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Bangladeshi Graduate Student Addresses Food Insecurity in Home Country Through Research at Ohio State

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9.6 billion. That is what the global population is expected to reach by the year 2050, precipitating an unprecedented demand for food and other resources. The statistic and its implications have dominated discussions at recent international meetings and symposia, with a particular emphasis on the need to sustainably intensify agricultural production. Often overlooked however is how the world's developing regions are beginning to look beyond their staple food sources - rice, corn, beans, and conventional livestock to name a few - and more towards fish and other seafood to feed their growing populations. This trend has been the motivation behind research conducted by Mohammad Ashraful Alam, a Ph.D. student in fisheries and wildlife in the School of Environment and Natural Resources.

Alam is a Bangladeshi student completing his doctoral degree at Ohio State with funding from the Borlaug Higher Education for Agricultural Research and Development (BHEARD) Program, which is administered by Michigan State University and funded by the U.S. Agency for International Development (USAID) in partnership with the Association of Public and Land-grant Universities (APLU) and the International Maize and Wheat Improvement Center (CIMMYT). Along with 3 other BHEARD-sponsored graduate students – two in the Department of Plant Pathology and one in the Department of Agricultural, Environmental, and Development Economics - Alam is seeking to address serious agricultural and nutritional needs in his home country through his graduate research, thereby building the technical capacity of his home institution and enhancing food security in Bangladesh. Bangladesh is one of 19 countries that have been prioritized by USAID through the Feed the Future Initiative.

Because of Bangladesh's already high population density - approximately 160 million people in an area of land the size of Iowa - and with the population projected to continue to increase in the coming years, Alam outlines the "excessive nutritional demand" facing his country and how fish is vital to filling this nutrition deficit.

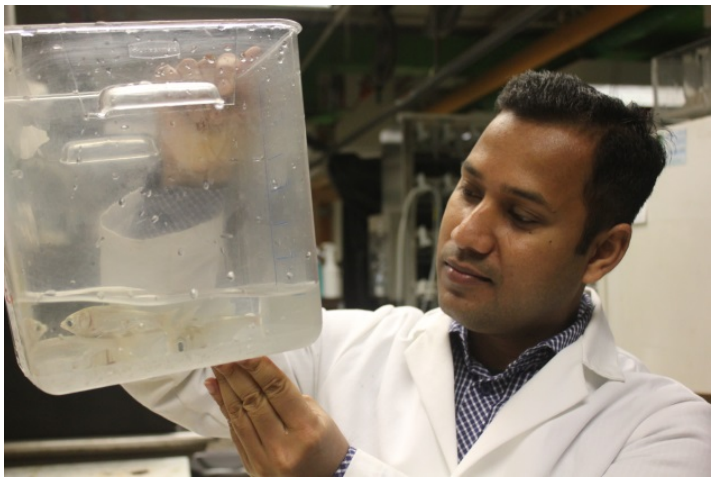
Mohammad Ashraful Alam, a Ph.D. student in the School of Environment and Natural Resources at Ohio State University, conducts aquaculture research in the lab of Professor Konrad Dabrowski.

"Fish is playing a vital role in meeting the nutritional demands of the people in Bangladesh," shares Alam. In fact, Bangladesh now ranks 5th in the world for farmed fish production according to the United Nation's Food and Agriculture Organization's 2014 "State of World Fisheries and Aquaculture" report.

"However, to keep up with the demand of 160-plus million people, we definitely need new, dynamic, and cost-effective technologies for aquaculture systems."

In an effort to contribute to this need for knew knowledge, Alam is working with Dr. Konrad Dabrowski, professor of aquaculture in the School of Environment and Natural Resources, to study how water temperatures affect the growth and physiology of freshwater fish species, including big-head carp (*Hypophthalmichthys nobilis*).

"Basically I'm trying to determine what is the most suitable temperature range for these species at their various growth stages," explains Alam, who says that this information is imperative for determining the optimal

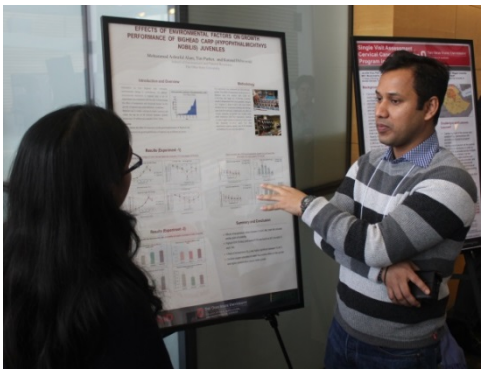


Alam's research, which focuses on fish growth and development, will improve aquaculture knowledge not only here in the U.S. but also in his home country of Bangladesh.

temperatures for fish to feed and grow. This knowledge can then be shared with aquaculturists trying to improve and maximize their own artificial fish production systems - systems that have become heavily relied upon to meet the growing food demand, all while wild fish stocks in Bangladesh diminish as a result of overfishing, environmental degradation, and climate change.

Alam notes that his research not only has positive implications for food security in Bangladesh, but also plays a role in conserving biodiversity and promoting environmental stewardship in South Asia. Because of the demand Bangladesh's aquaculture markets have experienced throughout the past several years, some aquaculturists have opted to import, farm, and market fish species non-native to Bangladesh, such as the African sharptooth catfish (*Clarias gariepinus*) and various piranha species. Individuals from these non-native populations then escape or are introduced by other means into the surrounding ecosystem, an occasion too common even here in the United States, and reproduce enough the sustain a population that then has the potential to threaten the ecological systems of native species.

Before coming to Ohio State University, Alam served as a Scientific Officer at the Bangladesh Fisheries Research Institute researching the presence of heavy metals in aquatic systems. Metals such as lead, mercury, zinc, and cadmium are toxic to humans in high doses and can be present in effluents discharged into waterways from cement, fertilizer, and pharmaceutical companies in Bangladesh. Due to minimal environmental regulations and lax oversight of these industries, these metals can quickly accumulate in natural fish populations that inhabit adjacent waterways and which are a source of food for many Bangladeshis.



Alam discusses his research poster at Ohio State's International Scholarship Symposium on February 27, 2015.

Alam and his research program have certainly benefited from Ohio State and the School of Environment and Natural Resources' leading role in addressing a number of Ohio's water-related concerns, including the threat of invasive carp to Lake Erie or harmful algal blooms throughout the state. This level of engagement in important issues has already provided him the opportunity to present his research findings at the recent World Aquaculture Conference and Ohio State's International Scholarship Symposium.

So whether the effort is feeding his country's future generations or improving Bangladesh's ecological integrity, Alam is confident that his studies at Ohio State will better prepare him to tackle these major issues in Bangladesh and other areas of the world.