

Assessment of Overall Sustainability of Contrasting Rice Farming Systems Based on the Sustainable Rice Platform Performance Indicators and Standard

From the Philippines to Vietnam



Mara Weis

Afton, Iowa

2017 Borlaug-Ruan International Internship

International Rice Research Institute (IRRI), Los Baños, Philippines

Table of Contents

Acknowledgements.....	3-4
My Introduction-Small Town Iowa Farm Girl	4-6
My Journey to the Opposite Side of the World.....	6-7
The International Rice Research Institute and My Research.....	7-8
The Sustainable Rice Platform.....	8-9
Abstract.....	9
Introduction.....	9-10
The Loc Troi Group Vietnam.....	
GIZ-BRIA Iloilo, Philippines.....	
Explanation of Materials and Methods.....	11-12
Results.....	13-15
Discussion.....	15-17
The SRP Towards Food Security.....	17-18
Self-Reflection.....	18
High School Graduate to Borlaug-Ruan Intern.....	18-20
Pictures.....	21



Works



THE WORLD FOOD PRIZE

Acknowledgements

Spending two months, more than 8,000 miles away from home is not easy on anyone, in fact this experience has been both challenging and amazing in its own ways. However, I would not have had this experience without the support of those around me who have been instrumental in my process of becoming a Borlaug-Ruan International Intern.

First, I would like to manifest my gratitude for **Dr. Norman Borlaug**, the father of the green revolution, the man who has saved over a billion lives and the founder of the World Food Prize Foundation. It has been his legacy that sparked my interest in food security and pushed me to apply for and complete this internship opportunity. Every day at IRRI, I was reminded of his legacy and confidence in the younger generation. My personal connection to him as a small-town Iowa farm kid has been important in my journey, as well as something I hold close to my heart. In addition, I would also like to thank **John Ruan** and his family, along with **Ambassador Kenneth M. Quinn** for making this opportunity and many others available to numerous youth through The World Food Prize activities.

I would like to express my deep appreciation for **Mrs. Lisa Fleming**, the Director of Internships and Career Development for her endless and tireless support in making sure all interns have the best experience possible. Thank you for always being available when I needed guidance and support and for having confidence in me to carry out this daunting, life changing experience of helping make an impact in combating global sustainability issues. I would also like to recognize **Mr. Jacob Hunter** for his impact and influence in my involvement in World Food Prize events, while ensuring my success through the Iowa and Global Youth Institutes. Also, special thanks to the complete **World Food Prize Staff** for their contributions to making the youth programs and Borlaug-Ruan International Internships a success.

Next, I would like to recognize those at the International Rice Research Institute who made me feel welcome, empowered and always made sure I was in my best shape possible. I would like to extend great appreciation to **Dr. Sarah Beebout** and her family for making me feel at home and providing me guidance throughout the whole internship. You helped me adjust quickly to this environment and were always willing to help me throughout my time at IRRI. I am forever grateful for your kindness and support. Next, **Mrs. Estela Pasuquin** for looking out for me while Sarah and her family were away on vacation, you were not just a mentor but a friend as well. Also thank you for allowing me to observe and use your data analysis in my report. In addition, I would like to express appreciation to **Mrs. Trang** of the Loc Troi Group for hosting me for five days in Vietnam and allowing the use of the Loc Troi Group data. Next to Arce at GIZ-BRIA for hosting me in Iloilo and allowing the release of pilot testing data. Finally, to **Mr. Joel Janiya** and **Mrs. Abigail Mabilangan** for also kindly allowing me to use their SRP data sets in my report.

Another group of people who I would like to extend deep regards for are the teachers and mentors, who helped me prepare for and achieve this prestigious internship opportunity. **Mrs. Marla Shifflett** for being the fuel to spark my interest in Dr. Borlaug and The World Food Prize youth programs. Without your confidence to write a report for the Iowa Youth Institute, I would never have been set upon this path. Also to **Mr. Mike Cooley**, for endless support and encouragement to follow my dreams. Your passion for soil science and all things agriculture has been very influential in developing my role as a youth in agriculture. To my volleyball coach and homeroom teacher, **Mrs. Gail Thatcher** for instilling the hunger for success, grit and mental toughness in me and always being available to support this dream of mine in any way possible. Finally, to **Mrs. Karen Struble** and **Mrs. Melisa Crook** for being there to help me grow as a writer and willing to proof read and provide criticism to make my work perfect. Without your countless hours of support, I would not be in the position I am today.

Finally, the group of people who have served as a backbone through my journey and believed in me, even when I didn't myself. My parents, **Mark Weis** and **Gale Vert** for always allowing me to follow my dreams and always providing encouragement and support when it comes to World Food Prize activities. Also, the two people who initiated and helped grow my passion for agriculture, my grandparents **Fritz** and **Lois Weis**. Thank you to my siblings **Alyssa**, **Sydney**, **William** and **Kade Weis** for your support throughout this endeavor and always being available on the other side of the phone to offer me encouragement and to share a few laughs. Lastly, to my best friend **Mason Ohnemus**, for always believing that I can achieve anything that I set my mind to and seeing the passion for global agriculture in my eyes from the very beginning. Without your motivation and always being willing to help me on the bad days, I would never have been able to carry out this experience. Each one of you have been instrumental in my personal growth and success as a Borlaug-Ruan Intern and I thank you for constantly reminding me that I can in fact change the world.

My Introduction – A Small Town Iowa Farm Girl

My name is Mara Weis, and I am a recent graduate of East Union High School in Afton, Iowa. Throughout high school my primary focus was on agriculture studies through agriculture classes and The National FFA Organization (formally The Future Farmers of America). While I was very active in sports and other scholastic endeavors, agriculture was where my passion rested. Growing up on a family farm in a small rural town with nearly 900 people, I was destined to have a future path in agriculture. My grandparents and father are responsible for engaging me within the industry, as my father's first profession was an agriculture educator and my grandparents having both made a livelihood out of farming. For as long as I can remember, I had been riding in the tractor, feeding cattle and bringing new life into this world next to my grandfather and father. My keen interest for agriculture, along with my personal goal of feeding the world and resolving hunger, has led me on a journey that I would not have seen coming if it hit me square in the face.

My interest with food security was triggered after attending the 87th National FFA Convention and Expo in Kentucky. As I sat in a stadium seat in my blue corduroy jacket and listened to Jeff Simmons from Elanco explain that there is going to be over nine billion people inhabiting our world by the year 2050 and a 70 percent increase in demand for meat, milk and eggs, which might I add will not happen overnight, I knew that I had to do something to contribute to this arising issue. When I told my agriculture teacher that I wanted to make an impact, she directed me towards writing a prepared public speech for FFA about the information Elanco published. While I didn't advance far in competition, a window was opened leading me down the same path.

