Israel)--Best Student Presentation: Tilapia leptin and leptin receptor
- Orly Eshel (Israel)--Best Presentation (general category): Detection of genes and microRNA involved in sex determination in Nile tilapia (*Oreochromis niloticus*)
- Martha Hernandez (Mexico)--Best Student Poster: Polyculture of Nile tilapia *Oreochromis niloticus* with the Mayan cichlid predator *Cichlasoma urophthalmus*
- Matan Golan (Israel)--Best Poster (general category): Pituitary structure and differential regulation of gonadotropins in tilapia

The Tilapia International Foundation presented their award recognizing exceptional career service in support of poverty alleviation through tilapia aquaculture to Israel Snir during the gala dinner. Israel Snir is widely recognized as a tilapia-farming pioneer. Starting at a kibbutz farm in Israel, he moved to the US to market fish from Israel. Later he worked in Colombia, Ecuador, and Honduras, as well as several other countries to develop and manage some of the biggest and most successful farms ever built. The Heinje award most importantly recognizes the benefits that tilapia farming has brought to the inhabitants of the developing countries where tilapia farms are built. This has been a hallmark of the entire Snir family, as they have all contributed to the success of each farm.

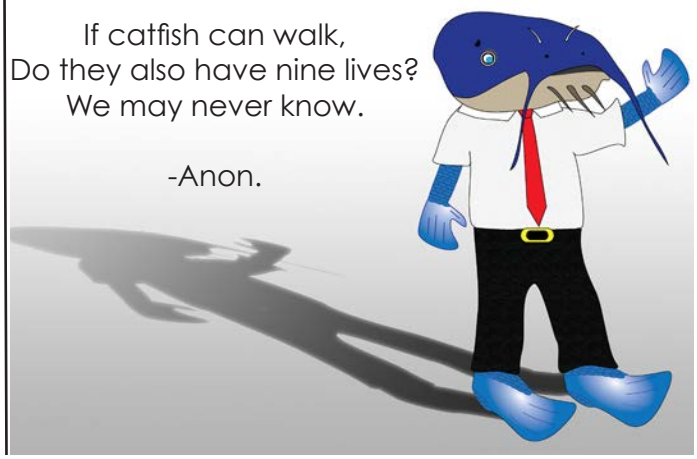
Tilapia harvested in the Philippines (photo courtesy of Russell Borski).

PONDERINGS...

A Haiku

If catfish can walk,
Do they also have nine lives?
We may never know.

-Anon.



AquaFish Student Corner

Graduate Student Profile: Akuffo Amankwah

Akuffo Amankwah, originally from Berekuso, Ghana, received the 2013 Borlaug LEAP Fellowship last April, recognized as a promising leader in the field of agriculture and related disciplines. Akuffo is currently pursuing his Ph.D. at Purdue University under the mentorship of AquaFish US-PI, Dr. Kwamena Quagrainie. Akuffo is also involved with the AquaFish Strategic Investment in Rapid Technology Dissemination (SIRTD) Associate Award, entitled "Enhancing the Profitability of Small Aquaculture Operations in Ghana, Kenya, and Tanzania".

Akuffo grew up near Lake Volta and saw the employment and increased rural income generated by the development of small tilapia farms on the lake and has been interested in aquaculture ever since. After receiving his Bachelors in Agriculture from the University of Ghana in 2006, Akuffo returned to pursue his Masters in Agricultural Economics under the guidance of Dr. Irene Egyir, graduating in 2010. According to Akuffo, the University of Ghana has the best agricultural program in the country, and he chose to pursue his Ph.D. at Purdue because it is one of the best schools in the field of agricultural economics in the world. Akuffo has observed "the contribution of graduates from Purdue University and faculty members is encouraging." His thesis is titled: Comparative Study of Aquaculture and Agriculture Among Small Holder Farm Households in Ghana and Kenya.

Akuffo Amankwah

For his AquaFish work, Akuffo is examining the adoption of aquaculture best management practices (BMPs) in Kenya. He plans to distribute questionnaires to aquaculture farmers in Ghana and Kenya in the spring of 2014. One of the major goals of the research is to make recommendations that will facilitate scaling up of BMPs to other parts of the sub-region of focus. According to Akuffo, collecting field data in Kenya and attending BMP workshops are some of the most rewarding experiences of his work. These opportunities have enabled him to see, first hand, local innovations put to use. Akuffo and other AquaFish partners also plan to provide policy recommendations on how to efficiently integrate aquaculture into household farming systems in both Ghana and Kenya. This will be done by looking at ways to allocate limited farming resources across fish and crop farming systems to maximize profits while meeting household food requirements and generating wealth simultaneously. The expected completion date for this research is December 2015.

