# Scientific Communications; The Necessities of Conveying Information Throughout the Research World

*WORLD FISH: Penang, Malaysia*

*Lane Kunzie: 2018 World Food Prize Borlaug-Ruan Intern*

*Corydon, Iowa*

## *Acknowledgements*

When I first arrived at Malaysia, it was difficult at first. It was the beginning of an adventure where anything was possible. A new country was at my fingertips; and an amazing facility was there to help me understand a passion. I struggled with culture shock; it was very confusing, as I had never been to a country so diverse than my own. I coped with these personal afflictions by exploring the island on the weekend, and diving into the culture. When I began to write this paper, I had no confusion on who to thank for this wonderful opportunity.

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# Abstract

In this paper, I will elaborate on my two-month abroad experience in Penang, Malaysia; from my adventure over there to the reason for scientific communications. I worked with Paola Reale on the CRP documents, finalizing them, and also disbanding Flagship three; nutrition. WorldFish's sustainable aquaculture program focuses on fisheries, and also, aquaculture. Over the span of two months, I met with several individuals from across the globe, and conversed with them about their research. I encountered a woman who was working on the synopsis of her past work in Indonesia, and as her first language was not English, I helped proofread her paper. It was interesting to get a viewpoint on current world issues from other cultures and feel as if I was doing the research myself.

Sharon Suri was my adviser, and she was always giving me articles and paperwork to read through and proofread. One of the articles that caught my attention was a system based in a southern state of China, where the people gave up their land to become a community, and create a rice-fish paddy culture system that generated an outstanding income for the residents of the community, and I will explain how science communications has allowed the profound succession of the situation. Also, communications aren't just research papers anymore; it is diagrams, graphs, polls of the public, social media, and much more that allow scientists to interpret their findings to the outside world.

## *Three Days of Travel to a Foreign Country all by Myself.*

I arrived in Penang, Malaysia on the 10th of June after two days of extreme traveling and tiring airport sittings. I was supposed to leave on the 7th, but my flight was canceled as I was sitting on the plane. After I got off the plane, I sat in line for two hours waiting to get a voucher for a free hotel room. I got to my hotel and crashed, ready for my flight the next morning; which was canceled again and rescheduled for 6PM that next night. I flew from Des Moines, Iowa to Dallas, Texas; Dallas, Texas to Los Angeles, California; Los Angeles, California to Hong Kong; Hong Kong to Penang, Malaysia.

It took 58 hours to get where I needed to be, and needless to say, I was exhausted after my adventure. That night I arrived at my host parents' apartment. It was nice and cozy, although the bed was stiff. I woke up the next morning and went to work at WorldFish; it was very different. The office is very accommodating to its workers; it is very laid back. Also, everyone is cordial and very understanding about the language barrier. I did not try to learn Malay, as there are several main languages in the country; English, Malay, and Mandarin Chinese. In common conversation, people will start off in English, and then mix in their personal language. It is a large variety of communities within Penang that are derived from several countries from around the world. When I first arrived in Malaysia, I didn't really know what to think, and I started to go into culture shock within the week. It ended quickly as I inserted myself into the culture and accepted that I needed to understand that this is how things would be for the next two months. I went through the phases quickly and I was adjusted within two weeks.

## Penang, Malaysia; a City with More Culture than Anywhere in the World.

Malaysia is a country with several dominant religions, specifically Islam; this also includes Buddhism and Hindu, as well as Christianity. Religion is a key component to Malaysia's culture. Any person would come here from a developed country and be overwhelmed, as it is a lot to take in. I arrived at my host parent's apartment and saw my first alter for Buddhism. I had three different homestays (SK, Jocilla, and Paola) and they were all awesome. They made sure I was busy while staying with them, as well as keeping my stomach full. Penang is famous for the food that is derived from an exponential amount of cultures that surrounds the country; Chinese, Indian, western, and a bit of everything else. Georgetown is the site of a British settlement; any person could infer that with the area being populated with churches and particular architecture.