A few weeks after being devastated about not completing my goal of advocating for this issue, my agriculture teacher had us complete a project on Dr. Norman Borlaug in class, since it was his birthday. I honestly had no idea who this man was, but the way my teacher was talking about him, made him seem like a superhuman. To make me even more proud of this agricultural leader that saved over a billion lives, he grew up on a small farm in the great state of Iowa, just like me. Even though I knew hardly anything about Dr. Borlaug, I instantly felt connected to him. Mrs. Shifflett noticed that I was very interested in him and told me that if I had any free time today, to watch the dedication of his statue in statuary hall in Washington, D.C. So instead of doing my work in third hour, like a good student, I plugged my headphones in and watched the dedication of Norman Borlaug's statue. I was amazed at what this man had done throughout his lifetime and I felt empowered to make the same impact as he did. After all, if Dr. Borlaug; a young farm boy from Iowa could save the world, then I can too.

I was approached a few days later by Mrs. Shifflett about writing an essay for The World Food Prize Iowa Youth Institute. She had received an invitation and said to me that she has always wanted to take a student, but nobody had ever presented her with a finished research report. If I took her up on this offer, I would be the first student at East Union High School to participate. I decided after not really knowing what was required, that I would make Mrs. Shifflett happy and write her an essay. After all, how hard could it be? After attending the Iowa Youth Institute and presenting my essay, I was in awe. I left the Scheman Building at Iowa State University feeling empowered, significant and proud to be a part of such a wonderful program. Thus far in my life, I had never wanted anything as bad as I wanted to be selected for the Global Youth Institute and continue of the legacy of Dr. Norman Borlaug. I still remember the morning I woke up to an email from Jacob Hunter regarding the status of my essay and The Global Youth Institute, I literally jumped out of bed ran downstairs and cried tears of joy to my father as I told him my paper had been selected for GYI.

There was nothing that could have prepared me for what I would experience at the Global Youth Institute. As I entered the Marriot and saw all the flags hanging from the ceiling and the giant globe at the center of it all, I couldn't do anything but smile and feel content with where I was. The one thing to this day which I hold onto from the 2015 Global Youth Institute, is the powerful and encouraging words of Her Excellency Joyce Banda. She is a former president of Malawi, a country within Africa. Not only was she the president, but the first female president of Malawi and the second female to take office throughout the whole continent of Africa. It was in this moment that I knew I could make a difference. If she could beat the odds, save countless women and children from suffering and stand before us that day, then I could make my own contribution to changing the world. After watching the two Interns receive the Elaine Szymoniak and John Crystal awards at the Laureate Ceremony and seeing the presentation of The World Food Prize to Sir Fazle Hasan Abed, I was amazed. I needed to become a Borlaug-Ruan Intern, it would be the only thing to feed this hunger of making an impact growing inside me.

Almost two years after attending The Global Youth Institute, I was a nervous wreck showing up to my interview for a Borlaug-Ruan Internship. I wanted this opportunity more than anything and it was now or never. It seemed like forever before I heard news on the status of my interview and as I opened the door of my truck after track practice, my phone buzzed and I had a new email from Mrs. Lisa Fleming. After reading the email, I got into my vehicle and took a moment to just cry happy tears and be thankful for all the hard work, heart and passion I had put into the whole process, I had done it and my dreams were coming true! I was on track to be just like my daily inspiration, Dr. Norman Borlaug. This small-town Iowa Farm Girl, who is way too comfortable shoveling manure, was going on a journey of a lifetime to the International Rice Research Institute to work under Dr. Borlaug's legacy and begin her journey in solving world hunger.

The International Rice Research Institute and My Research

The International Rice Research Institute (IRRI), was officially established in December of 1959 via the signing of A Memorandum of Understanding by the Ford and Rockefeller foundation presidents; Dean Rusk and Henry Heald along with the Philippine Secretary of Agriculture; Juan de G. Rodriguez. (“Our history”). IRRI is a non-profit research and educational institute focused on reducing hunger and poverty through rice science, while also protecting the environment and ensuring the health and welfare of rice farmers and consumers in the process. The headquarters are located in Los Baños, Philippines, but an additional 17 offices exist throughout Africa and Asia. IRRI is a member of the CGIAR consortium, whose mission is focused on a food-secure future (“Our organization”).

IRRI develops complex rice varieties that are resistant and adaptable to many diseases, natural misfortunes and the influence of climate change. These varieties help farmers earn a more profitable crop while also complying to sustainable practices and consumer demands. Over half of the rice grown in Asia is a product of IRRI. The first variety produced by IRRI, IR8 was revolutionary in rice production during the Green Revolution. IR8 was so successful due to short plant height (semi-dwarf variety) which enabled it to support more grain without falling over. The research done at IRRI is composed of many different disciplines such as, soil science, plant tissue analysis, entomology and seed health. By having a diverse campus, they can achieve ground-breaking research and provide training to improve the overall health and sustainability of rice and the farmers who grow it.

My research overseen at IRRI was within the Crop and Environmental Sciences Division (CESD). The role of CESD is to conduct research concerning crop, soil, water and environmental sciences to guarantee that sustainable and environmental-friendly high yielding rice varieties are available to improve farmer livelihoods. Dr. Sarah Beebout is the senior scientist and soil chemist who served as my mentor at IRRI. Dr. Beebout obtained her PhD in Soil Science at Cornell University while residing in the United States. At IRRI, she focuses mainly on integrating environmental, economic and social research to improve the sustainability of rice cultivation. She also works on zinc uptake in rice plants for human and plant nutrition, as zinc is an essential micronutrient for both humans and plants alike. Dr. Beebout has been involved in numerous projects at IRRI related to chemical changes in soil, decomposition of rice straw, production of greenhouse gases, and the effects of elements in the soil on plant availability of iron, sulfur and cadmium (“Sarah Beebout”). However, for a duration of my time here, Dr. Beebout was on home leave. For nearly a month, while Dr. Beebout was away, I was under the supervision of Dr. Estela Pasuquin who is an assistant soil scientist within the same division. I was fortunate to have not only one, but two amazing mentors while I was at IRRI.

My project in this division was the Assessment of Overall Sustainability of Contrasting Rice Farming Systems based upon the Sustainable Rice Platform (SRP) Indicators and Standards. Dr. Beebout was very excited for me to work on the SRP as it is a unique program. The SRP was

currently undergoing revision upon my arrival at IRRI, so I was fortunate to be able to observe the process, as well as travel to Vietnam and see the SRP working in action. Since my project required no lab work, I was mainly focused on data analyzing. However, I had the opportunity get experience in a few different labs observing and carrying out short projects. The soil science and plant molecular biology labs were where I conducted lab work when the opportunity arose. My personal objective while here was to interact with rice farmers specifically regarding sustainable practices, while gaining experience in the lab to further understand components of rice production to implement through my work with the SRP.