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Akuffo Amankwah interviewing a fish farmer in the field in Kenya (photo courtesy of Akuffo Amankwah).

AquaFish Student Corner

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Akuffo also presented two papers at the World Aquaculture Society Conference in Nashville, Tennessee, in 2012, titled 'The Adoption of Aquaculture Best Management Practices in Kenya', and 'The Impact of Aquaculture Best Management Practices Adoption on Technical Efficiency of Kenya Fish Farmers: A Stochastic Frontier Analysis'.

Akuffo believes that some of the major constraints to aquaculture are the lack of knowledge of best practices by farming households. This is compounded by the lack of fisheries officers in Ghana and Kenya due to financial and institutional constraints. Even with the launch of the Ghana National Aquaculture Development Plan (GNADP), which aims to enhance and improve the practice, management, and development of aquaculture as a viable business, there is still no major aquaculture policies in Ghana. In Kenya, however, Akuffo says that aquaculture has been able to grow more rapidly, mostly due in part to support from Kenya's Economic Stimulus Program. According to Akuffo, "In both countries, there is also the problem of efficiently integrating aquaculture in the household farming system to improve welfare."

Akuffo plans to personally invest in small-scale aquaculture one day, once he feels as though he has made his contribution to the field and food security in Ghana. "I personally want to invest in the aquaculture business especially with my growing knowledge in its operation and the wealth creation potential for the rural folks as well as contribution to national food security," commented Akuffo. Some of his other related interests include: technology adoption in the presence of risk; integrating aquaculture into the farming system; rural and international development; efficiency of analysis of smallholder farmers; social and economic impact analysis of public and private projects; and what works and what doesn't work using randomized controlled experiments.

The Fourth Shanghai-Ocean University-AquaFish Yang Yi Young Scientist Travel Award

Hillary Egna (left) and Dr. Liping Liu (right) present the Yang Yi Young Scientist Travel Award to Kang Li and Md. Shariful Islam (photo courtesy of Liping Liu).

This year's Shanghai Ocean University (SHOU)-AquaFish Yang Yi Young Scientist Travel Award was given during the World Aquaculture Society Conference in Vietnam, December 2013. The two winners of the 4th SHOU-AquaFish Yang Yi Young Scientist Travel Award are Mr. Kang Li from Shanghai Ocean University and Mr. Md. Shariful Islam from Bangladesh Agricultural University.

Dr. Hillary Egna first proposed the Yang Yi Young Scientist Award in association with Shanghai Ocean University in honor of Professor Yang Yi, who passed away in 2010. In remembrance of Dr. Yi and in support of young scientists in aquaculture and fisheries, the award funds international conference attendance. The selection process began in 2012, as the selection committee nominated six candidates. Since then, four young scientists have been funded by the award. Awardees said that they will carry on Dr. Yi's devotion to and spirit for aquaculture, and will continue to make contributions for development and collaboration of global aquaculture.

...Philippines continued from page 2

AquaFish has many long-standing partners throughout the Philippines and Vietnam and remains committed to these partnerships, particularly at this time as these countries recover from this disaster. In the Philippines, AquaFish has been working to improve cost efficiencies and livelihoods throughout the fish value chain through a number of strategies, including reduced feeds for small-scale tilapia and milkfish farmers, improving hatchery technologies for enhanced tilapia seed quality, developing information dissemination strategies such as podcasts for tilapia farmers, and distributing guidelines for market analyses on production structures.

Although none of the project sites were within the areas hardest hit by typhoon Haiyan, some seaweed farms were heavily affected in areas such as Northern Iloilo in the Western Visayas. Seaweed farming is part of the AquaFish research on multi-trophic aquaculture systems that integrate seaweed, finfish, and shellfish into one system that generates high levels of output with minimal waste. Partners and project areas in the Philippines include: Central Luzon University (CLSU) and the Fresh Water Aquaculture Center (FAC) in Nueva Ecija; Southeast Asian Fisheries Development Center (SEAFDEC) in Iloilo; Genetically Improved Farmed Tilapia (GIFT) Foundation International; The University of the Philippines in the Visayas (Institute of Fish Processing Technology); The Bureau of Fisheries and Aquatic Resources; Shushilan NGO; The Department of Agriculture; Mindanao State University; West Visayas State University; and project sites in Negros Occidental and Luzon. Additionally, Remedios Bolivar from CLSU and a long-time AquaFish participant currently serves as the AquaFish Regional Center of Excellence (RCE) lead coordinator in the region.

