

JIRCAS International Symposium 2018

Women in Fisheries:

Sustainable Development Goals (SDGs) and Contributions to Research and Industry

Proceedings

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CONTENTS

Opening Remarks

Masa Iwanaga *President, JIRCAS*5

Welcome Remarks

Kazuhiko Shimada *Deputy Director General,
Agriculture, Forestry and Fisheries Research Council Secretariat, MAFF*
.....7

Keynote speeches

Chairperson: Kunihiro Doi *Director, Research Strategy Office, JIRCAS*

Women's contributions to fisheries and aquaculture in the developing areas: Present achievements and future prospects for women researchers and administrators

Meryl Williams *Chair, Gender in Aquaculture and Fisheries Section, Asian Fisheries Society*
.....11

Women in fisheries and aquaculture in Japan: Current achievements and future prospects in research and industry

Kaoru Nakata *Executive Director, Japan Fisheries Research and Education Agency*17

Session 1 “Women in Fisheries Research”

Chairperson: Osamu Abe *Director, Fisheries Division, JIRCAS*

The contribution of fisheries in achieving SDGs: Perspectives of women researchers

Yumiko Kura *Country Director, WorldFish Cambodia*25

R&D for sustainable aquaculture development towards food and nutrition security in Southeast Asia

Evelyn Grace de Jesus Ayson *Scientist, Southeast Asian Fisheries Development Center / Aquaculture
Department*31

Development of new aquaculture and seed production technology for commercially-important shrimp species: Research at JIRCAS

Bong Jung Kang *Research Scientist, Fisheries Division, JIRCAS*37

Session 2 “Women On-site in Fisheries and Aquaculture”

Chairperson: Masayoshi Saito

Director, Research Planning and Partnership Division, JIRCAS

Activities of women in fishing communities starting businesses in Japan

Izumi Seki *Professor, Tokai University*45

Women in aquaculture: Stories from the field

Bonnie Waycott *Writer, The Fish Site, 5M Publishing*51

Panel Discussion

Moderator: Marcy Wilder *Senior Research Scientist, Fisheries Division, JIRCAS*

.....57

Closing Remarks

Osamu Koyama *Vice-President, JIRCAS*

.....67

Abbreviations found in program

JIRCAS: Japan International Research Center for Agricultural Sciences

MAFF: Ministry of Agriculture, Forestry and Fisheries

SDGs: Sustainable Development Goals

JIRCAS International Symposium 2018

Women in Fisheries: Sustainable Development Goals (SDGs) and Contributions to Research and Industry

『水産』で活躍する女性研究者～SDGsへの貢献

主催：国立研究開発法人 国際農林水産業研究センター (JIRCAS) 共催：国立研究開発法人 水産研究・教育機構
後援：農林水産省 農林水産技術会議事務局 水産庁 国立大学法人 東京農工大学 国立大学法人 東京外国語大学
国立研究開発法人 農薬・食品産業技術総合研究機構 一般社団法人 首都圏産業活性化協会 持続的開発のための農林水産国際研究フォーラム (J-FARD)



JIRCAS International Symposium 2018
United Nations University, Tokyo, Japan
November 6, 2018

Opening Remarks

Masa Iwanaga

President, JIRCAS



Distinguished guests, participants, ladies and gentlemen, good afternoon.

It is my great honor and privilege to open the JIRCAS International Symposium 2018, “Women in Fisheries: Sustainable Development Goals (SDGs) and Contributions to Research and Industry”.

This symposium is organized by the Japan International Research Center for Agricultural Sciences, JIRCAS for short, and co-organized by the Japan Fisheries Research and Education Agency.

First of all, I would like to extend my sincere welcome to all guests and participants. In particular, I would like to express my sincerest appreciation to the keynote speakers, Dr. Meryl Williams of the Asian Fisheries Society, and Dr. Kaoru Nakata of the Japan Fisheries Research and Education Agency, as well as to all of our other speakers who have traveled great distances to participate today and present their in-depth knowledge and insight. I would also like to extend my appreciation to the chairpersons, moderator, and all of our staff who have been working behind the scenes.

Through various joint research programs in the field of agriculture, forestry and fisheries in the tropical and developing regions, JIRCAS has not only contributed to the international advancement of scientific research and collaboration, but has also provided valuable assistance in fostering human resource development, including the promotion of gender equality.

One of the keywords of this International Symposium is “Gender Equality”. JIRCAS actively participates in a program entitled “Initiative for Realizing Diversity in the Research Environment”, that is supported by funds from Japan’s Ministry of Education, Culture, Sports, Science and Technology, with the goal of further promoting women’s contributions to scientific and technological advancement in agriculture, forestry and fisheries. Under the auspices of this program, JIRCAS is currently seeking to promote active roles for female researchers, both domestically and internationally.

At JIRCAS, we convene an International Symposium every year focusing on a topic of importance in agriculture, forestry and fisheries. This year, in connection with the issue of “Gender Equality”, we made a decision to focus on fisheries and women’s contributions. In the past, fisheries-related work was typically considered to consist of hard physical work at sea, and to be a workplace for men only. However, nowadays, an increasing number of female workers in the field of fisheries are showing a very high level of potential and contribution in their various roles. Especially in the rural areas, the involvement of women as leaders as well as workers, are indispensable to the fisheries industry. As researchers, regarding women’s abilities, there is no doubt whatsoever as to what they are able to accomplish, and we expect their contributions to technology development and its dissemination will become even more prominent if we indeed pursue the realization of gender equality in earnest.

Opening Remarks

Another keyword for this Symposium is the SDGs, which means Sustainable Development Goals. The 17 goals and 169 targets of the SDGs have been put forth by the United Nations, aiming to demonstrate the scale and ambition of the new universal Agenda toward 2030 for Sustainable Development. JIRCAS is actively seeking to realize the SDGs, including those of “Gender Equality” and “Life Below Water” which are relevant to “Fisheries” as we understand.

Today, leading female administrators and scientists in the field of fisheries have been invited to share with us their research findings and views on the need for the active participation, involvement, and leadership contribution of women working in fisheries research and technology development for securing the SDGs, thus leading to food security and our healthy future

Finally, I would like to express my sincere wishes, that with the important contributions of our distinguished speakers, along with the participation of our valued audience, that this Symposium will be fruitful and achieve the objectives for which it was organized.

Thank you very much.

Welcome Remarks

Kazuhiko Shimada

Deputy Director General,

Agriculture, Forestry and Fisheries Research Council Secretariat,

MAFF



Eminent Speakers and Chairpersons,
Distinguished Guests,
Ladies and Gentlemen,

Good afternoon. I am Kazuhiko Shimada, Deputy Director-General of Agriculture, Forestry and Fisheries Research Council Secretariat. On behalf of the Ministry of Agriculture, Forestry and Fisheries of Japan, I would like to extend a warm welcome to all the participants who have come to join the JIRCAS International Symposium 2018 today. I would especially like to express my deepest appreciation to JIRCAS for organizing this symposium under the theme of "Women in Fisheries: Sustainable Development Goals (SDGs) and Contributions to Research and Industry".

In recent years, Japanese food culture such as sushi and sashimi - which we are so proud of - is becoming extremely popular all over the world. The Japanese people have a long tradition of consuming seafood, which we consider as a precious gift from the ocean. The fishery industry of Japan has continued to develop against this background of food culture while adapting itself to the changes of the times.

Women's presence has always been significant in fishery in Japan. In the traditional fishery industry, women fishers called "ama" are famous for diving without equipment (oxygen tanks) in the coastal areas. In the modern days as well, women have been playing an important role in selection and processing work for fishes that are landed at the seaport. At the symposium today, female researchers will be giving lectures from the women's point of view, with special focus on women who are active in the fishery industry. I am convinced that discussions based on these lectures will enable us to better reflect women's opinions and ways of thinking in the fishery industry, as well as to support women researchers in the field of fisheries.

In our country, the production volume of fishery and aquaculture industry has been declining. In 2016, it was four point three six (4.36) million tons, coming down to one third (1/3) of the figure during the peak period, while the gross fisheries output almost halved compared with its peak (to 1 trillion five hundred and eighty-five point six billion yen in 2016). One of the factors that is responsible for this decline is overfishing in the world, which has resulted in a decrease in fishery resources. Demand for fishery products is rapidly increasing worldwide because of factors such as health consciousness in Europe and the United States, economic development of China, and overall increase in the world population. The fishery resources of the world are already fully utilized or rather over-utilized, which threatens the sustainable development of the fishery industry.

Welcome Remarks

Under these current circumstances, in 2015, the United Nations adopted the Sustainable Development Goals (SDGs), and has been promoting efforts to protect "Life Below Water", which is one of the SDGs. In response to this situation, in June this year, the Japanese government decided upon a strategy of reforming the fishery policy in order to manage fishery resources appropriately, and to transform the fishery into a growth industry. The Ministry of Agriculture, Forestry and Fisheries is currently examining necessary measures to implement this reform.

In view of these circumstances, it is very timely and appropriate that the goal of achieving SDGs has been selected as the theme of this symposium. I sincerely hope that today's symposium will help you to better understand the role of women in the fishery industry in achieving the goals of SDGs. Finally, it would be my great pleasure if today's discussion leads to the promotion of women's active participation in research and society, and sheds new light on our work to achieve sustainable development of fisheries resources and food security.

Thank you for your kind attention.

Keynote Speeches

Chair:

Kunihiro Doi, JIRCAS



WOMEN'S CONTRIBUTIONS TO FISHERIES AND AQUACULTURE IN THE DEVELOPING AREAS: PRESENT ACHIEVEMENTS AND FUTURE PROSPECTS FOR WOMEN RESEARCHERS AND ADMINISTRATORS

Meryl Williams

Chair, Gender in Aquaculture and Fisheries Section, Asian Fisheries Society

Meryl Williams received her undergraduate degree in Science from the University of Queensland, first class honors in Marine Biology from James Cook University, and masters in mathematical statistics and doctorate in Zoology, both from the University of Queensland. Dr. Williams has over 40 years experience in Australian and international fisheries, aquaculture, conservation and agricultural research and development. Currently, she is focusing on research and advocacy on women and gender in aquaculture and fisheries, and information and science for fair and responsible fish production for food security and nutrition.

She is the Chair of the Asian Fisheries Society's (AFS) Gender in Aquaculture and Fisheries Section, Vice Chair of the Scientific Advisory Committee of the International Seafood Sustainability Foundation, a member of the board of Aquaculture without Frontiers (Australia), and sits on two journal editorial boards. She was formerly Director General of the WorldFish Center (1994-2004), during which time she concentrated the focus of WorldFish on eradicating poverty, improving people's nutrition, and reducing pressure on the environment. She was previously the Director of the Australian Institute of Marine Science, Executive Director of the Bureau of Rural Sciences, tuna fisheries statistician at the Secretariat for the Pacific Community and fisheries biologist in the Queensland state government service.

Finally, Dr. Williams is a Fellow of the Academy of Science, Technology and Engineering (ATSE), awarded an Australian Centenary Medal, made an Honorary Life Member of AFS, an Outstanding Alumnus of James Cook University, Australia, awarded the Crawford Medal, Australia, and the Prof. M.C. Nandeesha Gender Justice & Equality Award, India.



ABSTRACT

Women are slowly becoming recognised as the backbone of the fisheries and aquaculture sectors (Gopal et al. 2017). Researchers and women's representative groups make the case that, from catch to consumer, gender matters and women must be empowered, counted and given voice in decision making (Williams et al. 2018). The case for gender is based on evidence that: the fish sector benefits when women's contributions are valued; gender-blind policies and data undermine women's contributions; and society and the environment benefit when women are empowered. In developing areas where most of the world's fish is now produced, fisheries and aquaculture are undergoing major transitions that increase the challenges to gender equality, and also offer opportunities.

Women researchers and administrators have been at the forefront of gathering the evidence and making the case for gender sensitive policies and development interventions. Sometimes they have been joined and supported by their male colleagues, but frequently their gender work has been ignored, denied or even suppressed within their institutions. My own deeper interest in women and gender in fisheries came about through the initiatives of two of my male colleagues, Dr M.V. Gupta, and the late Prof M.C. Nandeesha. As women become more prominent in many societies, the future prospects for women researchers and administrators in fisheries seem brighter, but will depend ultimately on the directions taken by their societies and economies.

Many researchers promote the need for gender transformative change, but also realise that technology change and the political economy of fish production and trade, from local to global scale, also govern the possibility for transformative change. I will draw from over 40 years of experience as a woman working in mainstream fisheries and aquaculture research agencies in developing and developed regions, and bring together the big trends in the fish sectors and women's roles and contributions, with a focus on the outlook for women researchers and administrators. My conclusions converge on those from recent political and public gender debates - that gender does not explain everything, nor does it explain nothing, but it does explain many of the future prospects for women researchers and administrators.