The Sustainable Rice Platform

The Sustainable Rice Platform (SRP), is a multi-stakeholder platform established in 2011, by the International Rice Research Institute and the UN Environment. They exist to provide private, non-profit and public stakeholders in the rice industry with sustainable production standards and outreach tools that promote an increasing global supply of safe and affordable rice, as well as improved environmental impacts of rice production, and strengthen the livelihood for rice producers. Their mission is to promote resource efficiency and sustainability in the global rice sector through an alliance that links research production, policy making, trade and consumption. The goal or vision of the SRP is that one million rice smallholders will adopt sustainable best practices in rice production by 2020, boosting farm income and protecting our environment through an alliance that drives innovation and creates shared value (“Overview”). The SRP is governed by an advisory committee, working groups, and a secretariat. They exist to provide oversight, implementation, support and an overall coordination of SRP. With a projected shortfall in global rice production by 2050, it is important that a program such as this is in place for rice farmers. (“Rice Facts”) Since being established in 2011, the SRP now has 66 members who implement their standards and indicators. Those members consist of government agencies and research institutions, rice traders and environmental and social non-governmental organizations (“Membership”).

Abstract

The implementation of the Sustainable Rice Platform (SRP) in rural Vietnam and throughout four provinces in Iloilo shows that farmers are eager to be participating in a program that positively impacts the environment, requires safety and health regulations and reduces input costs which leads to an overall increased profit. This report aims to observe implementation of newly developed methods of SRP applications in farmer’s fields and to understand the issues and constraints of the program, while also contrasting different farming systems. Through quantitative assessment this report also attempts to identify factors that lead to successful data collection, while also finding those factors which lead to unsuccessful data. This case study in Vietnam analyzes data collected from the first cropping season, summer-autumn 2016, as well as

observes the SRP performance indicators and standard in use by organized field visits. Vietnam benchmark data is compared with Iloilo benchmark data in order to contrast rice farming systems between the two countries. Data analysis and field visits conducted by IRRI ensure the credibility and effectiveness of the SRP performance indicators and standards. The assessment yields information of Loc Troi Group and Iloilo farmers showing areas and levels of compliance in the sustainability requirements and those farming practices which need further improvement. The SRP is a progressive program that is continuously evolving. The results found in this study show the need to improve tools, likewise, they identify opportunities for improving in farming provinces towards a more sustainable crop.

Introduction

The idea of ensuring a food-secure world to feed over nine billion by 2050 continually proves to be a daunting task. IRRI projects that there will need to be a 25 percent increase in the next 25 years to meet global demand. Whereas, rice is the daily staple for more than 3.5 billion people, accounting for 19 percent of dietary energy globally. In addition, it provides a living for over one billion people and is cultivated on over 160 million hectares of land by 144 million smallholder farmers (“Rice Facts”). Using the SRP indicators and standards will assess the current rice farming practices and work towards meeting the demands of global rice consumers through the best sustainable practices. These sustainable practices are described in the SRP performance indicators and standard manuals.

The criteria for producing a sustainable rice crop are highlighted by the target areas outlined in the SRP Performance Indicators for Sustainable Rice Cultivation; 1) profitability, 2) labor productivity, 3) productivity: grain yield, 4) food safety, 5) water use efficiency, 6) nitrogen use efficiency, 7) phosphorus use efficiency, 8) pesticide use efficiency, 9) greenhouse gas emissions, 10) health & safety, 11) child labor, and 12) women’s empowerment. In addition to these 12 performance indicators, there are eight themes listed within the SRP Standard on Sustainable Rice Cultivation for an extensive assessment of the farmer’s rice crop. The themes are as follows: 1) farm management, 2) preplanting, 3) water use, 4) nutrient management, 5) pest management, 6) harvest and postharvest, 7) health and safety and 8) labor rights. By assessing farmers in these areas, SRP implementers, companies and all involved agencies will be able to identify issues in individual rice farming systems and advise to improve practices for an overall more sustainable crop for future cropping seasons.

The purpose of my study is to learn about the on-going project between the Loc Troi Group, GIZ-BRIA and the International Rice Research Institute on implementation of the SRP performance indicators and standards regarding contrasting rice farming systems. In addition I also will be meeting and interacting with rice farmers to learn about their experiences, the

benefits and constraints in implementing SRP guidelines. It is my hope that I will be able to bring home knowledge on sustainable rice production with principles that may be adopted in any other crop production setting. A portion of my internship was spent traveling to Vietnam and Iloilo with Dr. Estela Pasuquin and Mr. Joel Janiya to meet with farmers who are participating in pilot testing of the SRP performance indicators and standard. While in Vietnam and Iloilo, several developments and constraints were raised by farmers that need immediate response. From those trips I experienced SRP implementation in two very different countries.

The Loc Troi Group Vietnam

An assessment of the SRP performance indicators and standards is being conducted in Vietnam by the Loc Troi Group (LTG). The LTG is a leading provider of agricultural services and products in Vietnam, as well as a rice exporter, who works jointly with the International Finance Corporation to implement SRP indicators and standards. They partner with LTG contracted farmers to promote sustainable practices while boosting rice value through name branding and applying tools and amenities for progressive development of rice farming systems in Vietnam (“Core Values of Loc Troi Group”). IIRI provides technical assistance to Loc Troi and the International Finance Corporation with the establishment and implementation of the SRP indicators and standards. Currently, Loc Troi is collecting data from over 150 farmers in three cropping seasons. By the end of 2018, they hope to have reached a target of 4,000 farmers.

Selected LTG farmers were assessed on results of a pilot test, which is composed of data from 150 farmers over the duration of three cropping seasons. IIRI is responsible for conducting training on the use of SRP performance indicators and standards, providing data collection tools and analyzing data collected by Loc Troi and their technicians, referred to as “farmer friends.” In addition, IIRI makes scheduled visits to the SRP field sites to view the crop and converse with farmers to gain feedback from their experience using the SRP indicators and standards. Scheduled visits are important in understanding how farmers and stakeholders are using the SRP tools and to also ensure the effectiveness of the platform and data collection.

GIZ-BRIA Iloilo, Philippines

The SRP is implemented through individual farmers in Iloilo through support from the Better Rice Initiative Asia (BRIA), German cooperation: Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), IIRI and the Philippine Department of Agriculture. The aim of the BRIA project is to achieve the goal of a strengthened agricultural sector and improved food security in the Philippines. Focus areas for improvement are farmer’s market position, income and food security through extension service, access to extension services and markets. (“Project Objectives and Indicators.”) BRIA is a non-profit organization composed of three components that focus on better rice production, better market linkage and policy dialog knowledge and

management. IRRI contributes to the success of GIZ-BRIA and SRP implementation by providing technical support and training for farmers and extension workers.