In Vietnam, AquaFish and partners have been developing new alternatives to freshwater aquaculture projects mostly in the lower Mekong Basin. AquaFish partners in Vietnam include: Can Tho University; Nong Lam University; Dong Nai Fisheries Company; University of Agriculture and Forestry of Vietnam (Nong Nam University); and project sites in the Dong Thap and An Giang provinces.

Many international, government, and NGO aid groups are working on the ground and sending supplies to assist in the recovery and to help lessen the potential of disease outbreak. Some countries have pledged millions of dollars in assistance to the Philippines. The Philippines Consulate advises donating through the Philippines Red Cross, Department of Social Welfare and Development, and the National Disaster Risk Reduction and Management Council. AquaFish Management wishes all those affected by the typhoon a speedy recovery.

Creating Synergies: Africa Regional Meeting

An Africa Regional Meeting was held at Kwame Nkrumah University of Science and Technology (KNUST) Engineering Guest House in Kumasi, Ghana, on 5-9 July 2013. Dr. Hillary Egna, AquaFish Innovation Lab Director, was the program organizer for the meeting, with local organizers Steve Amisah and Kwamena Quagrainie helping with on-site logistics. Nelson Agbo (HC Co-PI) served as the meeting organizer with assistance from other KNUST faculty. Many of the organizers met in February 2013 at the World Aquaculture Society conference in Nashville, TN, before the grant for Phase II of the AquaFish Innovation Lab was awarded, to discuss preliminary details for the meeting.

Dr. Emmanuel Frimpong (second from left) leads a team meeting at the AquaFish Africa Regional Meeting. (Photo credit Steve Amisah.)

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Africa Regional Meeting participants at pond site in Ghana (photo courtesy of Kevin Fitzsimmons).

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The meeting served as an opportunity to start drawing commonalities across projects and to empower project participants to connect with other regional AquaFish partners. Feedback from participants indicated these goals were achieved. A similar meeting was held in 2005, prior to the start of AquaFish Phase I, as a way to find potential project sites and initiate new connections. This second meeting was important for bringing new and continuing partners together, and for introducing new projects. The meeting helped create synergies across the region so that projects can work better to benefit one another towards AquaFish's broader goals.

In order to take advantage of meeting participants being in Ghana, the meeting was interposed with a best management practices (BMP) workshop in Tarkwa and a council meeting in Accra. On the first day of the Africa Regional meeting, Dr. Egna explained the new Phase II AquaFish Innovation Lab and discussed proposed AquaFish projects in Africa with participants from Purdue and Auburn University projects. Kwamena Quagrainie and Steve Amisah reported on the Purdue project, titled "Improving Competitiveness of African Aquaculture through Capacity Building, Improved Technology, and Management of Supply Chain and Natural Resources". Joe Molnar and Theodora Hyuha reported on the Auburn project, titled "Hydrology, Water Harvesting, and Watershed Management for Food Security, Income, and Health: Small Impoundments for Aquaculture and other Community Uses". Other topics led by Dr. Egna covered developing synergies and regional collaboration with other groups working in Africa. Break-out sessions focused on capacity building, technology development, impact assessment, and outreach. Each break-out group had a shared focus on gender, human nutrition, and USAID's mission of interaction and general outreach.

Updates on BMP activities from the FTF Associate Award were covered for Ghana, Kenya, and Tanzania on the second day. An agreement for synergistic activities amongst countries was drafted as well, requiring each participating country to engage in an investigation called the Global Experiment. As part of the meeting there was a book dedication ceremony for the AquaFish Management Team's ongoing Library Donation Project. Donations included scientific literature, textbooks, and journals.

Some of the participants, led by Steve Amisah and Nelson Agbo, spent two days visiting several of the AquaFish field sites in Ghana: an aquaculture farm in the Eastern Region of Ghana, the Aquaculture Research Development Center, and the Ranaan Feed Facility. While participants explored the field, meeting organizers Hillary Egna, Emmanuel Frimpong, and Kwamena Quagrainie attended a Council meeting in Accra which included several representatives from USAID Missions as well as USAID Washington. After the council meeting, Drs. Egna, Quagrainie, and Frimpong attended the Feed the Future Collaborative Research Innovation Labs and Partners Workshop.

While in Accra, the participants gathered informally to introduce the group to the new Agreement Officer Representative (AOR), Shivaun Leonard. Shivaun was hired in response to the GS-13 advertisement released by the Bureau of Food Security in Winter 2013 and came on board just in time for the Ghana workshop. The Africa Regional Meeting was a great success, and the AquaFish community continues to foster regional collaborations and connections in Africa as well as Asia.