Malaysia is a country that is split in two; one half being on Borneo island, sharing that with Indonesia; the other half is a peninsula that sticks off of the Asian continent right under Thailand. Both parts of the Malaysian country are surrounded by water, especially the peninsula. These countries, with the certain geographical features, are highly dependent on marine systems to feed the population which is exponentially larger than most. Penang is a state but holds the island and claims a part of the mainland as its own. The states of Malaysia are a part of the monarchy system which has a governor for each state, and a king that rules all of them.

Malaysia has a population of 31 million people with a low amount of area. In Penang, housing is difficult to come by, so they rely on housing complexes that have several apartments and are very tall, structure-wise. Asia is one of the most highly populated areas in the world, so the demand for housing is very high in general.

Malaysia uses a large amount of aquaculture and small-scale fisheries to feed its population. Although they eat pork, beef, and chicken, some struggle to consume adequate amounts of protein due to religious values and insights on the consumption of certain byproducts of animals. In example, an individual who practices Islam wouldn't consume pork, and a person who partakes in Buddhism or Hinduism would not eat beef.

Malaysia is very diverse in religion but has a majority in Islam and Hinduism. This country is diverse, but also technologically advanced and has better infrastructure than surrounding countries. Southeast Asia lacks in infrastructure, the availability of education in certain areas, and higher GDP. Culture is apparent in every country, but Malaysia is cultural mixing pot with several attributes that make it how it is. As far as my research has gone, I will not be focusing on Malaysia, but a majority of countries within southeast Asia. These countries are more than dependent on fisheries and aquaculture, because the food source is so abundant.

## WorldFish's History and the Opportunities Received.

WorldFish is an organization, created in 1975, although it wasn't named WorldFish; it was originally the International Center for Living Aquatic Resources Management (ICLARM). After 1975, it established several offices throughout the world; Bangladesh, Philippines, Zambia, Cambodia, and then the headquarters moved to Penang, Malaysia in 2000. It was then selected to become a CGIAR for Aquatic Agriculture programs. This allowed for extensive funding and the facility's researchers to partake in what they desire. (WorldFish History, (2018))

During my time at WorldFish, there weren't any opportunities for an empirical experiment. I worked with Sharon Suri, as she was my adviser, and Paola Reale. WorldFish is an organization that focuses on the studies of aquaculture and fisheries to improve nutrition and health in poverty and people in general. One of their most prized accomplishments, or advancements, is the GIFT (Genetically Improved Farmed Tilapia) that has assisted several small-scale farmers across the globe as they make efforts to feed families, stock the markets, and have an income. The GIFT tilapia utilized the difference of selected breeds and took the best qualities from each species. This created a type of tilapia that allowed for a more extensive and increased output from one farmer to the next. *(Genetically Improved Farmed Tilapia, 2015)*

WorldFish's mission is not only to create a better food source for people who rely on aquaculture and fisheries, but to increase gender equity within communities throughout the world that use WorldFish's GIFT strain and other species that increases food production. Gender is a factor that can change everything regarding food production, health, and livelihood. In certain cultures, religion affects every household regarding who makes the income, who eats first, and how many mouths there are to feed. Religion has several culture formalities and needs to fulfill

its membership of faith. WorldFish doesn't try to take away from the fact that religion has drawbacks, but they are highly involved in gender equality; more or less, equality in general.

WorldFish has several locations across the world, such as Malaysia (headquarters), Bangladesh, Myanmar, Cambodia, Egypt, and several others. These locations are very diverse, as the ones in southeast Asia focus on a wetter climate, and the African countries are drier. The research conducted will conclude to strains that are easy to adapt to any circumstances and areas of the earth. The work done in these differing countries is very intriguing; a lot of the work that is done away from the headquarters in Penang, Malaysia is more experimental, as the HQ directs it and has researchers of its own which they deploy out into the field on occasion. WorldFish has hosted a large amount of people to do their theses for masters or PhD programs at the organization, while also helping benefit the organization with the assistance on research and giving credit to those who helped in their theses.

I attended several workshops to assess my English abilities and learn about the aquaculture and fisheries in the world. Researchers from countries around the world come together every month, regarding their work in the art of sciences. Projects stretch from fishmeal production to the nutrition of local villages using small scale fisheries; the spectrum is wide in variation.