The SRP pilot test in Iloilo is spanned over four municipalities consisting of 83 farmers. Training was completed in April by Mr. Joel Janiya and the first season of SRP rice in Iloilo is currently growing. Data collected from Iloilo is only represented of benchmark scores since the implementation is new. Like in Vietnam, IRRI makes scheduled visits to farmer fields to provide insight to farmers. Continuing forward, the pilot season will extend to October of 2017 and based upon farmer feedback and performance further participation in the program will be debated.

Explanations of Materials and Methods

Tools Used for Data Collection: Two different tools are made available to stakeholder members by the Sustainable Rice Platform. The first tool is the **SRP Performance Indicators for Rice Cultivation v.1.0**. The 12 performance indicators and measurements exist to assess sustainability progresses resulting from alterations of farming practices. The performance indicators are to be used as a basis of communication and understanding progress towards sustainability. They are exercised in conjunction with the **SRP Standard on Sustainable Rice Cultivation v.1.0** to obtain an overall assessment of the implementation of sustainable best practices.

The SRP standard contains 46 requirements, created on the 12 ideals defined by the performance indicators to be used as important markers for sustainable improvement. Farmers are sub-scored on all 46 requirements, with a total score from 0-100 being decided after complete recording of requirements. Performance levels under each requirement range from three to zero, with three being the highest level of compliance. In addition to scoring requirements, two claims exist to determine improvement and to recognize the sustainability of a crop. A farmer is considered “working towards sustainable rice cultivation” if the score is between 10-90. Whereas, “sustainably cultivated rice” is considered with a score of 90-100. Since this is such a broad area, 10 is believed entry level, 67 is considered essential or acceptable and 90 is deemed sustainable. The score is then divided by the total amount possible and multiplied by 100 to get the percent sustainable.

Table 1. shows the performance indicators and their formula for measurement. (SRP Performance Indicators for Sustainable Rice Cultivation)

SRP Performance Indicators	
Name of Indicator	Measurement
1. Profitability: net income from rice	\$/ha/crop cycle or 4/ha/year

2. Labor Productivity	Kg paddy rice/days or \$ net income from rice/days
3. Productivity: grain yield	kg paddy/ha
4. Food safety	kg safe milled rice/kg milled rice x100
5. Water use efficiency: total water productivity	kg paddy/L (rainfall + irrigation)
6. Nutrient use efficiency: N	kg/kg elemental N or kg elemental N removal / kg elemental N input
7. Nutrient use efficiency: P	Kg/kg elemental P or Kg elemental P removal/kg elemental P input
8. Pesticide use efficiency	Balanced scorecard
9. Greenhouse gas emissions	Mg/CO ₂ eq/ha
10. Health & safety	Balanced scorecard
11. Child labor	Balanced scorecard
12. Women's empowerment	Balanced scorecard

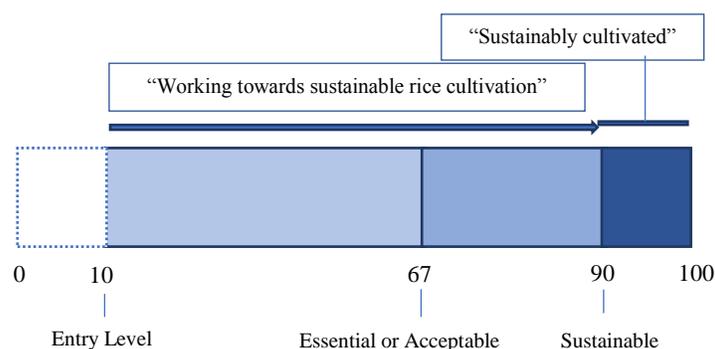


Figure 1. SRP Standard scoring and claims.

Implementing Tools in Farmer's Field: In Vietnam, pilot testing of the SRP by the Loc Troi Group is currently on its third season. The implementation of the SRP by the LTG followed these steps; 1) Training workshop and orientation conducted by IRRI extension agronomist, Mr. Joel Janiya and IRRI environmental scientist, Dr. Estela Pasuquin. Training was for LTG Field Technicians or “farmer friends” to understand scoring of the SRP standards, implementation and requirements. 2) Loc Troi Group selected participating farmers to test SRP standards for pilot testing in three separate provinces; Kien Giang, Tan Hong and Vinh Binh. 3) Another training workshop is conducted by Loc Troi Group Staff for correct use of filling out farmer diaries and understanding the content of SRP standard. 4) LTG Farmer Friends visited farmers frequently to record and collect data and observe field health within three provinces. Each province had fifty farmers each resulting in a total of 150 farmer diaries. 5) Data analysis is carried out by the Loc Troi Group and IRRI for overall score in relation to requirements outlined in the SRP standard. The score represents the level of compliance to sustainable practices.

All four municipalities in Iloilo followed a similar pattern of training, however Mr. Joel Janiya was the only one to assist GIZ-BRIA in the training workshop in April of 2017. GIZ-BRIA is currently experiencing their first season of SRP rice and data analysis is carried out by GIZ-BRIA extension workers with the technical help of IRRI. Data is based upon data recorded by farmer diaries.

Data Collection: Data is collected for performance indicators is through farmer diaries made by the Loc Troi Group. The format of the diaries is based upon the requirements of the 12 performance indicators as mentioned above in Table 1. Data is collected in the farmer diaries and later computed for each of the 12 indicators to monitor trends and improve areas with low values. All data is analyzed using a high value to represent compliance, except the data gathered based upon the greenhouse gas emissions, where low values would be more desirable. There was a similar case within the four municipalities in Iloilo however, since it is just being introduced there is low participation. GIZ-BRIA has their own famer diaries that outline the same principals laid out by the SRP.

Results

Table 2. includes the final SRP performance indicator data analyzed jointly by the LTG and IRRI. The Loc Troi Group SRP pilot test includes three cropping seasons (50 farmers in each province.) Data is representative of the first cropping season (summer-autumn season 2016). Data has been analyzed and grouped into four areas; the mean, 10 percent highest profit, lowest values and highest values. Note that when computing for final data, raw data was used; the average days of labor across the three provinces ranged from 11.5 to 51 days, elemental N: 85.2 kg to 140.5 kg, elemental P:23.3 kg to 35.9 kg, elemental K: 33.8 kg to 53.9 kg.