New AquaFish Management Team Members

Kat Goetting
Outreach and Communication Manager

Kat joined the AquaFish Innovation Lab in September 2013 as the Outreach and Communication Manager. She moved to Corvallis from Cape Cod, MA, where she worked for a non-profit conducting industry-driven fisheries research in the northeast sea scallop fishery. Originally from Tulsa, OK, Kat pursued a Bachelor's Degree in Marine Biology from the University of North Carolina – Wilmington. She also holds an Associates Degree in Aquaculture Technology from Brunswick Community College. Upon graduating, Kat joined the Peace Corps in the Rural Aquaculture Production (RAP) program in Zambia, where she helped subsistence farmers develop fish-farming projects that increased both income and nutritional food options in Luapula Province. Years later, she moved to Ghana to manage a commercial fish farm in the Eastern region. Upon returning to the US, Kat switched her focus towards commercial fisheries while working as a Fisheries Observer. She holds a Master of Science in Environmental Science and a Master of Marine Studies in Fisheries Resource Management from Memorial University of Newfoundland, where she studied the recovery and sustainability of the Newfoundland redfish fishery.

Jenna Borberg
Research and Communication Manager

Jenna began working for AquaFish in August 2013 as the Research and Communication Manager. She grew up in California and received a Bachelor's degree in Marine Ecology from California Polytechnic State University in 1999. Her early career involved marine invertebrate research and she worked her way up the food chain to study marine mammal and seabird ecology for the National Oceanic and Atmospheric Administration's (NOAA) Southwest Fisheries Science Center in La Jolla, California. Her work for NOAA took her to the waters of the Antarctic, Alaska, Hawaii, and the Eastern Tropical Pacific. Interested in bridging gaps between scientists, managers, and stakeholders, she returned to school to obtain her Master's degree in Marine Resource Management from Oregon State University (OSU) where she focused on climate change adaptation. Upon degree completion, she worked to advance regional ocean science and policy priorities through a one-year fellowship in the Oregon Governor's Office. This fellowship led to a position with Oregon Sea Grant in 2009 where she led and coordinated research and engagement activities with OSU, state, regional, and federal partners. Jenna's experience in research, communication, and project management along with interest in learning about new cultures and international travel led her to AquaFish.

Notices of Publication

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

Antimicrobial use in aquaculture re-examined: its relevance to antimicrobial resistance and to animal and human health (13-316)

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The worldwide growth of aquaculture has been accompanied by a rapid increase in therapeutic and prophylactic usage of antimicrobials including those important in human therapeutics. Approximately 80% of antimicrobials used in aquaculture enter the environment with their activity intact where they select for bacteria whose resistance arises from mutations or more importantly, from mobile genetic elements containing multiple resistance determinants transmissible to other bacteria. Such selection alters biodiversity in aquatic environments and the normal flora of fish and shellfish. The commonality of the mobilome (the total of all mobile genetic elements in a genome) between aquatic and terrestrial bacteria together with the presence of residual antimicrobials, biofilms, and high concentrations of bacteriophages where the aquatic environment may also be contaminated with pathogens of human and animal origin can stimulate exchange of genetic information between aquatic and terrestrial bacteria. Several recently found genetic elements and resistance determinants for quinolones, tetracyclines, and beta-lactamases are shared between aquatic bacteria, fish pathogens, and human pathogens, and appear to have originated in aquatic bacteria. Excessive use of antimicrobials in aquaculture can thus potentially negatively impact animal and human health as well as the aquatic environment and should be better assessed and regulated.

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Upcoming Meetings and Events...

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

AquaFish Innovation Lab Annual Meeting
8 February 2014
Seattle, WA USA
www.aquafishcrsp.oregonstate.edu

Aquaculture America 2014
9-12 February 2014
Seattle, WA USA
www.was.org/meetings/default.aspx

AquaFish Special Session: "Low-Cost Feed and Input Solutions for Sustainable Small-Scale Aquaculture in Developing Countries "
WAS Aquaculture America 2014
11 February 2014
Seattle, WAshington, 2014
www.was.org/meetings/pdf/AA2014RegBrochure.pdf

IAI Aquaculture Conference
21 February 2014
New Delhi, India
www.en.cngormix.com/MA-aquaculture/events/iai

16th International Symposium of Fish Nutrition and Feeding (ISFNF 2014)
25-30 May 2014
Cairns, Australia
www.isfnf2014.org/

Aquaculture UK 2014
28-29 May 2014
Aviemore, Scotland
www.aquacultureuk.com

AQUATECH 2014
World Aquaculture 2014
7-11 June 2014
Adelaide, South Australia
www.was.org/meetings/default.aspx

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

Innovation Lab Lead Subcontractors

The mission of the AquaFish Innovation Lab is to enrich livelihoods and promote health by cultivating international multidisciplinary partnerships that advance science, research, education, and outreach in aquatic resources. AquaFish received notification from USAID in March 2013 of a five-year extension award to initiate new projects that build on past successes. The five core research projects represent all of the key regions, themes, and topic areas called for in the third AquaFish RFP, issued in 2013 by Oregon State University (OSU), the Lead Institution for the AquaFish Innovation Lab. The projects below include 10 countries, 11 US Universities, and 20 Host Country (HC) Institutions in formal funded partnerships.