## Population in the Western Pacific Countries and the Need for Aquaculture and Fisheries

According to the FAO, around 2.5 billion people worldwide each year get 20 percent of their daily food intake from fish or fish-based products. *(State of World Fisheries and Aquaculture, 2008)* The percentage increases as it grows closer to coastal livelihoods, specifically the southern parts of Asia and countries surrounded by water. This increase makes it harder for certain places to get food, as they are densely populated. Southern Asia and the Indonesian Islands make up a large chunk of the world's population, and nonetheless, rely on aquaculture and fisheries as a food source and even an income. From India to the beginning of the west Pacific Ocean and northern China to the border of north Australia, the circle stretches; more people live inside this circle than there are outside of it. *(World Bank, 2018)* Due to certain religions backtracking on birth control, unprotected sex, and other religious formalities, this led to a severe population growth. 3.7 billion people live within this circle; the majority of this population consumes a high amount of fish or marine species; a factor caused when being surrounded by water. *(Desjardins, 2016)*

Fish, or marine species that are popular for consumption, are full of vitamins and nutrients, especially protein as it is low in fat. Also, it is high in calcium, which some people may be lacking if they don't have access to dairy products. Some families may not have a cow for dairy purposes, which draws back on calcium and other valuable vitamins and minerals that they produce. WorldFish aims to increase yields in small scale fisheries in developing countries, specifically the ones where the work is being orchestrated.

In underdeveloped countries, malnutrition is one of the leading causes of death in young children. Also, malnutrition will cut back on an individual's growth, such as stunting and wasting. The stunting prevents a person from achieving their body's full potential; this will result

in short stature, an extremely unhealthy low body-fat percentage, and irregular bone growth. In a country like India, 38 percent of children under five are stunted. India is the second highest populated country in the world, resulting in an extremely high number of youngsters that are stunted in growth. *(Stunting; India, n.d.)*

Therefore, stunting affects brain progression, resulting in long lasting consequences. In countries that are based in Africa, southeast Asia, and South America; they have significantly higher stunting rates than developed countries. A majority of these countries live near areas that are located close to water sources, specifically rivers and lakes. In these areas, aquaculture and the use of fisheries is extremely high, as it is cheap. It doesn't require a lot of attention to create this food source; in general, all it takes is to feed the fish, which they will do on their own, all that is needed is to provide the source of the fish's' food. *(Gregory, 1997)*

But, what do fish eat? Fish eat other fish, fish meal, algae, and other scrumptious organisms that live in the waters of the ecosystem. The people who harvest ensure that the species they are gathering will be fed to the point where they are fully mature. It is about six months until the harvesting period begins; a person should not harvest too soon, otherwise it will burden the yield. Most people, when harvest season rolls around, will drain the pond, ditch, or area of cultivation (AoC). Draining allows the farmer to catch the highest yield and get the highest income possible. Since a lot of fish are left while at full maturity, without draining the AoC, it is also healthy to ensure that no single fish will dominate the area when the farmer repopulates the AoC with new and younger ones; a larger fish will consume a smaller one due to predatory stances, or just simple hunger. Fishmeal and sustenance for the fish is a key factor in receiving a proper yield; fishmeal is one of the most researched topics when it comes to aquaculture. *(Coche, 1994)*

Fishmeal is the use of small marine animals that are combined/ground up with fish oils and bones; this isn't suitable for human consumption and is a highly nutritious supplement for fish farms, and also is a natural fertilizer. It takes about 4 tones of fish to create about 1 ton of fishmeal. The fish are dried and processed, but still holding the given nutrients in a more compact form. Fishmeal doesn't use fish that are consumed by people or have a high amount of bones within its meat. The bones are a key component to creating a nutrient-rich fishmeal. Small-scale fisheries and aquaculture systems are highly dependent on fish-meals to fulfill its inhabitants' needs for maturity. *("Editor", 2006)*

In regard to research, there are several organizations and universities that conduct research on a more sustainable way to produce fishmeal and habilitate marine animals. WorldFish is a CGIAR that is focused on feeding the world more efficiently. The organization has several 'flagships' that are derived from the main attributes of aquaculture and have leading experts to direct each according flagship.