Province	Profit USD/cr op cycle	Labor Productivity Kg/paddy rice/no of days	Grain Yield Kg/ha	Nutrient Use Efficiency: N Kg paddy/kg elemental N	Nutrient Use Efficiency: P Kg paddy/kg elemental P	Greenhouse Gas Emission CO ₂ Equiv./ton/ha	Irrigation Water Productivity Kg/grain/L water
Mean							
Vinh Binh	568.1	672.8	5015.5	62.4	110.0	8.7	0.0021
Tan Hong	548.5	164.8	4985.4	54.1	69.1	7.3	0.0009
Kien Giang	470.4	511.3	4449.3	39.0	72.9	7.3	0.0013
10 Percent Highest Profit							
Vinh Binh	891.4	527.2	6144.0	72.3	183.8	9.6	0.0022
Tan Hong	842.7	243.4	6033.9	60.7	79.3	7.2	0.0011
Kien Giang	806.5	421.3	5241.8	54.6	81.0	7.9	0.0019
Lowest Values							
Vinh Binh	85.5	64.3	2689.1	34.2	0.0	5.8	0.0005
Tan Hong	140.2	22.9	3849.9	33.6	41.2	5.9	0.0003
Kien Giang	188.5	74.0	3577.7	8.5	14.2	4.5	0.0006
Highest Values							
Vinh Binh	943.1	1829.8	6642.6	150.3	429.7	14.5	0.0046

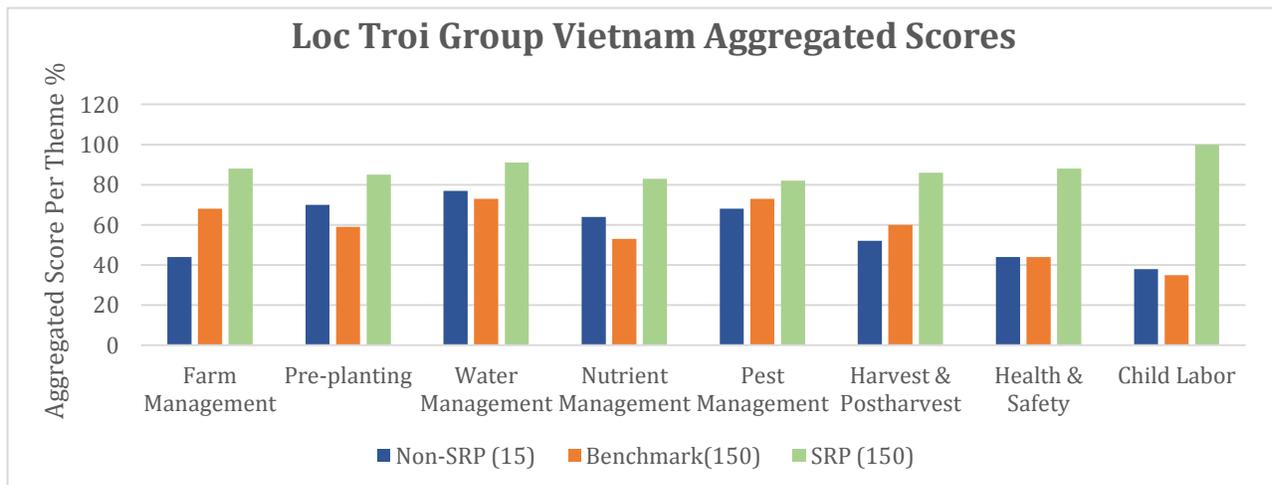
Tan Hong	1056.8	875.7	6562.6	95.9	115.4	10.4	0.0020
Kien Giang	914.2	1793.9	6139.5	109.8	380.4	14.7	0.0025

Figure 2. compares the SRP standard aggregated scores by theme between 15 non-SRP, 150 benchmark (farmers before implementation of SRP), and 150 SRP farmers

Loc Troi Group Observations: After comparing these three categories, there is a significant jump in standard score from non-SRP farmers to SRP farmers. Non-SRP and benchmark farmers fluctuate, as non-SRP farmers have a higher percentage in pre-planting, water management, nutrient management, and labor. However, those results could be the cause of a small control group of only 15 farmers related to 150 benchmark farmers.

The three lowest scoring benchmark areas were health and safety, child labor, nutrient management. When I took a closer look at the requirements of these themes, the ones that were missed in the health and safety theme were use of safety instructions, personal protective equipment, washing and changing facilities for post pesticide application, re-entry time after use of pesticides and the use of pesticide disposal. In terms of child labor, the reason for low scores was a result of non-applicable data. There were two areas in nutrient management that were root of low values; use of organic fertilizer and inorganic fertilizer choice, both being scored a zero. When looking at the graph, there was a significant increase in those categories. Based upon the data from the 150 SRP farmers, the farmers achieved higher scores when it comes to health and safety requirements of PPE, re-entry time and pesticide disposal. However, farmers were still receiving low scores in use of safety instructions and washing and changing facilities. Child labor data was accounted for in this interview period and the farmers achieved a 100 percent score. Nutrient management improved in the organic fertilizer use requirement, as farmers stopped using it. Percent improvement from benchmark to SRP for each category is as follows: Health and Safety: 44, Child Labor: 65 and Nutrient management: 30.

Overall, the largest improvements were made in the child labor and health and safety themes, two of which received low benchmark scores. Since the implementation of the SRP, child labor has been eradicated as it has achieved a 100 percent score. Use of personal protective equipment



(PPE) and the proper labeling and storage of pesticide and fertilizer after application has proven to be effective based upon improved scores, thus leading to improved health and safety of farmers. Performance indicator data helps pinpoint the provinces that need improvements in the specific theme areas.

When comparing the performance indicator data in the three provinces, Vinh Binh has the highest profit, labor productivity, grain yield, irrigation water productivity and nitrogen and phosphorus nutrient use efficiency. In addition, Vinh Binh also has the highest greenhouse gas emission, which is not desirable. Tan Hong, has the second highest mean profit, grain yield, nitrogen nutrient use efficiency. However, labor productivity is the lowest out of the three. This may be a result of less mechanization, meaning there is more manual labor conducted. In addition, they also have the lowest irrigation water productivity, which could be caused by using large amounts of irrigation water during the season (further clarification and checking of data is required before confirming). The final province, Kien Giang has the lowest mean profit, lowest grain yield and nitrogen use efficiency. This can indicate that the Kien Giang province needs to make improvements on nutrient and pest management in order to obtain higher standard scores. It is important to note that the nitrogen and phosphorus nutrient use efficiency and methane emissions (greenhouse gas) of the Kien Giang province is quite similar to that of Tan Hong. In terms of the 10 percent highest profit, the provinces followed the same trend as overall mean; 1) Vinh Binh, 2) Tan Hong and 3) Kien Giang.