KEYWORDS

Gender transformative change, Political economy, Women in fish value chains

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- Dr. Modadugu Vijay Gupta: https://en.wikipedia.org/wiki/Modadugu_Vijay_Gupta



Women's contributions to fisheries and aquaculture in the developing areas

- A journey - formalising the contributions of women researchers and administrators through the Gender in Aquaculture and Fisheries Section
- Along the way, we found why gender matters in fisheries and aquaculture
- And we formed a new perspective on where gender research needs to go



Equal contributor: Catching fish using gill net from a river in Indian Sundarban. Photo by Ranjan Manna, India

A journey - formalising the contributions of women researchers and administrators through the Gender in Aquaculture and Fisheries Section

From personal initiatives to creating a formal professional institution

The journey: Two early influencers

Asian Fisheries Society linked events initiated by Dr M.C. Nandeesh

WorldFish engagement with women in aquaculture began with Dr M.V. Gupta



A 28 year journey: forming the Gender in Aquaculture and Fisheries Section (of the Asian Fisheries Society)

1990	• Workshop on Women in Fisheries in India, AFSIB
1994	• National Workshop on Women in Cambodian Fisheries, PADEK
1995	• Iloilo Resolution on The Role of Women in Fisheries Development in the Asia-Pacific • 4th UN World Conference on Women, Beijing, China
1995	• Women in Fisheries photo competition, AAF, China, PADEK & AFS
1996	• Women in Fisheries in Indo-China Countries Seminar, PADEK
1998	• International Symposium on Women in Asian Fisheries, AAF, Thailand, AFS and ICLARM.
2001	• Global Symposium on Women in Fisheries, GAF, Taiwan, by AFS & ICLARM - The WorldFish Center
2004	• GAF: Global Symposium on GAF, 7AFF, Malaysia, AFS and WorldFish Center
2007	• GAF2, 8AFF, India, GAF network meeting
2011	• GAF3, 9AFF, China, GAF network meeting
2013	• GAF4, 10AFF, Korea, GAF network meeting
2014	• GAF5, 10IAF, India, GAF network meeting • Voluntary Guidelines for Securing Sustainable Small Scale Fisheries*** • United Nations Global Goals for Sustainable Development***
2015	
2016	• GAF6, 11AFF, Thailand, GAF network and Partners; GAF-101 training
2017	• Gender in Aquaculture and Fisheries Section, Asian Fisheries Society formed • GAF-India, 11IAF, India, AFSIB, by GAF5, AFSIB and ICSF
2018	• GAF7, Asian Institute of Technology and GAF5, GAF-101 training

On our journey, we documented a typical feminist pathway

- Noticing that fisheries/aquaculture are seen as masculine
 - Women do fish! [WIF Asia 1998]
- Investigating omissions and "adding women"
 - Where are the women in fisheries? [WIF Global 2001]
- Adding women and adding gender
 - From women in fisheries to gender and fisheries [WIF Global 2001]
 - ...the first global look at the gender dimensions of fisheries [GAF1 2004]
- Seeking greater equality, recognising intersectionality and social norms
 - gender & development [GAF2 2007]
 - moving the agenda forward [GAF3 2011]
 - navigating change [GAF4 2013]
 - the long journey to equality [GAF5 2014]
 - engendering security [GAF6 2014]
 - expanding the horizons [GAF7 2018]



Why gender matters in fisheries and aquaculture

WE FOUND LARGE CONSTRAINTS FOR WOMEN

- Women have smaller enterprises, lower pay, riskier work
- Gender-blind policies and lack of sex-disaggregated data undermine women's contributions
- Women have to fight for their basic rights and decision-making power
- Fisheries and aquaculture modernization has downsides for women

AND LARGE OPPORTUNITIES FOR SOCIETY

- Women's empowerment and group action help overcome constraints
- The whole fish sector wins when women's contributions are valued
- Society and the environment benefit when women are empowered
- Women fish workers are the key to fish as nutrition
- Integrating women into action on climate change and natural disaster relief benefits households and communities

FISHING FOR EQUALITY
GENDER EQUALITY

www.genderequality.genderaquafish.org

What is to be done?

- Count women and make them visible in policy and programs
- Increase funding to gender research and educational outreach a hundredfold
- Support women's empowerment
- Collaborate on gender research

Fish market in Assam, India.
 Photo by Deepjyoti Baruah, India

We have a new perspective on where gender research needs to go

gender in aquaculture and fisheries research has been small scale, like women's enterprises; it needs to upgrade and connect to the political economy if the SDGs are to be achieved

From current gender research approaches to new directions

- Looking at fisheries through a gender lens, seeing the fisheries/aquaculture problems more clearly
 - the gender lens focuses on gender differentiation of roles, power, access and opportunities
 - Place/fishery based studies can reveal gaps in current priorities, e.g., post-harvest activities
 - May not address why the existing priorities emerged
 - And the fisheries agencies have not responded
- Looking at GAF through a gender lens, seeing gender inequality
 - Mainly interests gender actors who see patriarchal social norms and focus primarily on a Gender Transformative Approach

Cover: Mending lives together at a fishing harbour in West Bengal. Photo by Pradip Kumar Mahato, India

From current gender research approaches to new directions

- Should we look at gender through a (fisheries) political economy lens and see the world that is?
 - Political economy is the study of production and trade and their relations with law, custom and government.. (Wikipedia)
 - Stresses the importance of historical processes, structural forces and institutions in shaping economic outcomes (Henderson 2015)
 - Where the state meets the market; how economics and the state interact in structuring each other
 - Offers an approach to contextualising GAF and the constraints and opportunities to achieving equality and change
 - Helps identify where specific change needs to be negotiated, as an ongoing process, to achieve SDGS+SDG14

Cover: Mending lives together at a fishing harbour in West Bengal. Photo by Pradip Kumar Mahato, India

Sample political economy research questions

- How does industry policy affect women's work?
 - Via government support for exports industries, industrial trawling, intensive aquaculture, central markets, over small scale fisheries/aquaculture
 - Labour policy in factories – work security, pay, conditions, location, resistance/suppression
- Why studies on women in seaweed farming should not focus only on what happens in the water and on the shore, but also on the global seaweed hydrocolloid industry that determines the price
- Why complete sex-disaggregated statistics should be collected
 - Fisheries agencies current statistical collections are very incomplete; women's fishing is often not recorded; traditional and modern fish processing industry statistics are rarely reported
 - Statistics on reproductive economies are totally ignored
- What gender equality criteria should be included in sustainability certification and auditing schemes?
- What indicators on gender equality should be incorporated in SDG14?

Gender in fisheries and aquaculture research has to connect to the political economy whose forces shape women's contributions



A new research and training agenda, of greater scale, is about to be launched to address these challenges



WOMEN IN FISHERIES AND AQUACULTURE IN JAPAN: CURRENT ACHIEVEMENTS AND FUTURE PROSPECTS IN RESEARCH AND INDUSTRY

Kaoru Nakata

Japan Fisheries Research and Education Agency

Kaoru Nakata presently serves as Executive Director of the Japan Fisheries Research and Education Agency (FRA). Dr. Nakata holds a bachelor's and master's degree in Fisheries Science from Hokkaido University, and a Ph.D. in Agricultural Sciences from the University of Tokyo where her doctoral dissertation focused on studies in the field of fisheries oceanography. Dr. Nakata entered the Fisheries Agency of Japan in 1984 and commenced her career as a researcher at the Tokai Regional Fisheries Research Laboratory (presently the National Research Institute of Fisheries Science; NRIFS)

Thereafter, Dr. Nakata has held multiple positions at the directorial level; she was in charge of research promotion in the field of fisheries oceanography in her capacity as Director of the Marine Productivity Department of NRIFS during 2009-2010, and then as Deputy Director in the Research Management Department at FRA headquarters during 2011-2015. In 2016, when the National Fisheries University was integrated into the FRA, Dr. Nakata took up her present position, where she serves as Executive Director of the FRA as well as oversees operations at the National Fisheries University (located in Shimonoseki). In this manner, she is engaged in the advancement of fisheries-related education throughout Japan, while ensuring the smooth integration and cooperation of both organizations.



ABSTRACT

To “Ensure women’s full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life” was adopted as one of the targets of Sustainable Development Goal (SDG) 5, as a component of the aim to “Achieve gender equality and empower all women and girls” as stated on the United Nation’s Sustainable Development Knowledge Platform. In the fisheries sector in Japan, female workers constitute 13% of those engaged in fishing activities (fishers), 38.4% of land-based workers, and 64% of those involved in the marine products- processing industries. However, the percentage of women at the decision-making levels in these various endeavors are extremely low. The rates of ordinary members and those serving in official capacities in fisheries cooperative associations are as low as 5-6% and 0.5%, respectively. Similar trends are also found in the fields of education and research. For example, the percentage of women researchers holding formal positions in the Japan Fisheries Research and Education Agency (FRA) has reached 11%, but those engaged in management-level positions constitute only 3% of the total.

In 2015, numerical targets for ratios of women at the management/decision-making level of incorporated administrative agencies in Japan, such as the FRA, were established under the Fourth Gender Equality Basic Plan. The FRA has been exerting efforts to increase recruitment levels of female researchers into the organization, and to furthermore promote capable women to the management/decision-making level (Fig. 1). At the present time, there is a very small candidate pool for women researchers who are at the career stage eligible for such promotion; hence, it will take time to reach the desired numerical targets, but this goal is starting to be realized.

In Japan, fishery-related production has declined in recent years, and the fisheries industry is facing an aging crisis. An increase of women members at the decision-making level in local communities is expected to lead to the establishment of various systems that will consider women’s needs and utilize their talents. Women are regarded to have a high level of competence in communicative skills, and in this regard, it is highly probable that their active participation will bring new power and energy to their respective communities. Increasing women’s participation in both the local community and in the research arena will be key to achieving a much-needed boost to Japan’s fisheries sector.

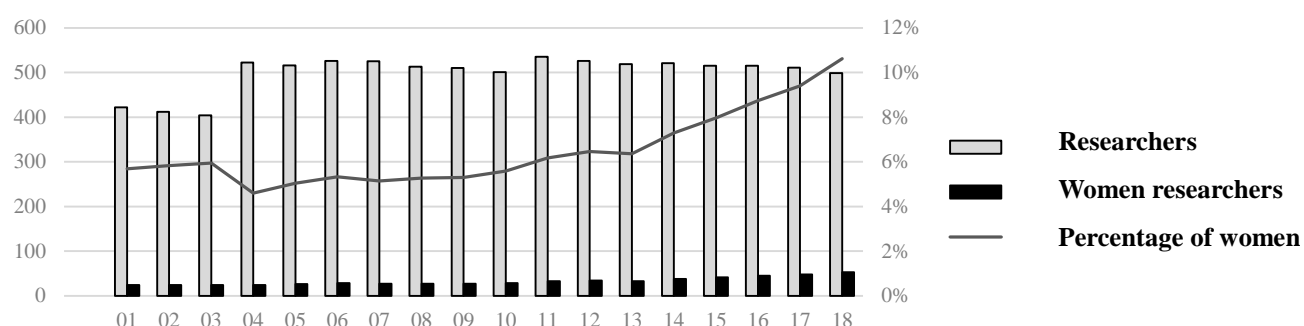


Fig. 1. Recent increasing trends for women researchers in the Japan Fisheries and Education Agency (FRA).

KEYWORDS

Decision-making levels, Fourth Gender Equality Basic Plan, Sustainable Development Goal (SDG) 5

Women in Fisheries: Sustainable Development Goals (SDGs) and Contributions to Research and Industry

Women in fisheries and aquaculture in Japan: Current achievements and future prospects in research and industry

Kaoru NAKATA
(Japan Fisheries Research and Education Agency)



5 GENDER EQUALITY

SUSTAINABLE DEVELOPMENT GOAL 5
Achieve gender equality and empower all women and girls

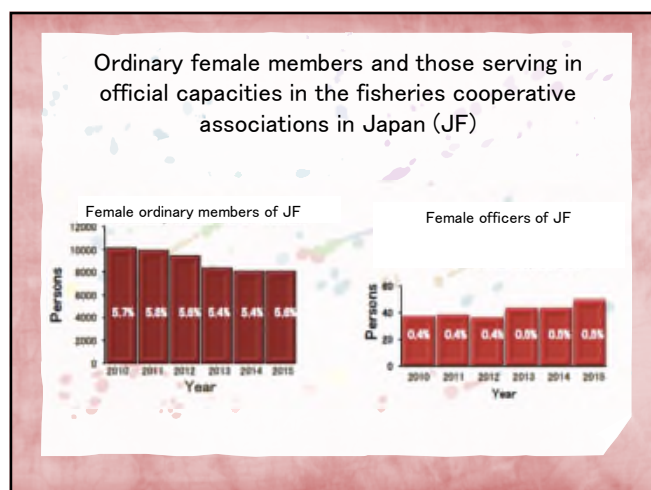
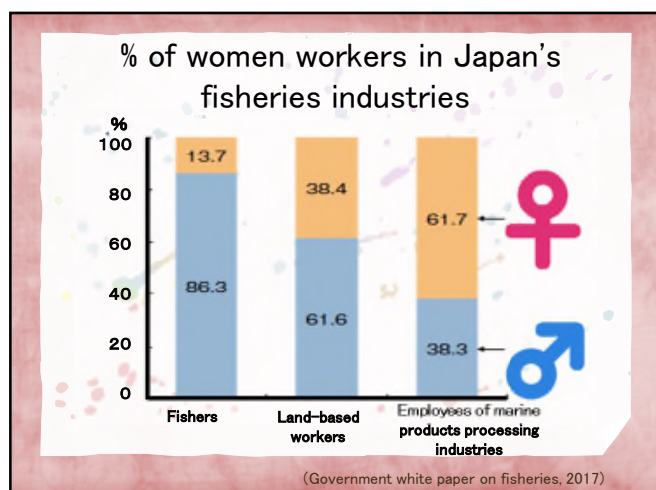
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Ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life