Partner Institutions	Personnel/Host Country PI
Enhancing Aquaculture Production Efficiency Sustainability and Adaptive Measures to Climate Change Impacts in Bangladesh	
North Carolina State University (Lead US Institution)	**Russell Borski (Lead US PI),** Upton Hatch
Bangladesh Agricultural University	Md.Abdul Wahab(HC Lead PI), Ms. Sadika Haque, Ms. Shahroz Mahean Haque
Southeast Asian Development Center (Philippines)	Emilia Quinitio
Department of Agricultural Management (Philippines)	Wilfred Jamandre
Khulna University (Bangladesh)	Sk. Bazlur Rahaman, Sattyananda Biswas
WorldFish – South Asia (Bangladesh)	Manjurul Karim
University of Dhaka (Bangladesh)	Abu Torab M.A. Rahim
Hajee Mohammad Danesh Science Technology University (Bangladesh)	Md. Ashraful Islam
Addressing the Impacts of Climate and Non-Climate Change on Fisheries and Aquaculture in Cambodia and Vietnam	
University of Connecticut (Lead US Institution)	**Robert Pomeroy (Lead US PI)**
University of Rhode Island (USA)	David Bengston
Inland Fisheries Research and Development Institute (IFReDI) (Cambodia)	So Nam (HC Lead PI), Nen Phanna, Chheng Phen, Touch Bunthang, Syvain DeGuise, Prum Somany, Hap Navy
Cantho University (Vietnam)	Tran Thi Thanh Hien, Tran Ngoc Hai
Development of More Efficient and Environmentally Sustainable Aquaculture Systems for Nepal	
University of Michigan (Lead US Institution)	**James S. Diana (Lead US PI),** Bailey Keeler
Agricultural and Forestry University (Nepal	Madhav K. Shrestha (HC Lead PI), Sunila Rai, Narayan P. Pandit, Ram B. Mandal, Dilip K. Jha
Directorate of Fisheries Development (Nepal)	Rama Nanda Mishra
Fisheries Research Center, NARC (Nepal)	Jay Dev Bista, C.N.R. Yadav
Aquaculture Development in Kenya and Uganda: Indigenous Species, Training, and Water Science	
Auburn University (Lead US Institution)	**Joseph J. Molnar (Lead US PI),** Claude Boyd
University of Arizona (USA)	Kevin Fitzsimmons
University of Georgia (USA)	William Tollner
Makerere University (Kenya)	Theodora Hyuha (HC Lead PI), Monica Beharo
NaFiRRI (Uganda)	Gertrude Atukunda
University of Eldoret (Kenya)	Julius Manyala
Kenya Ministry of Agriculture, Livestock, and Fisheries	Charles Ngugi, Judy Amadiva, Julius Nyoro, Mwangi Mbugua
National Fisheries Resources Research Institute (Uganda)	John Walakira
Aquaculture Production and Human Health, Nutrition, and Food Supply in Ghana and Tanzania	
Purdue University (Lead US Institution)	**Kwamena Quagrainie (Lead US PI)**
Virginia Poly-technic Institute & State University (USA)	Emmanuel Frimpong
University of Arkansas at Pine Bluff (USA)	Rebecca Lochman
University of Hawaii at Hilo (USA)	Maria Haws
Kwame Nkrumah University of Science & Technology (Ghana)	Steve Amisah (HC Lead PI), Nelson W. Agbo, Regina Edziyie
Sokoine University of Agriculture (Tanzania)	Sebastian Chenyambuga, Nazael Madalla, Elibariki Emmanuel Msuya
University of Dar es Salaam (Tanzania)	Narriman Jiddawi
Western Indian Ocean Marine Sciences Association (WIOMSA)(Tanzania)	Julius Francis
University for Development Studies and Technology (Ghana)	Akwasi Ampofo-Yaboah, Gifty, Anane-Taabeah
FarmerLne (Ghana)	Alloysius Attah

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

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

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