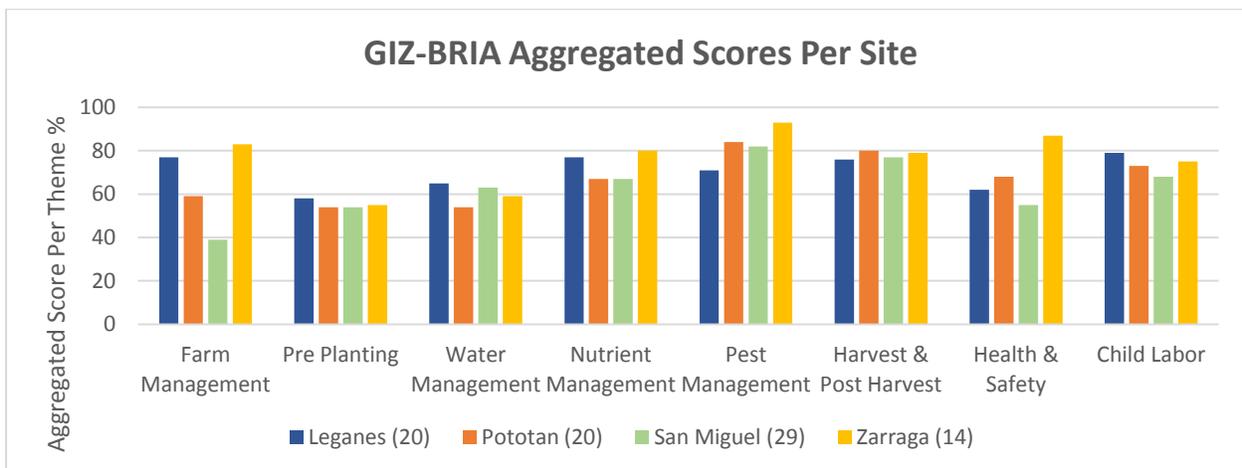


Figure 3. shows the preliminary benchmark scoring of the SRP standard split into the four sites and the number of farmers each in Iloilo.

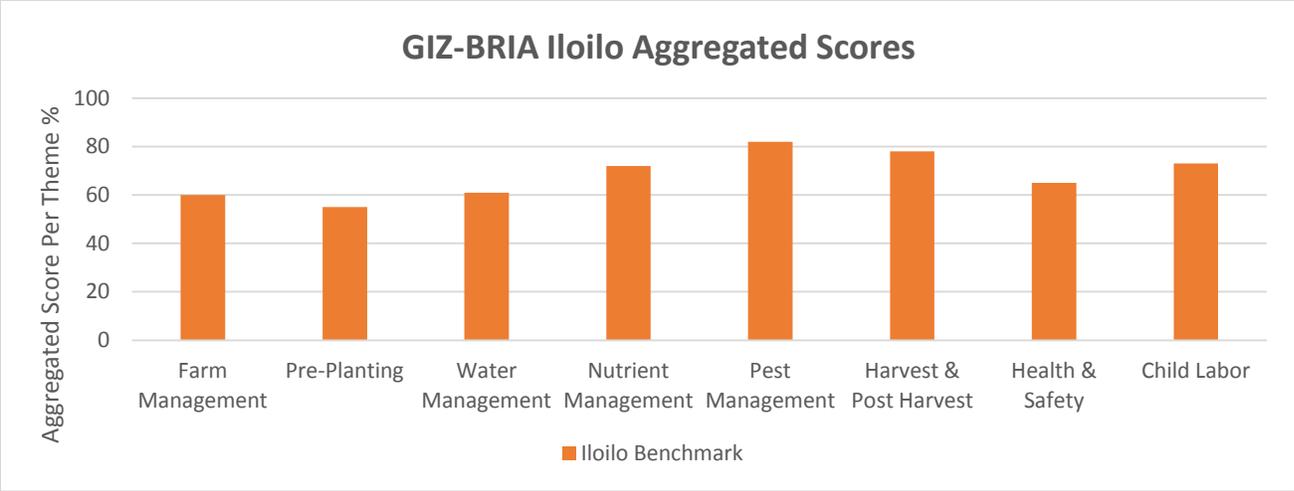


Figure 4. shows the preliminary benchmark scoring of the SRP standard based upon overall assessment of the four sites. After the cropping season is finished, a scoring of SRP standards will be completed again after the introduction of SRP standard principals. 83 Benchmark farmers were scored before the SRP cropping season (without use of SRP tools).

Table 3. shows the average of all eight themes per SRP benchmark site in Iloilo separated into the average, high and low scores.

GIZ-BRIA SRP Standard Benchmark Scores – Average of All Themes			
Score on Standard by Site	Average Score	High Score	Low Score
Leganes	70.4	85.6	46.0
Pototan	67.7	78.0	49.5
San Miguel	64.1	78.0	42.1
Zarraga	75.7	88.6	54.3

GIZ-BRIA Observations: When overlooking the data from the benchmark field sites in Iloilo, Zarraga has the highest scores in every category except pre-planting, water management and child labor. Leganes leads in the three themes that Zarraga does not, but also has the lowest score when it comes to pest management, harvest and post-harvest and health and safety. Pototan is in the middle of each category, but does score very high in the pest management theme. San Miguel is composed of some of the lowest scores, but does surpass Leganes in pest management and harvest and post-harvest themes. When considering raw data, it seems that where one province suffers, they all suffer. All categories are low scoring in pre-planting and lose points in heavy metal and salinity requirements. In addition, low scores in water management are a result of not complying with the irrigated production systems requirement. Table 3. Shows that an average of all themes results in Zarraga as the highest scoring province, followed by Leganes, Pototan and then San Miguel.

Significance of Data Sets Presented: These data sets are very important to identifying where farmers need to improve their farming systems. The performance indicator data is effective in pin-pointing specific areas for further improvements, as it is a more technical analysis rather than an interview platform. The standard scores may not be reliable due to farmers reporting inaccurate answers, therefore the performance indicators exist to accurately report where improvements should be made. It is also vital to be able to see improvements from the benchmark season to the first season of SRP implementation as well as the mean, high and low scores from each province at the end of a cropping season. By presenting this data, technicians can provide suggestions for improving weak areas in rice farming systems.

Discussion

Contrasting Rice Farming Systems: One of the main points of my project is to contrast rice farming systems based upon the SRP performance indicators and standard. While traveling to Vietnam and Iloilo, I not only have a greater understanding of rice farming systems, but also observed how the two countries contrast when it comes to producing rice. The first difference is that LTG farmers are contracted and belong to small member cooperatives, whereas Iloilo farmers are individual farmers. Because of that, LTG farmers have experienced more improvement from the benchmark season. This is due to the benefits of being a member of a cooperative or being a contracted farmer. The farmers in Vietnam are provided PPE and cooperatives provide pesticide application to the farmer. In addition, the LTG is responsible for all post-harvest requirements, such as drying and storage of the crop. They also provide soil testing to the farmers. These benefits are not available to individual farmers in the Philippines. While the LTG also provides services to the farmer, another difference is the size in farms compared to the Philippines. In Vietnam, it is common for farmers to own rice systems that are composed of 14 hectares. In the Philippines, five hectares is considered above average, where one hectare is more common. The size difference in farms is considerably notable.