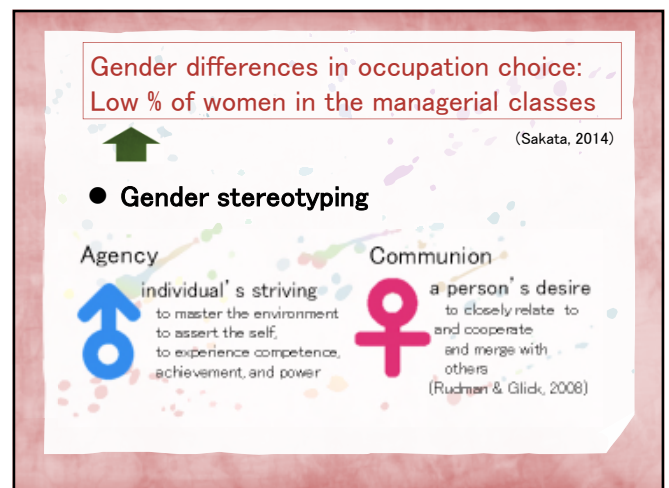
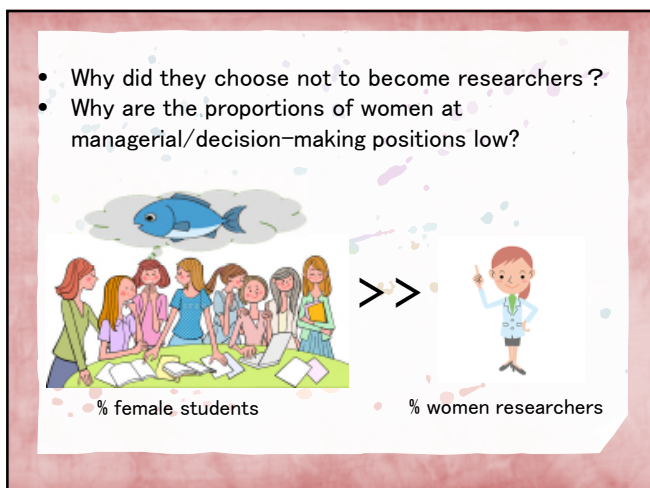
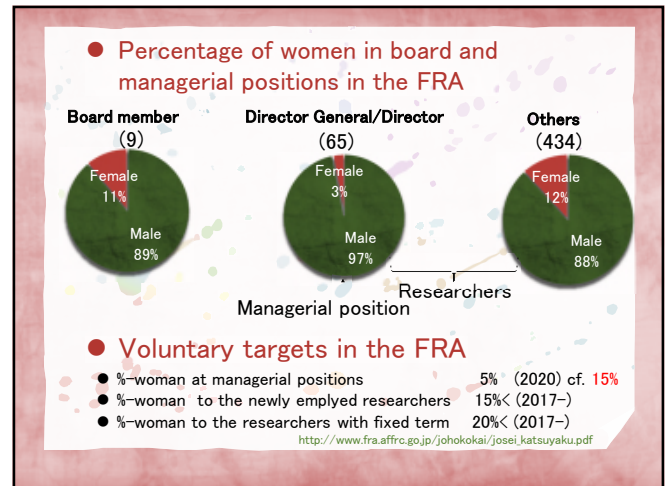
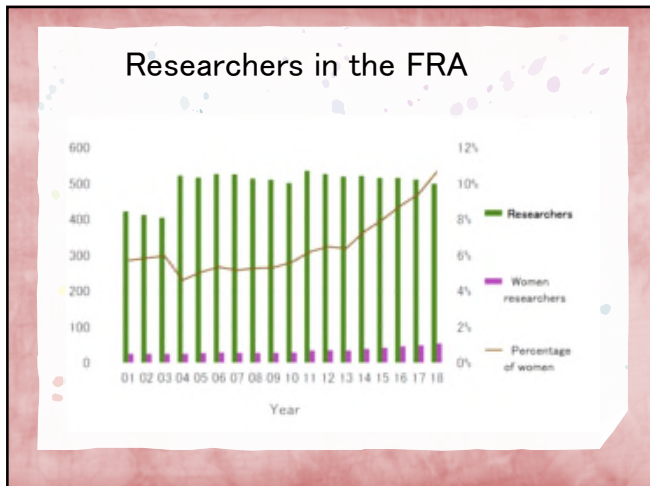
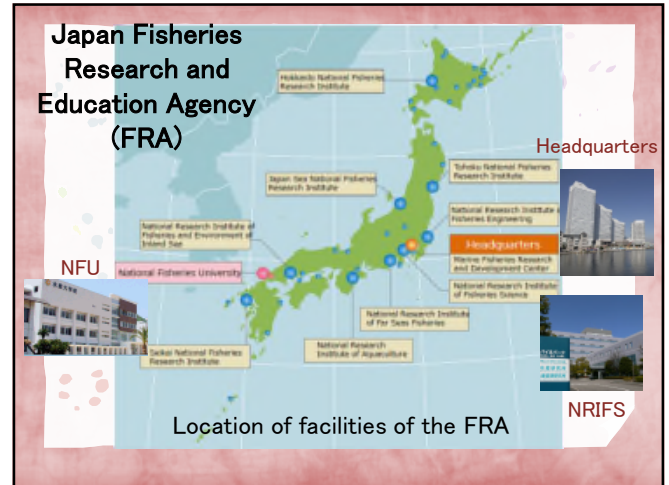
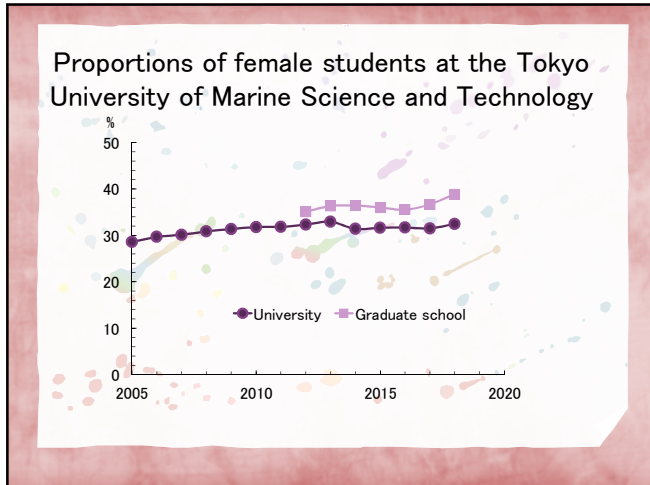
Today's topic

- Present state of women's participation at the decision-making level in the fisheries sector
- Merit-based increase of women at decision-making/managerial positions
- How to proceed in increasing participation of women in positions with leadership

Examples of numerical targets for the desired proportion of women in managerial positions under the 4th Gender Equality Basic Plan

Items	2015 (%)	2020 (%)
● Incorporated administrative agency		
Director and section chief	13.5	15
Board Member	10.5	13
● Private enterprise		
Section chief	9.2	15
Director	6.0	10





Gender differences in occupation choice: Low % of women in the managerial classes



● Gender stereotyping

Fields where men dominate

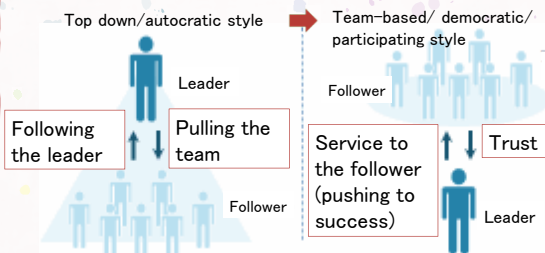
Women cannot feel that they belong to such fields

Decline of interests in such fields

- Numerical targets can be effective for promoting women's activities in the fisheries sector

Leadership

Changes in the image of effective leadership



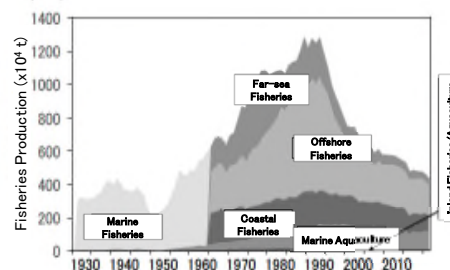
- The recent leadership image seems to fit with women's stereotypical characteristics, rather than men's
- Enlightenment on recent effective leadership style is important

What is management?

Director of the Marine Productivity Division (2009–2010)
National Research Institute of Fisheries Science (NRIFS)

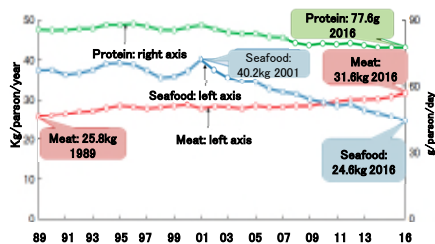
- *Management of researchers and their research
 - Discussion with each researcher to decide his/her annual plan
 - Advising to make his/her goals more appropriate and to obtain better results
- *Assisting the Director General
- *Building cooperative relationships with prefectural fisheries research centers
- *Responding to emergency situations in fisheries
ex. F1 NPP accident (2011, Mar.11–)

Severity of the fisheries industries in Japan (1)



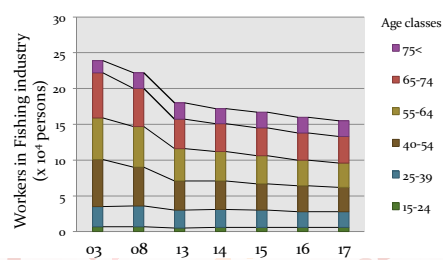
- Decrease in fisheries production

Severity of the fisheries industries in Japan (2)



- Decrease in seafood consumption

Severity of the fisheries industries in Japan (3)



- Decrease in workers in fisheries industries
- Predominance of elderly workers

For achieving sustainable fisheries

- Importance of having enough income to live by fishery-related work and to allow children to receive an appropriate education
- Problems of local fishery industries vary from region to region
- It is important for workers in the regional fishery industries to **think about** how to deal with the problems **for themselves**.
I'd like to earn my livelihood by fishing and have enough income to allow my children to receive an adequate education



For constructing local strategies to achieve sustainable fisheries

- Collecting information on measures taken at other places with similar problems, and sometimes cooperating with researchers is effective.
- Women are generally good at obtaining information by establishing networks



For researchers, it is worthwhile if their research results are utilized in the fisheries industries

Increase of women members at the decision-making level in the fisheries sector

- Because things of interest differ according to gender, an increase of women's participation will broaden the scope of view and help make various types of information more available.
- Easier introduction of various systems that meet women's needs => male-friendly, too.
- Increase of women at the decision-making level will be key to achieving a much-needed boost to Japan's fisheries sector.

Thank you!!



Session 1

Women in Fisheries Research

Chair:

Osamu Abe, JIRCAS



THE CONTRIBUTION OF FISHERIES IN ACHIEVING SDGS: PERSPECTIVES OF WOMEN RESEARCHERS

Yumiko Kura

WorldFish - Cambodia

Yumiko Kura is the Director of WorldFish in Cambodia. She is an environment and natural resource management specialist with over 20 years of research and program management experience in fisheries policy, aquatic resource management, and biodiversity conservation, and has worked in various countries throughout Southeast Asia and Africa. In this capacity, she has exerted a leadership role in multi-disciplinary research for development projects of various sizes, with funding from donors including the Asian Development Bank (ADB), the Australian Centre for International Agricultural Research (ACIAR), and the US Agency for International Development (USAID). Much of her recent work focuses on ecosystem-based fisheries co-management in wetlands and floodplains in the Mekong River Basin and Myanmar. She holds a Master's degree from Clark University (Massachusetts, USA). She is originally from Kanazawa, Japan, and has been based in Phnom Penh, Cambodia since 2005.



ABSTRACT

WorldFish is an international research organization with a mission to reduce poverty and hunger by improving fisheries and aquaculture. Our work focuses on sustainable small-scale fisheries and aquaculture in developing countries where impoverished persons rely on fish for purposes of livelihood and food security. When the Sustainable Development Goals (SDGs) came into effect in 2016, it was clear that WorldFish's work contributed most directly to Goal 14 - *Conserve and sustainably use the oceans, seas and marine resources*. However, a review of the specific targets of each SDG revealed a more complete picture. WorldFish puts people in the center of sustainable resource use and planning. That means that fish has an important role to play in nearly all of the SDGs, especially in terms of ending poverty (1), as well as achieving zero hunger (2), good health and well-being (3) and gender equality (4). Approaches to fisheries have been shifting from a focus on production technologies and yields, to scaling up and out to include questions around what is the role of fish in the context of household income portfolio, subsistence, nutrient supply, and governance (Curtin and Prellezo, 2010). When we put humans at the center, we also start to include questions of fair valuation of labor and benefit-sharing so that both women and men in different segments of society can enjoy equitable share of the benefits of this common pool resource, and a seat at the decision making table (FAO 2015). At WorldFish, we pursue gender as a cross-cutting theme, meaning we think it is important to apply a gender lense in all aspects of our work. WorldFish's researchers, both women and men, assess power dynamics and social norms that exist at community and household levels and create barriers for women to apply their knowledge and skills to solving the issues at hand. Then, by removing those barriers, we can begin to link our fisheries and aquaculture interventions with positive livelihood and nutritional outcomes at household and community levels (Cole, 2014). For the field of fisheries science to go the extra mile and become relevant to SDGs, researchers need to think out of the box and out of the comfort zones of their own individual expertise and space where they operate. Both male and female fisheries researchers need to build the skills and knowledge to apply gender transformative approaches to his or her work to ensure that research outcomes reach beyond fish production increases. Some examples of WorldFish's work illustrate practical applications of this thinking, including nutrition-sensitive fisheries and aquaculture, post-harvest value chains, and the role of fish in dietary diversity.

KEYWORDS

Benefit-sharing, Gender SDGs, Livelihoods, Nutrition


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The contribution of fisheries in achieving SDGs: Perspectives of women researchers

Yumiko Kura, WorldFish
JIRCAS International Symposium 2018
November 6, Tokyo, Japan


- About WorldFish
- Role of fish in SDGs
- Research questions relevant to SDGs
- WorldFish project examples

Outline

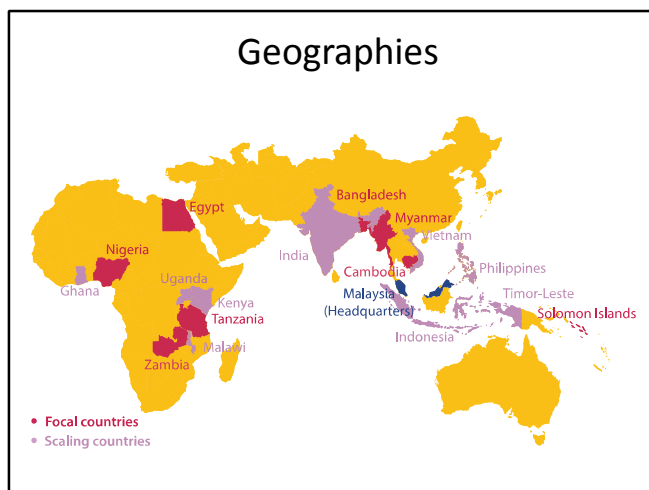
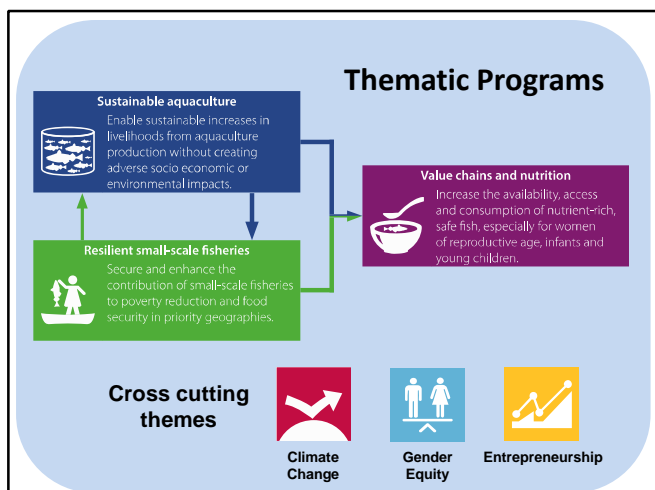



Mission

To reduce poverty and hunger by improving fisheries and aquaculture.