**Flagship 1:** Aquaculture, **Flagship 2:** Fisheries, **Flagship 3:** Nutrition. I worked with Paola Reale on the CRP FISH document that directly explains what WorldFish does in its flagships, the budget, and the expected outcome. The FISH flagships are controlled and monitored by a researcher who have expertise in the department, with help and inferences from fellow partners in the organization, as well as from other universities or NGOs whose main interests are in aquaculture and fisheries. WorldFish holds several conferences at their facility to discuss with partners on research and receive insight on the operations proceeding in the WorldFish facilities based in different countries other than Malaysia. Myanmar, Indonesia, Cambodia, etc. and Bangladesh (along with several others which can be found on the WorldFish website.) *(Todd, 2014)*

***Bangladesh; a viewpoint of the inside problems and need for fisheries; a way to produce two yields of differing aspects of agriculture; & how a Spectacular Vision Changed the Lives of Thousands***

A family of nine individuals lives on the outskirts of a small village in Bangladesh; mother, father, grandmother, two young sons, a teenage daughter, and another son with his wife with a baby on the way. The father is a farmer who works in the rice fields for stipends of food and simple currency exchange to allow him to feed his family. Nine mouths to feed on two incomes; his sons and his own. This may seem irrelevant to an average American, reading that there are two incomes supporting a fairly big family, but in a country where one in four people are in poverty and 1/10 people are in extreme poverty, it is a struggle to feed yourself and children on the daily.

Although the country has performed several advances into their academic system to distribute the opportunity to be educated, a majority of Bangladeshis are taught in home or at a community school. A majority do not proceed to achieve an education in their futures, because it is more vital to work in the fields and allocate more food to tables for people rather than making a living. *(Todd, 2014)*

About 155 million people live in Bangladesh, which is about the size of New York State. So, in a physical detail, half of the United States of America lives in a small state. Bangladesh is so densely populated that it is a struggle to get adequate nutrition for all people. 48 million people also live in poverty, which is a result of the overpopulation. The overpopulation is in reference to the lack of birth control, religious preferences over family statuses, and financial status holding a person back from accessing affordable pre-contraceptives (condoms, birth

control, etc.). These logistics are also a reason for the high prevalence of STDs that are common in high-poverty, third-world countries. *(Eliakimu, 2009)*

The capital of Bangladesh is Dhaka, with seven million people. A majority of the population lives in the rural areas, not the urban cities, because in order to be a resident of a larger city, it is necessary to make a living to pay rent and feed your family. In cultures, such as Asian, African, or Middle-Eastern, a large family is a key; this is why a majority lives in rural areas, because housing is cheaper, and a structured education isn't available to everyone. Education in third-world countries is more or less from a person who received nothing more than a secondary educational degree, because the individuals whom are to get a university degree will go teach at a more proclaimed system and attain a salary.

With youth on the mind, children in Bangladesh suffer harsh fallbacks from the lack of nutrition. These fallbacks include stunting, wasting, etc., and many more possibilities. *(Stunting; India, n.d.)* In Bangladesh, a majority of the population consumes rice on a daily basis. Bangladesh is also one of the highest producers; this is where I present my idea of heightened rice-fish paddy culturing. In the procedures of rice-culturing, they make sure the paddies are flooded several times a year, and also at a point where no weeds are able to grow sufficiently to get in the way of reducing the crop. Rice-fish paddy culturing hasn't been a large topic, since a majority of them are focused on the one yield and want to get it to the markets.