I have also observed the difference in water availability between the two systems. There is no shortage of water in Vietnam and the canals are always full of water and very close to rice fields. This is not the case in the Philippines. Canals or dikes may be poorly constructed and droughty within a particular year or farmers cannot pump irrigation water to their fields because a canal is not close nearby. There is also no funding available to individual farmers to construct a well, so water management is a large issue. Figure 5 can reflect that this relationship. Focusing on the graph, in addition LTG outscoring Iloilo farmers in water management, they also outscore in farm management and preplanting. LTG farmers are members of cooperatives so they have been pushed to keep records and have the access to testing for heavy metals and salinity, resulting in higher scoring. However, in five of the eight themes, Iloilo farmers outscore Vietnam farmers. Raw data showed that LTG farmers lack points when it comes to complying with sustainable pest management and pesticide calibration, straw management, and not using PPE. In these areas, Iloilo farmers were more compliant, mostly due to the organic farmers in Zarraga.

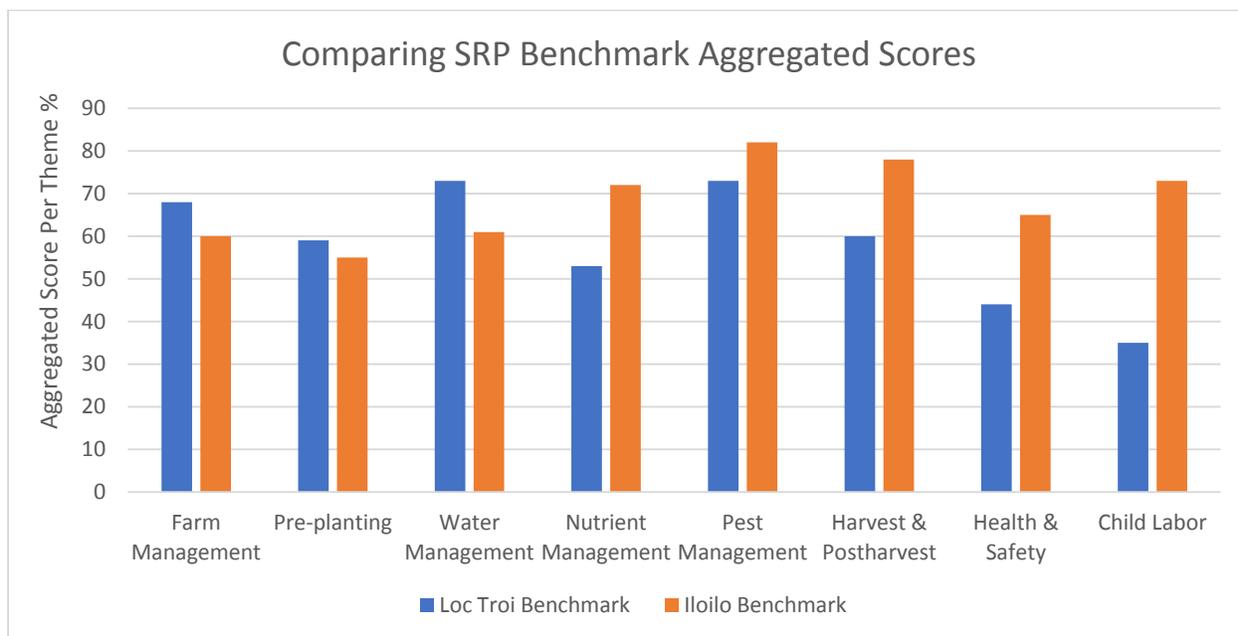


Figure 5. Compares the benchmark scores of the two systems and Iloilo already has much higher benchmark scores than Loc Troi. This means that there might be improvements in score, but just not as large of improvement as seen in Vietnam

Predictions for Iloilo SRP Results: The first SRP rice crop has yet to be harvested in Iloilo. Based upon my trip to the island and meeting with farmers, I can predict that there will not be as large of an increase in benchmark scores to SRP scores like that of the LTG farmers in Vietnam. After looking at the raw data and locating where farmers are losing scores, they are losing points in the heavy metal and salinity requirements. Farmers do not have nearby access to heavy metal and salinity testing and did not test their soil before planting the current season. Farmers have also expressed that it is too expensive for them to send their soil to be tested. In addition, farmers depend on rain for their irrigation systems. Farmers in Zarraga and Pototan may have access to irrigation pumps, but they lack wells during a dry season. Therefore, if there is not rain, there will be no irrigation system. Those factors cause there to be a little to no increase in preplanting and water management areas. However, I do think that there will be an increase in the farm management and health and safety due to the use of farmer diaries and PPE.

Concerns and Recommendations: After visiting the two areas, the main concern coming from LTG and Iloilo farmers, along with staff at GIZ-BRIA, was that there was no market for producing SRP rice. Meaning there is no incentive for farmers to be implementing the SRP throughout their systems. However, through discussion with farmers both in Vietnam and Iloilo they are very excited and open to participating in an SRP rice certification program once it is available to them. Another major concern was that it is hard for some farmers and technicians to

comprehend the standard interview questions because terminology can mean different things from one province to another, or even in one country to another. I believe that these concerns should be taken into consideration during the SRP revision processes.

I was fortunate to be able to take part in SRP revision cluster meetings while at IRRI and in addition to the current revision, I felt that in the future of SRP there needs to be a marketing platform established so that shareholders can help market farmer's SRP rice and provide them with a premium. As the SRP standard gets revised, it would be useful to see pictures alongside interview questions so that it is a more universal material.

The SRP Towards Food Security

Based upon this case study, it is evident that implementing the Sustainable Rice Platform performance indicators and standards is improving the overall sustainability of rice farming systems in Vietnam. As provided in the data sets from the first cropping season, reduction of pesticide, fertilizer, water and seed inputs were noted. In addition, Loc Troi Group Farmers are more aware of consequences of handling pesticides without the use of personal protective equipment (PPE). With the reduction of inputs and proper education and training, farmers are not only making a greater profit, but impacting the environment in a positive way, reducing greenhouse gas emissions and ensuring personal life longevity. All things that are major players when linked to food security. The SRP is a very useful tool in promoting sustainable rice production for a food secure future. By assessing farmers through the topics outlined in the SRP Performance Indicators for Sustainable Rice Production, economic, social and environmental challenges will be tackled, which will ensure safe and abundant production of rice to meet the 25 percent increase in demand in the next 25 years. Meeting the environmental, social and economic challenges will only continue to return good results as the SRP is a new platform and is updated and revised to ensure effectiveness frequently.