What We Do and Where



Fish contribution to the SDGs



Fish contribution to the SDGs



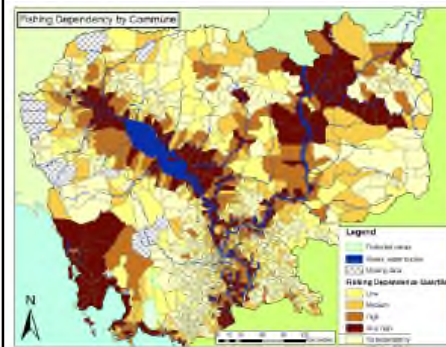
Fish for Income, Livelihoods, Jobs and Gender Equity (SDG 1, 5, 8)

800 million
people depend
on fisheries and
aquaculture for their
livelihoods

- Very poor often rely on fishing as a primary source of income
- Fishing is part of diverse income portfolio of rural households
- Fish value chains present opportunities to enhance gender equity and build income and assets of women and youth

漁業が途上国の農村の貧困層の生計安定と女性の経済参加に果たす役割は大きい

Distribution of Fishing dependent Communities in Cambodia



- 10-12% of GDP
- 50% of rural households involved in fishing at least occasionally
- 3-4 million dependent on fisheries
- 50% of the workforce in fishing sector are women

Sources: Mousset et al. 2016; Nasielski et al. 2013.

Fish for Food and Nutrition Security (SDG 2, 3)

Globally, more than
1 billion
people obtain most of
their animal protein
from fish

- 75% of the countries where fish contributes more than 1/3 of animal protein are -
- low-income food-deficit countries, where fish is often the cheapest and most accessible animal-source food.

世界中で10億人が動物性たんぱく質の多くを魚から摂取している

Hidden hunger

A Global Problem

途上国における貧血、ビタミン不足など
微量栄養不良の原因
は魚や肉などを含めた
多様な食生活を送
れていないから

2 BILLION
people worldwide
suffer from
hidden hunger,
or micronutrient
deficiencies

1 MILLION
children under five
die every year from
vitamin A and zinc
deficiencies

微量栄養不良は
子供の脳や体の発
育不良や免疫低下
などの健康問題を
引き起こす

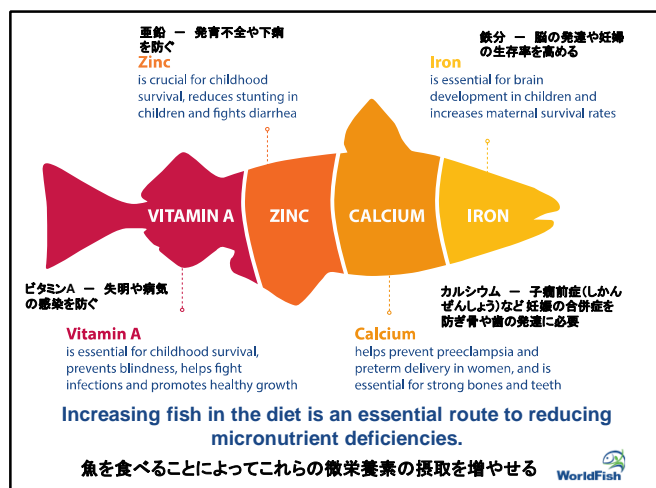
Micronutrient deficiencies are often caused by not eating a diverse diet including animal source foods like fish and meat and can lead to:

Impaired brain development in children
Adults who suffered from undernutrition as children earn 20% less than those healthy children who didn't

Stunting in children
450 million children will be affected by stunting in the next 15 years if current trends continue

Increased risk of diseases
Malnourished children are 10 x more likely to die from preventable diseases than healthy children





Role of Women in Food Security



- Women's fisheries work is a key part of household food security strategies
(Kawarazuka & Béné 2010)
- Women often primarily responsible for daily household food consumption
 - Directly through fishing (Bleige Bird 2007; Santos 2015)
 - Indirectly through fisheries income (Gnimadi 2004)
- Women sometimes expected to eat less or last
(D'Souza & Tandon 2015)

SDG contribution: research questions fisheries scientists are asking

Role of fish in income and livelihoods

- How do we maximize economic benefits of fisheries without overexploiting them? How do we implement this without overburdening women?
- How do we ensure equitable benefit-sharing of fisheries resources among stakeholders, including women, men, minority groups?

Role of fish in food and nutrition security

- What are production technologies that are nutrition-sensitive? How do we integrate new approaches into existing production systems and practices?
- How do we ensure that home consumption of fish result in improvements in nutritional conditions among women and children?

Rice Field Fisheries Project, Cambodia (Phase I: 2012-2016, Phase II: 2016-2021)

Project Leader – Yumiko Kura (F)

Objective

Improved food and nutrition security of poor and vulnerable rural households in the Tonle Sap region

Approaches

- Increase **wild fish** populations in rice fields by creating refuge habitats for fish in dry season
- Build local community capacity to manage fish refuges and rice field environment
- Promote home consumption of fish, balanced diet, hygiene, clean drinking water



Managing Aquatic Agricultural Systems to Improve Nutrition and Livelihoods in Bangladesh (2015-2018)

Project Leader – Shakuntala Thilsted (F)

Objective

Increase household income in poor, rural households Bangladesh and also improve nutrition through increased intake of nutrient-rich small fish

Approaches

- Integrating small indigenous fish species (SIS) in homestead pond polyculture of commercial fish with no additional cost or labor
- Fish harvesting tools suitable for women for daily food preparation



Community-based fisheries management project, Solomon Islands (Phase I: 2012 – 2016; Phase II: 2017 – 2021)

Component Leader – Joelle Albert (F)

Objective

To promote food and nutrition security in the Pacific food system through improved management and use of fish

Approaches

- Mixed survey method targeting women and young children to understand dietary diversity and their perspectives on nutritional issues
- Action research with communities to test interventions to improve dietary diversity and strengthening the role of fish, e.g.
 - Cooking classes, backyard vegetable gardening, health and sanitation awareness



Improving Livelihood Security & Gender Relations in Rural Zambia through Post-Harvest Fish Value Chain Innovations & Social Change Interventions (2015-2017)

Project Leader – Steven Cole (M)

Objective

1.Design and test **improved post-harvest fish processing technologies** with people in fishing camps in the Barotse Floodplain to help reduce losses

2.Adopt **gender accommodative and transformative approaches** and test their contribution to improving gender relations in the capture fishery value chain

Left pictures: salting technology. Right picture: communication tool (drama skits that surface harmful gender norms and power relations in the capture fishery value chain)

Thank you for your attention!

For more information please contact:
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20

R&D FOR SUSTAINABLE AQUACULTURE DEVELOPMENT TOWARDS FOOD AND NUTRITION SECURITY IN SOUTHEAST ASIA

Evelyn Grace de Jesus Ayson

**Southeast Asian Fisheries Development Center/Aquaculture Department
(SEAFDEC/AQD)**

Evelyn Grace de Jesus Ayson is a Scientist at the Southeast Asian Fisheries Development Center/Aquaculture Department (SEAFDEC/AQD), and is involved in R&D projects on the breeding, hatchery, nursery and grow-out production of marine fish (e.g. grouper, snapper, seabass, pompano, milkfish and rabbitfish) including evaluation of the impact of climate change on reproduction and recruitment of marine fish larvae. She also oversees the marine fish breeding and hatchery operations at SEAFDEC/AQD. Dr. de Jesus Ayson was the Head of the Research Division from 2006 until 2011 and from 2015-2017. As Head of the Training and Information Division from 2012-2015, she was responsible for implementing the various training programs and information dissemination activities of the Department, as well as developing strategies to enhance its information dissemination initiatives and improve the visibility of SEAFDEC/AQD to its stakeholders. She is actively involved in the technology transfer initiatives of SEAFDEC/AQD and serves as a resource person in SEAFDEC/AQD's national and international training courses.

Dr. de Jesus Ayson obtained her Master of Science and Ph.D. degrees from the Ocean Research Institute (now Atmospheric and Ocean Research Institute) of the University of Tokyo, while receiving scholarships from the Japanese Ministry of Education, in 1990 and 1993, respectively.



ABSTRACT

The Aquaculture Department of the Southeast Asian Fisheries Development Center (SEAFDEC/AQD) is one of the Technical Departments of SEAFDEC, a regional treaty organization established to promote fisheries development in the region. AQD's mandates include the pursuit of research to generate aquaculture technologies; develop managerial, technical and skilled manpower for the aquaculture sector; and produce and disseminate relevant information. The programs of AQD address important constraints to aquaculture development including 1) supply of good quality seeds; 2) development of high quality feeds, evaluation and promotion of the use of alternative ingredients that can replace fish meal as a protein source, and promotion of sustainable feeding practices; 3) health management; 4) maintaining environmental integrity; 5) adaptation to climate change; and 6) ensuring that technological developments benefit all segments of the aquaculture production sector, including small-scale farmers. These are aligned with the needs and priorities of ASEAN Member States (SEAFDEC Member Countries) identified during the "Regional Technical Consultation on Sustainable Aquaculture Development for Food Security in Southeast Asia Towards 2010 and the ASEAN-SEAFDEC Conference on Sustainable Fisheries for Food Security Towards 2020: Fish for the People" that was convened in 2010 and 2011, respectively. AQD programs cover several aquaculture commodities (fish, crustaceans, mollusks) and farming systems for both large- and small-scale aquaculture. The capacity building programs include training which could be 1) regular or specialized training courses conducted either on station or on-site that are designed for specific commodities and culture phases, in consideration of the requirements and needs of the requesting stakeholder; 2) internships; or 3) on-the-job training for students of fisheries and aquaculture programs/technical assistance designed for institutional capacity development as well as for entrepreneurs. SEAFDEC/AQD is an equal opportunity workplace. The realization of its work programs is anchored partly on the significant contribution of its female workforce in research, technology development, technology dissemination and capacity building programs for the region and beyond.

KEYWORDS

Capacity building, Information dissemination, Sustainable aquaculture, Women in aquaculture

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R&D for sustainable aquaculture development
towards food and nutrition security in
Southeast Asia



Evelyn Grace de Jesus-Ayson

Outline

- SEAFDEC/AQD's R&D Programs
- Capacity Building Programs
- Contribution of women to SEAFDEC/AQD's programs

SEAFDEC/AQD's mandate



- promote and undertake aquaculture R&D that is relevant and appropriate to the SE Asian region
- develop human and institutional resources for sustainable aquaculture development
- disseminate and exchange information on sustainable aquaculture

SEAFDEC/AQD's Facilities/Stations



Tigbauan Main Station, Iloilo



Dumangas BW Station, Iloilo



Binangonan FW Station, Rizal



Igang Marine Station, Guimaras

SEAFDEC/AQD Programs

- ✓ Department Programs
- ✓ Programs under the Fisheries Consultative Group (FCG) Mechanism



Programs under the FCG mechanism

- ✓ Reinforcement and optimization of fish health management and effective dissemination in the SE Asian region
(5 research projects and 1 region-wide capacity building program)
- ✓ Environment-friendly, sustainable utilization and management of fisheries and aquaculture resources
(4 research projects, 2 training programs)

Department Programs

- ✓ Producing quality seed
(breeding and seed production)
- ✓ Promoting healthy and wholesome aquaculture
(nutrition and feed development; feeding and health management; food safety)
- ✓ Maintaining environmental integrity
(farming systems; environmental impacts; mitigation)
- ✓ Adapting to climate change
(impact on breeding, farming; mitigation)
- ✓ Meeting socio-economic challenges of aquaculture
(community/PO/family-based; livelihood; TURFs)

Challenges to Sustainable Aquaculture

- ✓ Seed supply
- ✓ Feeds
- ✓ Diseases
- ✓ Environmental impacts
- ✓ Inclusive growth and development

Commodities

- ✓ Marine fish
- ✓ Freshwater fish
- ✓ Shrimps and crabs
- ✓ Mollusks (abalone, oysters)
- ✓ Seaweeds
- ✓ Others (sandfish, seahorse, plankton)



Approach

- Full-cycle aquaculture
- Captive breeding
 - Seed Production
 - Nursery
 - Growout
- * in all appropriate culture environments
- * Feed development for various life stages
- * Health management
- * Economic feasibility

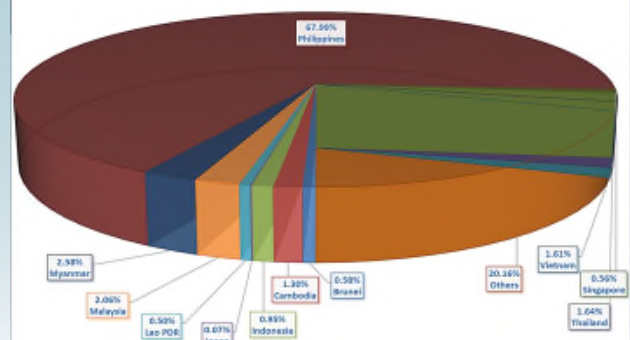


Capacity Building Programs - Training

- Regular training (commodity-based)
- On-site training
- Specialized training
- E-Learning
 - aquaculture nutrition
 - fish health management
- On-the-Job Training
- Internship



COUNTRY DISTRIBUTION, 1974 - 2018



From 1974-2018: 11,637 trainees; @ 68% are Filipinos

Capacity Building Programs – Technical Assistance

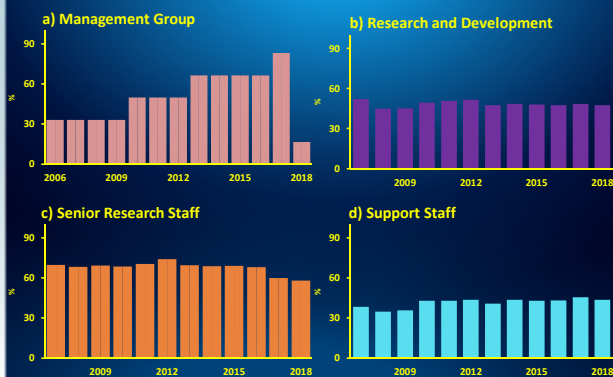
- Institutional Capacity Development for Sustainable Aquaculture (ICDSA)
 - partnership with LGUs, NGOs, POs, academe, government agencies
- Agree-Build-Operate-Transfer AquaNegosyo (ABOT)
 - for entrepreneurs