Some farmers, a majority specifically, do not want to join the aquaculture spectrum of the world, and would prefer to stick the formalities that they have focused on their whole lives. A study in a southern province in China (Yunnan) proved that if farmers in the local areas "gave up their land" to submit themselves to the aquacultural aspects of rice farming, they would receive free rent by working, doing physical labor to be attentive to the rice fields and the fisheries

within while also being paid, would give them a large benefit (financially) and allow the individuals working for the farmer to raise up out of poverty. This ideology from Yunnan, which proved statistically correct and beneficial to those who participated, would cut poverty into over half for individuals working in the rice farms in the terraces and lowlands of Bangladesh. Bangladesh is an amazing opportunity for rice-fish paddy culturing; especially with the implantations of the Yunnan project. *(Fletcher, 2018)*

The family I mentioned earlier; the father, Yetri, works at a rice terrace in a southern territory of the country. It has high rainfall and allows for a decent income, but barely enough to support his large family and keep his land and housing; this also isn't including the costs of food. A farmer, Kubo, that is fifteen miles away also has a large rice terrace, but he is perfectly well-off with his family, which is larger than Yetri's. Why? He utilizes his rice paddies as fisheries and hires workers from around his farm, offering them housing in return for the physical labor, and the workers make enough money to support themselves. This large farm, 15 miles away, has grown to the point where it is now 13 miles away. Kubo has offered the same stipend to several locals in this general area, also offering a larger wage to help persuade them to let Kubo utilize the local's land.

In regard to the fisheries, how does one cultivate marine species inside a systematic production, while benefiting the two, fish and rice, with a type of fish meal that will act as fertilizer? There has been research on how fish impact the rice, and the fish have a mutualistic relationship with the rice plants. The fish discrete their feces, and the feces float to the bottom of the paddy, fertilizing the plants and is soaked in as nutrients. This process from the fish defecating also increases the fertility in the ground, allowing for a more beneficial crop for the next harvest season. *(Ayssiwede, et al., 2016)*

In the Yunnan case, how would such a complex method of aquaculture and fisheries be acquainted with the mixture of rice paddies? Research facilities across the world that are involved in the same aspects of experimentation and fact-finding; the real question is, how does one facility in a certain region of the world encode its information to another facility thousands of miles away? Scientific communications. *(Stanchak, 2017)*

## *Scientific Communication and my Work at WorldFish; Reasoning*

In WorldFish, I had the opportunity to work with Paola Reale on the CRP document in the Sustainable Aquaculture Department. The CRP document is how the facility portrays the plans they have and the purpose for the research they partake in. It is presented at a conference in Rome for the FAO ever so often, and also just to keep the public up-to-date on the work they are doing. The CRP document is posted on the website for anyone to see.

In conclusion, scientific communications are an important key on making sure your research is valuable and structured. Conducting research is *great*, but it is pointless if you can't convey it appropriately. As most research goes, English is the common dominating language; a majority of the countries that conduct research are not native speakers. Science communication is not just proper grammar and spelling, but organization and chronological order of the events that occurred to make your research important.

The ways of scientific communications are very similar to the experimental method, as they follow a same track; the only difference is that the experimental method is the preparation for the conveying of the communications. In a case such as Yunnan, the researchers documenting the case would have to understand every aspect prior to closing, in order to explain themselves fully in hopes it would reproduce the same results over time in differing geographical locations. It requires patience, good verbal skills, and the ability to understand what is going on in the situation to not be biased. *(Fletcher, 2018)*

A person should be able to communicate with locals, in order to take polls to get the best estimate of how life in this area is reacting to the new stimulus. Science communications is not only structuring reports, but also being able to interpret and publicize it on several platforms,

such as social media (Twitter, Facebook, Instagram, etc.), a website (the most crucial source for people to get information from), and publications inside magazines, newspapers, or news platforms. The information described earlier in Bangladesh and the southeast Asian world is an example of precise scientific communications. The references/sources I used were organized and allowed anyone to comprehend and understand what the graph displayed, without seeming too difficult.

Every aspect of science ends up being communicated through text and dialogue to people who are practicing what is being researched or government (or non-government) organizations that may grant money to prolong or extend something they deem worthy of further investigation. WorldFish has dedicated a majority of their workers to improve their ability to interpret science and holds workshops for other facilities and researchers to come together and decipher their work correctly.

In these two months, I learned that the most crucial aspect of science is how it is portrayed socially and in writing. Paola Reale told me that ‘anyone can research, but not everyone can interpret what they are doing correctly. That is why we are stress science communications; we want people to be successful in their work’.

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