The SRP aims to make rice production more sustainable through the rice value chain. The value chain encompasses, production, marketing and consumption to improve livelihoods and reduce poverty in rural areas. Proof of this effort can be seen in Vietnam as the Loc Troi Group is trying to certify SRP rice to gain more profit for the farmer. In addition, farmers are noting an increase and upkeep in yield to meet the demands of consumers globally as much of the rice is exported in Vietnam. By using the SRP performance indicators and standards, IRRI and SRP shareholders attempt to promote resource efficiency and sustainability through trade flows, production and consumption operations. To cover all aspects of the rice value chain, SRP shareholders include: government agencies and research institutions, rice traders and environmental and social non-governmental organizations. With the use of environmental, social and economic benchmark

indicators, IRRI and the SRP intends to maintain rice yields for smallholders, reduce the environmental footprint of rice cultivation and meet consumer needs for food safety and quality.

Food security cannot be met by only combating one issue. The SRP does a great job in exemplifying that it takes all things to ensure sustainability and eventually, food security. They provide farmers with a realistic tool to help them grow a safe, healthy and consistent yielding crop. With frequent revisions and continued implementation of the SRP, the staple food for over 3.5 billion people will meet the 25 percent increase in demand within the next 25 years. The progress made over the next 25 years will be a basis of what still needs to be done to ensure there is abundant supply by 2050.

Self-Reflection

“We become not a melting pot, but a beautiful mosaic. Different People, different beliefs, different yearnings, different hopes, different dreams.” - Jimmy Carter

While at times I felt like my day was a melting pot, my eight-week journey in the Philippines turned out to be a beautiful mosaic. I was introduced to unfamiliar people who all had different hopes, beliefs and dreams and the one common thing we all at IRRI share, is chip of mosaic tile that encompasses building a sustainable world. My mosaic is not finished, but is now filled with a new outlook on global agriculture, greater understanding of the components of food security and newfound respect for myself as a young agriculturist. IRRI has provided me with room to expand and grow as a young woman in agriculture.

Growing as a Borlaug-Ruan Intern

No classes or conferences I completed through high school could have prepared me for the experience I had while being a Borlaug-Ruan Intern at IRRI. This experience showed me there are multiple phases of comfort zones and I was on the rise to tackle another one while at IRRI. I remember orientation day and planting rice while up to my knees in mud and then walking through the doors of my office on my first official work day. I was scared out of my mind and thought to myself that I just graduated high school and I am in no way qualified to be working with these soil scientists. Without having any lab experience outside of the occasional chemistry lab in high school, I was afraid to even touch a beaker for fear I would mess up the solution inside. However, lab experience or not, in no time at all, I felt like a member of the soils lab family and was welcomed every morning with a smile. I was given the confidence to speak up during group seminars and meetings, something that before would take a lot of courage.

When I reflect on my experience in the Philippines, I can't help but to feel self-pride in how much I developed and grew as a young woman. Every day was a new day that yielded something

exciting and exotic. Halfway through my internship, I was traveling to Vietnam with my assistant mentor working on my project, an opportunity I never would've imagined available to me here. I learned how to adapt quickly to new environments after traveling to Vietnam. Being a naturally shy person, I had to learn to make new friends and develop relationships with people I would be spending my whole summer with. I am constantly grateful for my little support system in my office and the group of interns from Illinois who took me in as one of their own. I was always provided with a hug and shoulder to cry on during the tough times when homesickness was overwhelming me. Most importantly, I learned how to be self-sufficient, a very important skill for my future. While in the moment, I felt discomfort, the experiences I had at IRRI have helped me figure out who I am, something I would have never realized sitting on my couch at home all summer. By the end of my four weeks, being at IRRI was normal and I did not want to return home. What they mention to you before you leave and something that you forget after experiencing culture shock, is that eight weeks goes by in a blink of an eye. One day you are early packing your bags to embark on your journey and the next you are tearing up as you pack to return home. It is not easy to leave behind people who were so instrumental in your personal growth and success. Despite leaving, I know that I will always be remembered as the American who loves her white rice and soy sauce and as the Beebout girls call me, Ate Mara. (Ate stands for older sister in Tagalog)

While I was provided with many joys and discomforts during my eight-week journey, every day I was reminded of Dr. Borlaug's legacy and my personal goal of inspiring young minds back home to follow in my footsteps. It was in that goal and aspiring to be like Dr. Borlaug that helped me get through the challenging times. I learned to stand tall and refocus myself. I constantly wish that I could have the chance to meet Dr. Borlaug, but working under his legacy is more than I could have asked for. My name will now forever be attached to his, an honor that not everyone has the opportunity of receiving. I know that he would be proud of all 24 interns for stepping outside their comfort zones to work diligently in combating global issues. This summer, I took one step closer to being able to achieve my dream of changing the world and becoming the "next norm(ia)."

Pictures



Works Cited

- “Project Objectives and Indicators.” BRIA (*Philippines*) – *Better Rice Initiative Asia*, Better Rice Initiative. www.better-rice-initiative-asia.org/philippines/objective.html. Accessed Web. July 2017
- "Core Values of Loc Trio Group" – Tập Đoàn Lộc Trời." *Tp on Lc Tri*. N.p., n.d. www.loctroi.vn/en/aboutvn/gia-tri-cot-loi-cua-loc-troi. Accessed Web. July 2017.
- "IRRI and FAO Step Up Joint Efforts to Globally Bolster Sustainable Rice Production." *FAO - News Article FAO*. 30 March 2017, www.fao.org/news/story/en/item/854617/icode/. Accessed Web. July 2017.
- "Membership." Sustainable Rice Platform (SRP). N.p., n.d. <http://www.sustainablerice.org/GetInvolved/#members-list>. Accessed Web. July 2017.
- “Our history.” *IRRI*. N.p., n.d www.irri.org/about-us/our-history. Accessed Web. July 2017.
- "Our mission." *IRRI*. N.p., n.d. www.irri.org/about-us/our-mission. Accessed Web. July 2017.
- "Our organization." *IRRI*. N.p., n.d. www.irri.org/about-us/our-organization. Accessed Web. July 2017.
- "Overview." *Sustainable Rice Platform (SRP)*. N.p., n.d. www.sustainablerice.org/About-Us. Accessed Web. July 2017.
- "Rice Facts." *Sustainable Rice Platform (SRP)*. N.p., n.d. www.sustainablerice.org/Resources/. Accessed Web. July 2017.
- "Sarah Beebout." *IRRI*. N.p., n.d. www.irri.org/about-us/our-people/specialists/sarah-beebout. Accessed Web. July 2017.
- SRP Performance Indicators for Sustainable Rice Cultivation*. Vol. 1. N.p.: Sustainable Rice Platform, 2015. Print.
- SRP Standard on Sustainable Rice Cultivation*. Vol. 1. Bangkok: Sustainable Rice Platform, 2015. Print.