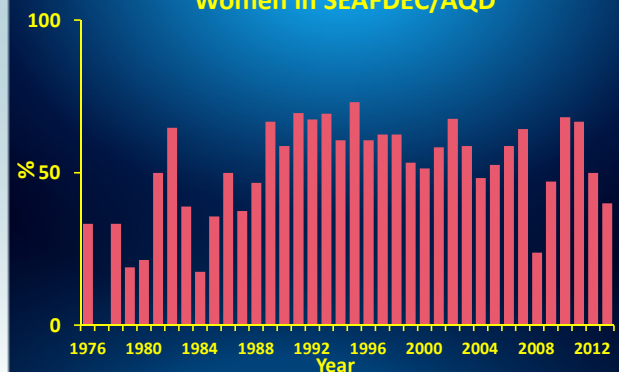
Outline

- SEAFDEC/AQD's R&D Programs
- Capacity Building Programs
- Contribution of women to SEAFDEC/AQD's programs

Women Involvement in SEAFDEC/AQD



Primary Publications Authored by Women in SEAFDEC/AQD



SEAFDEC/AQD's Women in Technology Extension Services



- Introduced technologies on:
- Cage culture of milkfish and other marine fish, especially grouper
 - Nursery and grow-out culture including fattening of mud crab
 - Grow-out culture of oyster
 - Seaweeds farming
- Also introduced seaweeds recipes for small business enterprise for women or for home consumption

SEAFDEC/AQD's Women in Technology Dissemination Activities



- Full cycle aquaculture of Mudcrab
- Establishment of mud crab hatcheries, grow-out farms and softshell crab production facilities in the Philippines
 - Technical assistance to the Governments of India, Bangladesh, Timor Leste and Tanzania

SEAFDEC/AQD's Women in Technology Dissemination Activities



Seaweeds farming

- Field testing of plantlets from clonal production and tissue culture in different regions in the Philippines
- Training of BFAR staff and technical assistance in the establishment of seaweeds tissue culture laboratories in major seaweeds production areas

SEAFDEC/AQD's Women in Technology Dissemination Activities



Promotion of community-based aquaculture and stock enhancement programs

- Resource enhancement of abalone and sandfish
- Integrated multitrophic aquaculture (milkfish, seaweeds and sandfish)
- Integrated hatchery and grow-out culture of giant freshwater prawn



DEVELOPMENT OF NEW AQUACULTURE AND SEED PRODUCTION TECHNOLOGY FOR COMMERCIALY-IMPORTANT SHRIMP SPECIES: RESEARCH AT JIRCAS

Bong Jung Kang

Japan International Research Center for Agricultural Sciences

Bong Jung Kang serves as Research Scientist at the Japan International Research Center for Agricultural Sciences (JIRCAS). She received an undergraduate degree in Biology from Dong-Eui University (South Korea), and a Ph.D. in Biomolecular Sciences from Okayama University, and after which she conducted postdoctoral study at Okayama University and JIRCAS prior to her current position. Dr. Kang previously conducted research on the elucidation of vitellogenin structure pertaining to reproductive mechanisms in crustaceans and fish. Currently, her research focuses on the development of new technology for the promotion of shrimp maturation in captivity using economically-important prawn/shrimp species. She has authored numerous research papers in her field, and has recently provided an entry for the authoritative Encyclopedia of Reproduction (2nd Edition), which is published only once every twenty years.



ABSTRACT

Shrimp culture is a significant component of the world's fisheries industry, and is conducted widely in South/Southeast Asian countries. Penaeid shrimp species are mainly targeted in such endeavors, and among these, the whiteleg shrimp, *Litopenaeus vannamei*, constitutes more than 80% of the world's total production. In order to support this very large shrimp farming industry, it is essential to produce sufficient quantities of juvenile shrimp. To this end, eyestalk ablation is frequently used in commercial hatcheries in order to induce ovarian maturation and spawning. However, eyestalk ablation exhibits adverse effects, such as increased mortality rates and deterioration of egg quality; moreover, it has received a great deal of criticism from the viewpoint of animal welfare by the general public. Therefore, it is urgent to develop a means of promoting maturation based on the understanding of the physiological functioning of the animal, in order to establish a more effective means of seed production for species such as *L. vannamei*.

With the goal of contributing to the promotion of a more sustainable shrimp farming industry, the Japan International Research Center for Agricultural Sciences (JIRCAS) is implementing a research project entitled "Development of advanced seed production and culture technology for economically-important shrimp species based on elucidation of reproductive mechanisms". This project is being carried out with the aim of elucidating mechanisms of maturation, with the ultimate goal of developing reproductive-stimulating technology that could potentially replace eyestalk ablation.

Many aspects of crustacean reproduction and the associated mechanisms in shrimp remain unclear; however, it is well-known that ovarian maturation is regulated negatively by neurohormones such as vitellogenesis-inhibiting hormone (VIH). VIH is synthesized at the X-organ/sinus gland complex, a neurosecretory organ located in the eyestalks. It is then secreted into the hemolymph, after which it acts negatively on reproduction by inhibiting vitellogenin (Vg) synthesis. Vg, which is the precursor of the major egg yolk protein in oviparous animals, is synthesized at the hepatopancreas and ovary, secreted into the hemolymph, and then accumulated in developing oocytes.

Studies at JIRCAS have utilized *L. vannamei* as a model animal; the principle aim of research up to now has been focused on acquiring basic information necessary for understanding reproductive mechanisms in further detail. For example, we have developed measurement systems for VIH and Vg, and have examined their relative dynamics in context of molting and eyestalk ablation in *L. vannamei* (Kang et al. 2014). In another paper, we clarified the structure of multiple VIH genes present in *L. vannamei*, and elucidated their expression levels in the eyestalks in relation to molting and unilateral eyestalk ablation (Kang et al. 2018). The results of such research will be presented in detail during the presentation, along with discussion of other endocrine factors besides VIH that potentially control ovarian maturation in shrimp. The over-arching aim of this research is to provide useful technology to developing regions of the world where shrimp culture is an important industry.

KEYWORDS

Litopenaeus vannamei, Shrimp, Vitellogenesis-inhibiting hormone (VIH), Vitellogenin (Vg)

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JIRCAS International Symposium 2018

Development of new aquaculture and seed production technology for commercially-important shrimp species: Research at JIRCAS

Japan International Research Center for Agricultural Sciences
Bong Jung Kang

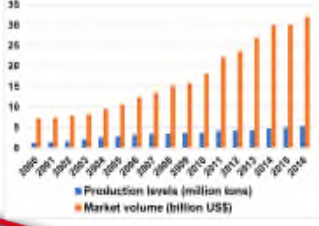
Nov. 6, 2018



World-wide trends in shrimp culture

- Annual production levels: 5 million tons; market volume: 30 billion US dollars.
- Most significant species: whiteleg shrimp (*Litopenaeus vannamei*).
- World-wide industry: 75% occurs in South and Southeast Asia.
- More than half of all shrimp consumed world-wide is provided by aquaculture.


Shrimp production (2016)




■ Production levels (million tons)
■ Market volume (billion US\$)

[FAO Statistics (<http://www.fao.org/fishery/statistics/global-aquaculture-production/query/en>)]

Shrimp species (2016)



■ *Penaeus monodon* ■ *Penaeus japonicus*
■ *Litopenaeus vannamei* ■ Others



Background

Major problems


- 1) Adverse environmental impact**
 - Destruction of mangrove forests
 - Self-pollution
- 2) Disease outbreak**
 - White spot syndrome virus (WSSV)
 - Early mortality syndrome (EMS)
- 3) Difficult to induce female reproduction in captivity**
 - Unstable seed production

Solutions

- Promotion of recirculating aquaculture systems (RAS)
- Use of specific pathogen-free (SPF) brooders and seed
- Elucidation of reproductive mechanisms
- Development of new techniques to control ovarian maturation in captivity

Approaches at JIRCAS

- ◆ Development of environmentally-friendly, consumer-safe shrimp culture systems
- ◆ Development of an efficient, animal-friendly seed production technology





◆ Development of environmentally-friendly, consumer-safe shrimp culture systems

▶ The Indoor Shrimp Production System (ISPS) [FY2004 ~ 2008]

- ISPS No. 1 (Myoko City, Niigata Pref., Japan)
- Japan International Research Center for Agricultural Sciences (JIRCAS)
- IMT Engineering, Inc.
- National Research Institute of Aquaculture
- Higashimaru, Co., Ltd.

Japan's first commercial recirculating shrimp culture facility:

Copyright 2016 IMT Engineering, Inc. All Rights Reserved.

◆ Development of an efficient, animal-friendly seed production technology


Why we need new technology to promote ovarian maturation:

Requirements

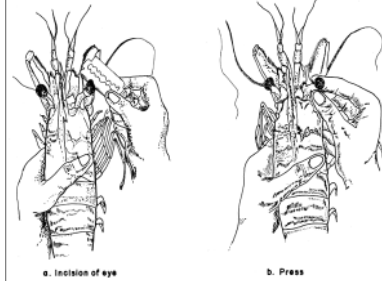
- Approximately 200 billion post-larvae (juvenile shrimps) are produced world-wide annually to support the 5 million tons of *L. vannamei* that are produced annually.
- For example, 800,000 adult broodstock pairs are produced and exported from the state of Hawaii (From: Shrimpnews.com, Feb. 3, 2016; "Hawaii-SPF broodstock exports set record in 2015").

Artificial maturation

- How: Eyestalk ablation
- Why: Ovarian maturation and spawning are difficult to control in captivity; eyestalk ablation causes a higher proportion of shrimp to mature



Conventional technology: eyestalk ablation




a. Incision of eye b. Press

"Along with cutting and squeezing the prawn's eye, other methods including cauterisation (cutting the eyestalk with a heated blade or forceps) and ligation (tying a thread or wire around the eyestalk causing it to fall off after a few days)."

Quote from: *Animals Australia* for a kinder world
(<https://www.animalsaustralia.org/features/prawn-farming.php>)

Figure referenced from: FAO Training Manual (1985) Shrimp Hatchery Design, Operation and Management

- Female broodstock normally produce up to 250,000 nauplii.
- Females subjected to eyestalk ablation can be used over several spawning cycles for 4 to 4.5 months.
- Fecundity drops gradually after several months and females are then discarded.



Adverse effects of eyestalk ablation


From: Animals Australia for a kinder world (<https://www.animalsaustralia.org/features/prawn-farming.php>)

The shocking practice that shows prawn farming is as cruel as factory farming

"The shocking practice that shows prawn farming is as cruel as factory farming"

- Increased mortality rates
- Deterioration of egg quality
- Criticism from the viewpoint of animal welfare by the general public

New reproductive-stimulating technology is required to replace eyestalk ablation



Female prawns in prawn farms have their eyes sliced open or cut off.

JIRCAS

Outline of research project

JIRCAS Fourth Medium to Long-Term Plan (FY2016–2020)

Goal-Oriented Basic Research

- Basic research aimed to develop technologies that will lead to future innovation
- Novel technology development for the creation of new food industries

Project

- Development of advanced seed production and culture technology for economically-important shrimp species based on elucidation of reproductive mechanisms

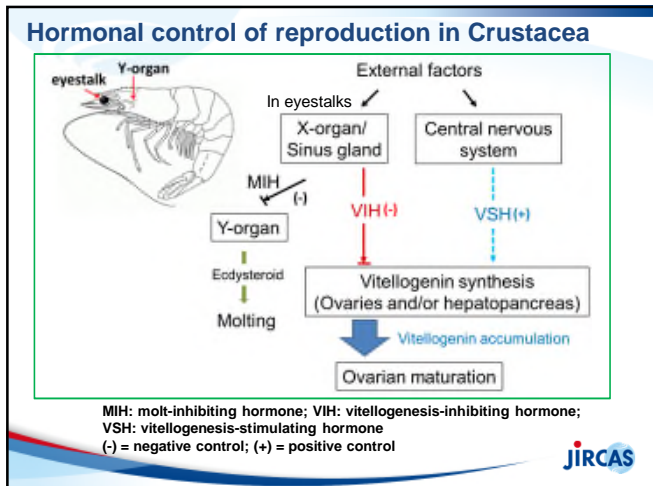
Purpose

- Development of new techniques to promote ovarian maturation and seed production in captivity

Approach

- Elucidate reproductive mechanisms in shrimp/Crustacea
- Develop technology based on the biological functioning of maturation-regulating factors

JIRCAS



Research results (1): Identification of VIH in *Litopenaeus vannamei*

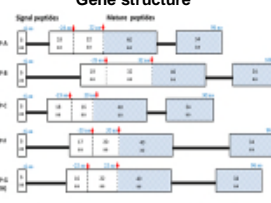
Subphylum: Crustacea
Family: Penaeidae

- Most significant penaeid shrimp species farmed worldwide
- Frequently used research species in physiological studies

Sinus gland peptides (SGP) in *L. vannamei*

Name of peptide	VIH activity	Gene information
SGP-A	○	×
SGP-B	○	×
SGP-C	○	○
SGP-D	×	○
SGP-E	○	×
SGP-F	○	×
SGP-G	○	○

Gene structure



[Kang et al., 2018. Fisheries Science, 84: 649-662]

Research results (2): Establishment of a measurement system for Vg and VIH levels in the hemolymph

Time-resolved fluoroimmunoassay for vitellogenin (Vg)

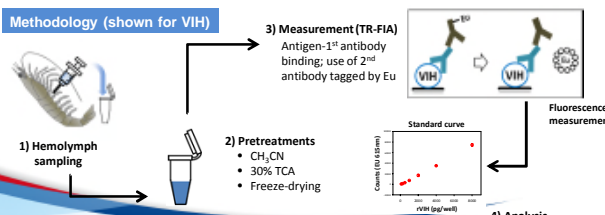
- Can quantify Vg from low volumes of hemolymph ($\geq 0.1 \mu\text{L}$).
- Possible to assess maturity levels in female shrimp.

Time-resolved fluoroimmunoassay for vitellogenesis-inhibiting hormone (VIH)

- High sensitivity; lowest detectable quantity is about 9 pmole of VIH.
- Possible to examine the relationship of VIH levels with maturation.

Methodology (shown for VIH)

- Hemolymph sampling
- Pretreatments
 - CH_3CN
 - 30% TCA
 - Freeze-drying
- Measurement (TR-FIA)
 - Antigen- 1^{st} antibody binding; use of 2^{nd} antibody tagged by Eu
- Analysis



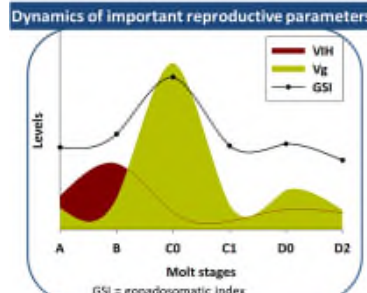
Standard curve

Fluorescence measurement

Research results (3): Dynamics of Vg and VIH in relation to molt stage

- In adults, Vg and VIH (SGP-G) levels fluctuate according to molting stage.
- Vg is induced after a surge of VIH (SGP-G) levels at molt stage B, and reaches a peak at molt stage C.

Dynamics of important reproductive parameters




GSI = gonadosomatic index

[Wilder, M.N., Kang, B.J., Higano, J. (2018). Vitellogenesis & Yolk Proteins, Crustaceans and Molluscs, In: Volume 6: Comparative Reproduction, The Encyclopedia of Reproduction. Elsevier, pp. 290-296.]

JIRCAS

On-going and future research

"A method of releasing the suppression of egg maturation in economically-important prawn/shrimp species"



Patent-pending

Suppresses the expression of the VIH gene, thus making it easier to induce ovarian maturation

X-organ / sinus glands (eyestalk)

~~(Vitellogenesis-inhibiting hormone: VIH)~~

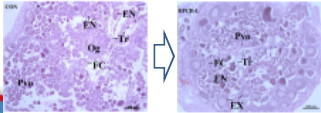
↓

Ovary / Hepatopancreas

Removal of the influence of inhibitory factors

✓ **Search for maturation-promoting factors**

- Candidate: red pigment-concentrating hormone (RPCH)



RPCH is:

- A peptide consisting of 9 amino acid residues.
- Expressed in multiple tissues including the eyestalks.
- Involved in the control of body color.
- Found to be involved in ovarian growth.

Increase in oocyte diameter after RPCH injection [Chen et al., 2018. Aquaculture, 495: 232-240]

Conclusions


This research has made possible the following:

- ✓ Elucidation of the dynamics of Vg and VIH in the hemolymph according to molt stage and the related process of ovarian maturation.
- ✓ Elucidation of the expression levels of Vg and VIHs in relation to molt stage and the related process of ovarian maturation.
- ✓ Artificial suppression of VIH gene expression.

Further work

- Search for the putative vitellogenesis-stimulating hormone (VSH).
- Development of new methods for promoting ovarian maturation in captivity.

We hope to develop new technologies that can be used in hatcheries in major shrimp-producing countries in line with JIRCAS's mission of "To undertake comprehensive research in agriculture, forestry and fisheries, and assist related industries in developing regions".



Thank you for your attention



www.jircas.go.jp

Session 2

Women On-site in Fisheries and Aquaculture

Chair:

Masayoshi Saito, JIRCAS



ACTIVITIES OF WOMEN IN FISHING COMMUNITIES STARTING BUSINESSES IN JAPAN

Izumi Seki

The School of Marine Science and Technology, Tokai University

Izumi Seki was born in Tokyo, Japan. She received her undergraduate degree in Sociology from Tokai University, and Ph.D. in Social Engineering from Hokkaido University. Since 2009, Prof. Seki has worked in her current capacity at Tokai University's School of Marine Science and Technology in the Department of Maritime Civilization. Prof. Seki's interests extend to the lifestyle, culture and activities of people in fishery and fishing communities, and she has traveled widely to conduct research on such communities throughout Japan. Recently, Prof. Seki has been pursuing research on fishing community tourism as a new form of industry complementing regional fishery activity, and has further investigated how entrepreneurial activity is being pursued by women in fishing communities. In addition, Prof. Seki and collaborators have established a group supporting women's activities in fishing communities. This group holds workshops and symposiums targeting women in fishing communities, and provides useful information for women who wish to start a business.



ABSTRACT

Until the present, women in fishing communities in Japan have supported community life and the fisheries industry without a visible presence; however, in recent years, many women have actively started appearing on the stage, taking advantage of various crises and other opportunities occurring in fishery and fishing communities to make viable contributions. Here, I report on the issues and prospects related to their activities.

Since investigation in a formal capacity has not been extensively conducted, many points remain unclear points concerning the actual conditions/activities of businesses being started by women in fishing communities. However, according to a questionnaire-format survey conducted by the Tokyo Fisheries Promotion Foundation in 2010, it was confirmed that there were 364 counts of businesses being initiated by women in fishing communities throughout the country. The Japan Fisheries Cooperative Association (JFCA) is an organization that is specifically responsible for promoting such activities, and they have stated that 65.8% of these activities are related to women's groups within the JFCA. Of these, 15.2% are newly-created organizations, and among these, there are many examples of corporate entities including limited liability companies or joint stock corporations. According to the results of the survey, sales related to processing/manufacturing and processed goods exceeded 60% of total sales. This was followed by 22% of sales being related to that of fresh fish/live fish, after which 9.9% of total sales was related to cafeteria management, and 8.2% to lunch delivery/sales.

The primary purpose of such business activities conducted by women is to stabilize household income even a little, where the householder is often a fisherman with an unstable income; furthermore, there is often the goal of making women more economically independent. However, such women's activities are not for money alone. What motivates women to undertake such activities is to give other women in the community the opportunity to work in and contribute to the community, and to not waste the fish that their husbands and sons have caught from the ocean, often under life-threatening circumstances. These women truly want to help consumers to understand more about fish and our precious fisheries resources. In this way, we believe that these women's contributions are essential to maintaining a healthy demand for fishery products in this country.

Regarding the challenges faced by such women in starting businesses, there are many issues and obstacles faced, such as sluggish sales, lack of successors, and lack of information and public support. However, there are many positive cases which have served to highlight product development, sales expansion, and the incorporation of new talent into current areas and activities. Such endeavors have also been undertaken with much enthusiasm by younger women members of the fishing community in recent years. Such young women are highly proficient in gathering and disseminating information using the Internet and SNS, and this has greatly impacted women's activities thus far.

Women of Japan's fishing communities think very seriously about the future of their home areas and fishery industries, and engage in these activities with pleasure and satisfaction, knowing that what they do is highly worthwhile. In conclusion, businesses promoted by women in the fishing community are true opportunities to encourage women's independence in the real sense of the word.

KEYWORDS

Activities in starting businesses, Continuance of activities, Encouragement of women's independence, Quality of life, Women in fishing communities

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ACTIVITIES OF WOMEN IN FISHING COMMUNITIES STARTING BUSINESSES IN JAPAN

IZUMI SEKI

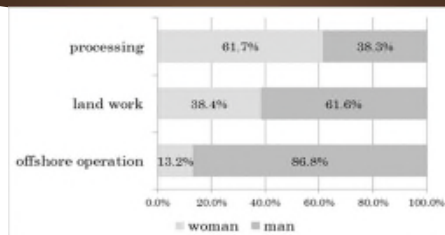
TOKAI UNIVERSITY THE SCHOOL OF MARINE SCIENCE AND TECHNOLOGY

ACTIVITIES OF WOMEN IN FISHING COMMUNITIES STARTING BUSINESSES IN JAPAN

- ▶ 1 Relationship between fisheries and women in Japan
- ▶ 2 Actual conditions of starting businesses by women in fishing communities in Japan
- ▶ 3 Purpose of starting business activities
- ▶ 4 Problems surrounding women's activities
- ▶ 5 Significance and perspectives of activities

Relationship between fisheries and women in Japan

The percentage of women engaged in work related to the fisheries industry in 2013



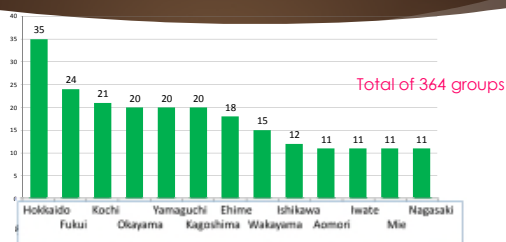
Fisheries Census 2013

Relationship between fisheries and women in Japan



Actual conditions of starting businesses

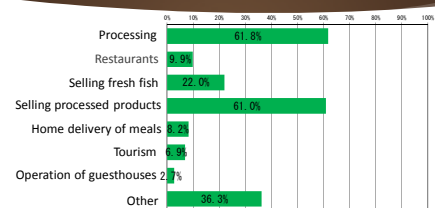
Prefectures with many women's business groups



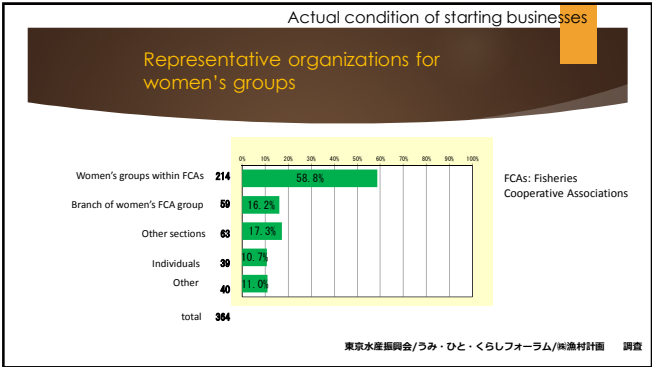
東京水産振興会/うみ・ひと・くらしフォーラム/県漁村計画 調査 2010年

Actual conditions of starting businesses

Activity content



東京水産振興会/うみ・ひと・くらしフォーラム/県漁村計画 調査



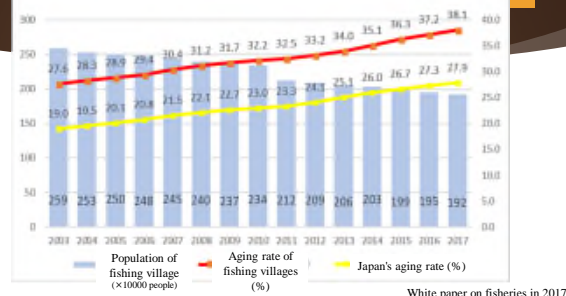
PROBLEMS SURROUNDING WOMEN'S ACTIVITIES

Problems surrounding women's activities

- ▶ Lack of information: for example, regarding financial support projects
- ▶ Human relations: area-related human relations; family-related cooperation
- ▶ Advanced age of women engaging in activities
- ▶ It is sometimes difficult for women to express their opinions in public

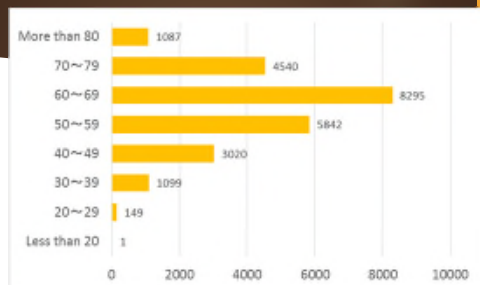
PROBLEMS SURROUNDING WOMEN'S ACTIVITIES

Changes in population and aging rate of fishing communities



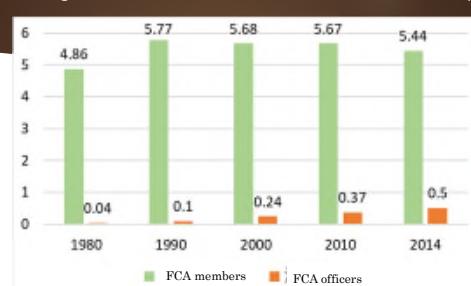
PROBLEMS SURROUNDING WOMEN'S ACTIVITIES

Age group composition of women's groups in FCAs in 2017



PROBLEMS SURROUNDING WOMEN'S ACTIVITIES

Percentage of women as FCA members and officers (%)



SIGNIFICANCE AND PERSPECTIVE OF ACTIVITIES

Many women have chosen fisheries as their occupation



Photo provided by Momoko Maeda

SIGNIFICANCE AND PERSPECTIVE OF ACTIVITIES

Young women find personal fulfillment in starting a business

Saori Masuda is married to a prawn farmer, and is committed to expanding sales channels. She has also received prizes at the national/ministerial level (for example, 2018 Prize of the Minister of Agriculture, Forestry and Fisheries for Outstanding Women Entrepreneurs).

Currently in collaboration with neighboring vendors, she is responsible for the sale of more than 300 items produced by over 100 vendors.



CREATION WEB PLANNING Corporation
Representative Director Saori Masuda

Honda Smile Mission HP

<https://www.tfm.co.jp/smile/reports/kumamoto/20180410/>

SIGNIFICANCE AND PERSPECTIVE OF ACTIVITIES

Young people migrate to new areas and start their own businesses

Establishment of "TOBISHIMA" (a limited liability company) by young people (returnees: "U-turn" and newcomers: "I-turn")

- Listening to stories of the island (seeing how people actually live, observing the local culture)
- Making processed goods (learning island traditions)
- Management of cafes and restaurants
- Promoting tourism: "Island Experience Tour"
- Helping to promote successors for fisheries endeavors, and hospitality-related businesses

Thank you for your attention

WOMEN IN AQUACULTURE: STORIES FROM THE FIELD

Bonnie Waycott

The Fish Site, 5M Publishing

Bonnie Waycott was born in the United Kingdom, grew up in Japan for five years as a child and became interested in marine life when her father taught her to snorkel on the Sea of Japan coast near her mother's hometown. After graduating from the University of Cardiff with a degree in Japanese and French, she returned to Japan in 2006 and worked as an NHK narrator until 2017 on News 7, NewsWatch 9 and Today's Close Up.

More recently, Ms. Waycott received an M.Sc. in Sustainable Aquaculture from the University of St. Andrews in Scotland. Her thesis (with distinction) focused on aquaculture recovery after the 2011 Great East Japan Earthquake and Tsunami and how Japan may serve as an example to other countries that are vulnerable to natural disasters.

Today, having brought together her extensive media experience and interest in marine life, she serves as an aquaculture and fisheries writer for aquaculture magazines and websites including The Fish Site in the UK.



ABSTRACT

Today, most of the world's capture fisheries are thought to be fully or overexploited (Finegold, 2009), while climate change and population growth are becoming increasingly significant issues that are likely to impact future global food security. Amidst this, aquaculture is seen as an innovative and sustainable way of producing more food and meeting the rising demand for fish.

As aquaculture continues to grow further, the need to manage its possible impacts (e.g. ecological, social) will become even more important. One way for aquaculture to make a positive impact is to involve more female scientists. According to a 2015 report published by the UN Food and Agriculture Organisation (FAO) titled "The Role of Women in the Seafood Industry," women make up half of the seafood industry's total working population worldwide and are essential contributors with key roles in fisheries, aquaculture, seafood processing and other related services. However, in the case of aquaculture, although 70% of the global workforce is female, some women have limited access to opportunities and resources (Monfort, 2015).

In order to promote women in the aquaculture industry, The Fish Site, an aquaculture and fisheries website in the UK, started a new series called Women in Aquaculture in January 2018, to shed light on the participation of women. A number of women from various countries and backgrounds have been interviewed over the past few months, including a catfish farmer in Nigeria (Lilian Elekwachi), a women's group in the UK (the Aquagettes), a minnow farmer and bait delivery driver in the USA (Margie Saul) and a specialist in the early detection of ciliate parasites in Singapore (Dr. Giana Gomes).

The vital roles that women play in aquaculture are no surprise to those already in the industry. However, with seafood a key source of nutrition worldwide, an increase in gender equality and an awareness of the roles women play in aquaculture could be crucial for food security. Through its series, The Fish Site aims to give women in aquaculture a platform to share their insights and encourage more women to join the sector. It also hopes to increase awareness among business leaders, enlarge their knowledge about the value that women bring to aquaculture and encourage more women to be considered in new projects or policies. The Women in Aquaculture series will be discussed in more detail during the presentation, with examples of stories, roles and responsibilities in the field.

KEYWORDS

Aquaculture, Female scientists, Gender equity, Promotion of women, Website series

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WOMEN IN AQUACULTURE: STORIES FROM THE FIELD

Bonnie Waycott

The Fish Site

Thank you for coming!
I hope you enjoy the presentation.



Bonnie Waycott

- Lived in Tokyo 2006 – 2017
- Former NHK narrator and rewriter
- Freelance writer specialising in aquaculture and fisheries since 2015

"With most of the world's capture fisheries said to be fully exploited or overexploited, aquaculture is going to be key to meeting the demand for fish, which will continue to increase with population growth, rising incomes and increasing urbanisation." (Finegold, 2009)

"Women accounted for nearly 14 percent of all people directly engaged in the fisheries and aquaculture primary sector." (FAO, 2018)

"On a global level women's participation in aquaculture is estimated at 70 percent of total workforce." (Monfort, 2015)

The Roles of Women in Aquaculture

- Strongly associated with post-harvest sector (FAO, 2018)
- Rural Aquaculture in China (33% of workforce)
- Freshwater and Cage Culture in Indonesia and Vietnam (42 - 80%)
- Taking care of ponds, feeding fish, measuring pH, checking water quality and keep records in Thailand
- Ensuring fish availability, preserving and processing in Africa (Monfort, 2009)

The Barriers that Women Face

- lack of recognition of their work and contributions
- lack of information on women's work and contributions, no gender disaggregation in employment statistics
- lack of integration of women's knowledge and experience into aquaculture
- personal reasons e.g. lack of time/confidence

How Do We Address This?

- How can we highlight and recognise women in aquaculture?
- Can we encourage more women to join the aquaculture industry?
- How can we allow more women to be considered in aquaculture projects?

5m Publishing



5m Publishing and The Fish Site

- provides global agricultural/aquaculture news daily
- Topics: health, welfare, nutrition
- Websites: The Poultry Site, The Pig Site,
- Aquaculture website: The Fish Site  The Fish Site
- Aims to share latest aquaculture developments to over 600,000 unique users



Lilian Elekwachi, Nigeria



"My dream is to improve Nigeria's aquaculture through new trends and opportunities." – Lilian Elekwachi, catfish farmer

The Aquagettes, UK



The Aquagettes, UK



"As a group we can inspire change more effectively than we could do as individuals." -- Dr. Sophie Fridman (right), the Aquagettes

Margie Saul, USA



"A woman can do any job that she is interested in." -- Margie Saul, minnow farmer and bait delivery driver

Dr. Giana Gomes, Singapore



Marie Tan, Singapore



"Whatever the stress, always persevere, because your hard work will always bear fruit." -- Marie Tan, Assistant Fish Health Manager

Dr. Giana Gomes and Marie Tan, Singapore



"I want to make a positive difference in an amazing industry that is transforming quickly and constantly." -- Dr. Giana Gomes, lecturer

The Women in Aquaculture Series

- A platform to share stories
- A way for women to connect
- A way to raise awareness of women in aquaculture and their roles
- A way of encouraging both men and women to join the aquaculture industry

Feedback

"The Women in Aquaculture series is fantastic, very inspiring and hymn to the diversity of women's experiences, backgrounds and roles in the sector."

-- Dr. Cecile Brugère, independent consultant and director, Soulfish Research and Consultancy, UK

"We loved the article you wrote on Natalie. Aquaculture is near and dear to our hearts here and it's especially wonderful since it highlights a woman!"

-- Ms. Susan Banks, Business Development Manager at the Dorchester Economic Development Office, Hooper's Island, USA

"I look forward to reading what you and your team will write for your next Women in Aquaculture interview."

-- Marie Tan, Assistant Fish Health Manager, Barramundi ASIA, Singapore

Addressing the Lack of Data

-- The Women in Aquaculture series is one small step in highlighting women who work in a new and thriving industry.

-- There appears to be a lack of data and information on women in aquaculture today.

-- We wish to address this lack of data.

Diversity

-- Diversity is a key word in our series.

-- Diversity generates different life experiences.

-- Applying these experiences to business creates a broad range of thinking.

-- Such thinking is essential for businesses.

Ideas Going Forward

-- Mentoring programme

-- Stalls at future aquaculture events

-- Aquaculture network to support women

-- Women in Aquaculture breakfasts

Thank you very much for your attention!

Panel Discussion

Moderator:

Marcy Wilder, JIRCAS

Speakers:

Meryl Williams,

Gender in Aquaculture and Fisheries Section, Asian Fisheries Society

Kaoru Nakata, Japan Fisheries Research and Education Agency

Yumiko Kura, WorldFish Cambodia

Evelyn Grace de Jesus Ayson,

Southeast Asian Fisheries Development Center/Aquaculture Department

Bong Jung Kang, JIRCAS

Izumi Seki, Tokai University

Bonnie Waycott, The Fish Site, 5M Publishing



Marcy Wilder:

Thank you for the introduction. Thank you, ladies and gentlemen. On behalf of JIRCAS, once again I would like to thank you for your participation and we hope that you have enjoyed today's presentations from our seven distinguished speakers. Briefly, to reiterate the goal of today's symposium, we at JIRCAS are determined to further promote women's contributions to scientific and technological advancement in agriculture, forestry and fisheries. With this goal in mind, we have convened today's symposium in order to showcase how women can contribute to the advancement of fisheries-related research and industry. I would like to take this opportunity once again to thank our speakers for sharing with us today their research findings and views on the need for the active participation and involvement of women and their leadership contributions to realizing the sustainable development goals in fishery science and industry.

So, without further ado, I would like to initiate the panel discussion. Briefly, today's format will be, first we will have one round of questions from the moderator to each panelist and then an additional round to the keynote speakers only. Next, panelists will be invited to follow-up in more detail among themselves. And then finally, we will open up questions to the audience. Please feel free to ask your question in either English or Japanese, but before starting your question, I would like to ask you to please identify yourself in terms of name and affiliations, as that will help our speakers, and to wait for the hall attendant to bring you a microphone. The first question will go to Dr. Meryl Williams.

In your presentation you have emphasized that fisheries and agriculture-related endeavors are viewed as masculine and that in developing areas women's enterprises are smaller, they have lower pay and their work is riskier. So, for example, given the situation compared to 30 years ago, would you say that this situation has vastly improved or do we still have a long way to go? And what should all of us who are engaged in international development bear in mind when carrying out our work?

Meryl Williams:

Thank you very much for that question. I really don't think we know whether we are more advanced than 30 years ago. And I think, if we did have the statistics, they would show a very mixed outcome. For example, in Dr. Kang's presentation on the global shrimp industry, we saw that between 2000 and today we have gone from one million tons production to over five million tons production. Every one of those shrimp has to be processed and most of that processing is done by women. So, there is five times as much shrimp produced in the last 20 years, which means a lot more jobs in the processing sector for women. In other sectors we have, and other countries, we have very different outcomes. For example, in the Norwegian salmon industry, between 1990 and 2010, a 20-year period, the percentage of women working in the salmon industry went from 20% to 9%, mostly because of the aggregation of small farms into much bigger enterprises. So, the picture is very mixed and as I said, and as many speakers have said, until we have good data, it is very difficult to know where the balance lies. So, there really is a big plea to have some of the basic information to know the situation.

In terms of what we should do about recognizing women in the sector, I think that in research institutions it is very important to have gender equality recruitment and retention practices and policies, targets, as Dr. Nakata pointed out, can work very quickly. Women see the opportunities when targets are there and if there is a population of graduates who can come into the research centers, then the percentages can change very quickly. Development projects, my final point. Development projects really should think right from the start of the design as to what women are doing or could do in the area that is being considered for development intervention and, having diagnosed the situation, then build, design the project to make maximum use of not just the men that are there, but the women and the whole community as well.

Marcy Wilder:

Thank you. Our next question will go to Director Nakata. You have told us about the current situation for women in aquaculture and fisheries in Japan and their achievements up until the present. And we have also received through your presentation an understanding of the Japanese government's policies and desire to further promote women. Yet, you have stated that many women are reluctant to be engaged in managerial or decision-making positions. So, going forward, what do you think we can do? Could elaborate a little bit more as to the most important factor in remedying the situation?

Kaoru Nakata:

I'll answer in Japanese. First of all, there are not many women role models in managerial positions yet. So, women researchers who are offered managerial positions, for example, would be worried about how big the responsibility would be, whether they would be able to handle it, etc. I think it's very important to remove such concerns.

As Bonnie Waycott said earlier, we can develop a mentoring system, for example, and develop role models. The number of women in managerial positions is gradually increasing. They can be role models in the near future, and it is extremely important that they encourage other women.

Another thing is that organizations should recognize the merits of women contributing to diversity in society and work towards improvements, instead of just pursuing quantitative goals.

Marcy Wilder:

I think we will agree that we have a bright future for women ahead. My next question goes to Director Kura. You have emphasized that women are often primarily responsible for providing for the family's daily household food consumption, yet they are often expected to eat less or last. So, where certain cultural differences exist in various countries, what are some of the things that we, especially scientists can do to help people overcome these differences or address them where such a thing is required?

Yumiko Kura:

I would like to answer this question using a very specific example. In Cambodia, more than 30% of all children are suffering from stunting. Stunting means they are shorter than the height they should be for their age. Thirty percent, more than 30%. This is a really, really scary figure. So, consider that this kind of malnutrition issue will have negative influence on these children for the rest of their lives and this is a serious issue and we have some idea what is causing this problem. This underlines the low dietary diversity of children and pregnant women. So, pregnant women, they should be eating a variety of food items, not just rice and some soup, but they need to be eating fish, they need to be eating vegetables and other types of food. Same with small children.

After six months of breast feeding, children need to start eating other types of food like fish, but it is not happening in Cambodia. Why? Because the mothers are busy. They do not have time to prepare separate food for small children. They prioritize; they cook food for the entire family including grandparents, the father, the other older siblings. Then they do not have the time to prepare food for babies. How do we begin to solve this kind of problem? As researchers, we encounter this type of issue all the time. Part of it is cultural and part of it is a structural issue, relating to labor allocation issue within the household.

So, it takes very small steps to start changing the perception of women themselves. They sometimes think that they are doing the right thing, as appropriate behavior as the housewife to provide food for entire family instead of prioritizing themselves, even when they are pregnant. But based on the scientific knowledge, we need to be able to somehow communicate that it is important that women prioritize their own food and their young children's food so that their families, can have healthy, economically productive lives.

Marcy Wilder:

Thank you. That is indeed something we need to think more about. Our next question goes to Dr. Ayson. You have discussed SEAFDEC's efforts in having women promote their work and technology and extension and dissemination and you have put forth that the success of your program depends significantly on the contribution of your female workforce. So, having seen from your data, that 50% of all of your researchers are women I would like to ask you at this time, do you see yourselves at the place where you want to be or do you need to make further efforts to maintain things, do you need to make further efforts to promote women in your organization?

Evelyn Grace de Jesus Ayson:

I think we should continue promoting women's participation in not only SEAFDEC's R&D programs, but also for other similar initiatives not only in the Philippines, but in the region and beyond. In the particular example of SEAFDEC, it is transitory. The 50% women in the workforce who are currently doing very well eventually retire and we will have to continue encouraging the younger ones through mentoring programs to go into agriculture and fisheries research. Currently we do it; we do this at two levels. We mentor our technical and research assistants to encourage them to go into graduate school and then those who come back, we mentor to help them start careers in agriculture and fisheries research. And it will also help if there are policies within the institution that would help these young researchers integrate into the system.

Marcy Wilder:

Thank you. That is very, very useful background information, and a model that we could adopt widely. My next question goes to Dr. Kang. Today you gave us an overview of goal-oriented basic research being done at JIRCAS and how it can be applied to assist food industries in developing regions in context of our mission. You also gave us some concrete examples of published research. However, as pointed out in our second keynote speech given by Director Nakata, in this country the percentage of women in fisheries-related research remains low. What do you see as an important factor in addressing the situation? Is there a need for more role models?

Bong Jung Kang:

Yes, I think there is a need for more role models. With many role models, it will be easier to imagine the future for young females. In order to realize that, I think that it is important to change the consciousness of women and men. For example, generally in Japan, many people think that women should take care of their family at home. And also regarding the question of my presentation, I never think I am a "female researcher", or I am not a "male researcher", I just think that I am a research scientist. I think there is no need to be sensitive about gender, and people should be accepted as they are individually.

Marcy Wilder:

It would be ideal if nobody thought in terms of gender anymore. My next question goes to Professor Seki. You have given us an overview about women who have started fisheries-related businesses in Japan and how their entrepreneurial spirit has helped to revitalize the local economies. Nevertheless, in Japan's Fisheries Cooperative Associations, the majority of leadership positions in these organizations are held by men, but women's contributions are being increasingly welcomed. Are there any specific examples of how being female can work to an advantage? And also as a second question, as an educator, what advice would you have to young women who are still students aspiring to a fisheries-related career?

Izumi Seki:

Well, I don't think being a female can be an advantage or a disadvantage in the world of fisheries. In terms of the Fisheries Cooperative Associations, women can't participate in their management in the first place, so this problem is a little different from being a female working with an advantage or a disadvantage. In fact, this is what I would also like to say to young women; the fisheries is an industry where each person's role is clear—people who fish, people who process, and people who sell their work together to develop one industry. I think it's better to view the fisheries industry this way.

Fishing is physical work and may be easier for men, and that is okay. There are many women who are good at doing work that requires precision on land. Those who are good at processing can do the processing, and everyone can do what she is good at and contribute to the fisheries industry as a whole. I would like to say to young people aspiring to a fisheries-related career that they don't need to do what other people are doing, and that they can do what they're good at to contribute to the fisheries industry. To this end, regardless of gender, we must recognize and respect each other's areas of work, know that everyone is a part of one big wheel, and work together to develop the fisheries industry. I want young people to join the fisheries industry with such awareness.

Marcy Wilder:

Thank you, that was very inspiring. And finally, for the first round of questions, the last question goes to Ms. Waycott. As a journalist, you have investigated the current situation for women who are engaging widely in agriculture-related work all over the world and have highlighted their contributions in the Women in Aquaculture series. Yet, many women have indeed faced obstacles in, firstly, obtaining employment and then secondly, for being recognized for what they have done. So, going forward, what do you see, again as some of the most positive developments that are occurring today?

Bonnie Waycott:

Well, I think that there are quite a few more in the sense of trying to raise awareness of the issues that women have in agriculture and, again, about their roles today. I have a few examples that I have come across during the course of my writing. One of them is Norway, the Norwegian Agency for Development Cooperation. They are also aiming to increase people's knowledge about the roles that women have in fisheries and agriculture. More recently, they have studied women's role in Mozambique and this study has been followed up by the Norwegian Embassy in Mozambique and some local authorities there. And I have had the impression that Norway itself is supporting international networks of researchers who are working on gender and on women's issues in agricultures and fisheries. They have also been providing some backing for conferences and in 2014 had a conference in India on promoting work on women's rights and gender equality.

I think that has been a very positive move in terms of raising awareness of what women are doing today. Going back to the Women in Aquaculture Series actually, we spoke to a woman in India called Shweta Vakil, and she works on a shrimp culture farm called West Coast. Her company, including herself as well, have set up a regular sort of engagement program for female staff in the company and it allows women to hold discussions, and have some work experience in different sectors of the company. If they are interested in a particular sector of the company, they can move to that sector for a while and try working there and see what areas they would like to specialize in and so on. And they can also hold discussions and share experiences and help to find solutions to the challenges they face not only in their professional lives, but also in their personal lives as well. Such as, for example, balancing child care and taking maternity leave and when to come back and how the company can support them and that kind of thing. And I think that's very positive as well.

Marcy Wilder:

Thank you very much. I would now like to direct two brief questions to each of our keynote speakers. Dr. Williams, in your abstract you have stated about women that frequently their gender work has been ignored, denied or even suppressed within their institutions. Can you give us an example how one might deal positively with such an obstacle?

Meryl Williams:

There are several examples that come to mind and some I won't promote because they involved giving up and going on to work on other things or other sectors. In the positive sense, one of the words that has come out from a lot of our presentations is "persevere" and I think that is important, but don't persevere in a silly way. Sometimes you have to take a step or two or three back and consider, was this not the right moment to try to get your point across, do you need other collaborators, other people who might be more powerful than you or may have a better inroad to decision making? I personally think that you need to try and link your issue to the issues that are important to the decision makers; There are often economic or institutional issues that are important, and use your networks to get things done.

But I think that at the end of the day, these topics we are talking about are so important for society, not just for women themselves, that it is important that we do persevere to try to get a better balance in contribution in the fisheries and agricultural sectors. So, keep going, but do it carefully and with attention to the right moment, the right time, the right partners.

Marcy Wilder:

Yes, absolutely. Couldn't agree more. Thank you. And one more question to Dr. Nakata. If possible, could you give us a personal example of overcoming a challenge, and your own strategy for achieving leadership?

Kaoru Nakata:

I used to conduct marine research. I needed to board a ship for the research, so I couldn't do the research alone. I would always explain to people what I want to do and how it can be useful to them, even though it sounded a little pushy. This is the approach I took to conducting joint research.

As part of my position in the Japan Fisheries Research and Education Agency, I re-located to the National Fisheries University two years ago. It was my first experience of working in education, and the first thing I did was to read various reports to know who is doing what, go and meet them, and develop my own network. Having a network of people is really helpful psychologically when starting new things. I think that is my strategy.

Marcy Wilder:

That was very, very valuable reference information for all of us. And since now we have completed the questions, I wanted to leave time to have the panelists discuss among themselves. But we will just do a little bit of that so we will have more time to take questions from the floor. So, I believe that Ms. Waycott had a question. Please do ask your question.

Bonnie Waycott:

I have a question for one of the panelists, for Professor Seki. What has the reaction been in Japan towards women who have started fisheries-related businesses?

Prof. Izumi Seki:

As Japan is promoting women's participation in general as a policy, various activities conducted by women are very well received. But such evaluation does not necessarily mean that there is support for their activities. The support programs that help these women are continually increasing in number, but the structures that can enable them to have direct access to information in the field, for example, are still lacking.

Marcy Wilder:

Do any of the other panelists wish to ask a question to the other panelists? Director Kura, please go ahead.

Yumiko Kura:

I have a general question to everyone on the panel. In Cambodia, we have a little bit of a backlash towards gender mainstreaming and women's empowerment in general because this agenda was introduced through Western donor agencies. Then, so gender/women's empowerment became the goal in itself without having justified itself sufficiently. And now we are struggling to somehow convince men in agriculture and natural resource management fields that empowering women actually has a benefit towards the greater development goals, such as improving nutrition and alleviating poverty. And this is a little bit of an unfortunate situation, but have you encountered something like this in countries where you have experience? And do you have some suggestions how to address this? That would be very helpful.

Marcy Wilder:

Perhaps, is there somebody who would like to answer that question, perhaps Dr. Ayson or Dr. Williams?

Meryl Williams:

I think it is a very important issue and not only in the overall pushing by global commitments and donor agencies. Women's empowerment is something that must be done everywhere and anywhere, but it also so happens – there is also backlash when new technologies come in, and I think Director Kura, you also mentioned a little bit of that yourself. It happens in agriculture, it certainly happens in agriculture and fisheries, where women might be especially targeted by the development agencies as the people to introduce a new technology tool to or to give help in small-scale fish farming. And it often happens in a situation where the men don't give much help for anything, where the overall local situation is quite poor. For example, one well-documented case is after the 2004 tsunami in Tamil Nadu on the east coast of India (southeast coast of India) some assistance went into helping women in small-scale brackish water agriculture enterprises and the men actually had very little livelihood opportunity in that same area. They were not getting additional help and they mostly had to migrate to the city to work in very low-paying labor. So, the help that went to the women was useful, but not really good enough because the whole community was at odds. So, I think looking at what all the needs are before coming in with some magic outside solution, we must give women-only help and we must empower women as a way to success, but of course it's quite complex to do properly.

Marcy Wilder:

I hope that answers your question. Thank you everybody. I would like to turn to the floor – we actually have only five more minutes (time goes very fast). Please feel free to ask on the content or to give a comment or your opinion. But please, state your name and affiliation first. Does anybody have a question?

Male Speaker:

Hello, good afternoon to all. I have a simple question to Dr. Williams about aquaculture. As earlier in conventional aquaculture we use a lot of water. Regarding what Goal 6 says, water and sanitation for all. And inside the water, a lot of water is used in aquaculture, they use chemicals also, that water pollution, and it causes land and soil pollution by those chemicals. So, aquaculture is really for conventional aquaculture in land fishery, conventional at a smaller scale level for a family or small income generation. Is it feasible? Because we have to use water, so water pollution and so land pollution occur. Or is it feasible or not, technically and economically and environmentally?

Meryl Williams:

Are you talking about water pollution in – I am sorry, in offshore aquaculture? I am sorry; I didn't really understand the question.

Marcy Wilder:

Maybe Dr. Ayson could answer this more specifically.

Evelyn Grace de Jesus Ayson:

You were asking about possible water use conflicts?

Male speaker 1:

Too much water is used.

Evelyn Grace de Jesus Ayson:

Of course, yes.

Male Speaker:

But the water is maybe needed for some other purposes in a small community?

Evelyn Grace de Jesus Ayson:

Yes, in certain areas there are issues about promoting or intensification of aquaculture and water use conflicts and also aquaculture activities are polluting water that is used commonly for other uses as well. But there are technologies in areas where there are constraints in water resources. For example, promoting recirculating aquaculture systems where you don't really use that much water. You use a limited amount of water, recycle it and use it in your production systems. So, perhaps in your area or other areas where there are limited fresh water resources, these technologies or innovations can be adopted instead.

Marcy Wilder:

Actually, time is going too fast, we can take only one more question. I would like to take a question that has to do with women's involvement.

Female Speaker:

Thank you and thanks to all the panelists for their contributions. So, this question goes to all the panelists. Women in fisheries is a topic that actually targets various parts of the Sustainable Development Goals, right? I myself, I do a lot of work on sustainability. I have worked here at the United Nations University. And my question is, what is the current engagement of women working in the different fields of sustainability science in women in fisheries and how, for example, how we can further collaborate with you in future projects or

Panel Discussion

capacity building initiatives that you may have? And also another question about the Fish Site series, I am very curious about what is the future of women in the fisheries. How do you see that coming because now with the use of technology, there is a growing network that has a lot of potential, so how do you see what will happen in the future?

Marcy Wilder:

Who would like to answer that one? Ms. Waycott?

Bonnie Waycott:

Did you ask about the future of women regarding the Women in Aquaculture series? How I see the future of women in aquaculture going forward?

Female Speaker:

Yes.

Bonnie Waycott:

I think it is positive for women, I think there are a lot of opportunities out there and I think their roles are definitely being increasingly recognized. There are still some challenges, I think, to address. Again, going back to the series that we are working on, a lot of men feel that they are not really included in it because it is very much women in aquaculture and they don't feel so involved. And I think getting them a bit more involved in the discussions and the challenges that women face and asking for their opinions and soliciting their advice as well is definitely a positive step that we can take. I think there is still a way to go in terms of having more women in leadership roles, managerial roles and so on, and I think there needs to be a little bit more work on that. But on the whole, I think it is a positive time for women and I think going forward there will be more opportunities and I think that this topic will be discussed further as well.

Marcy Wilder:

Thank you. I am very sorry, I am afraid we are out of time. I would like to thank everybody once again for joining us today and I would like to ask you to please help me in giving a big hand to our distinguished speakers.

Closing Remarks

Osamu Koyama

Vice-President, JIRCAS



On behalf of the organizers, I would like to make a few concluding remarks at the end of this symposium, though I am afraid that I am not qualified enough to play this role in this female-led symposium.

The main objective of today's symposium was to promote an active role of female players in fisheries research and industry. By listening to the excellent presentations and discussions, I am sure we have gained a deeper understanding on the vital role of female researchers and administrators in fisheries. Gender issue must be tackled in a broad context, not limited to research, but in society as a whole. I hope the society of fisheries research and industry can work together and make a good and promising model. We at JIRCAS will continue to make efforts to diversify our research environment to obtain better and meaningful research results, in other words, to become an international-standard research institution.

In this symposium, we have also discussed technological and business issues and how we can contribute to the SDGs in the context of fisheries research and industry. This year, the Fisheries Agency of Japan has started a series of prioritized policies to transform our fisheries industry to a high growth industry. I am sure the active participation of female players would be one of the key factors to promote such industrialization, and eventually to contribute to the achievement of the various SDGs.

I would like to take this moment to thank all our speakers, especially the keynote speakers Dr. Meryl Williams and Dr. Kaoru Nakata, for their excellent speeches; our session chairpersons and moderator, for summarizing the presentations and facilitating discussion. I would also like to offer a special word of gratitude to our co-organizer, the Japan Fisheries Research and Education Agency, and cooperators, the AFFRC-MAFF, Fisheries Agency of Japan, NARO, TUAT, Tokyo University of Foreign Studies, Greater Tokyo Initiative (TAMA) and J-FARD.

Finally, thank you to all symposium participants and to everyone involved in planning and holding this event. We are truly grateful for your valuable contributions and attendance. Thank you very much.





Program

12:30-13:00 **Registration**

Opening Ceremony

13:00-13:20	Opening Remarks <i>Masa Iwanaga</i>	President, JIRCAS
	Welcome Remarks <i>Kazuhiko Shimada</i>	Deputy Director General, Agriculture, Forestry and Fisheries Research Council Secretariat, MAFF

Keynote Speeches

Chair: Kunihiro Doi Director, Research Strategy Office, JIRCAS

13:20-13:50	Women's contributions to fisheries and aquaculture in the developing areas: Present achievements and future prospects for women researchers and administrators <i>Meryl Williams</i>	Chair, Gender in Aquaculture and Fisheries Section, Asian Fisheries Society
13:50-14:20	Women in fisheries and aquaculture in Japan: Current achievements and future prospects in research and industry <i>Kaoru Nakata</i>	Executive Director, Japan Fisheries Research and Education Agency

Session 1: Women in Fisheries Research

Chair: Osamu Abe Director, Fisheries Division, JIRCAS

14:20-14:45	The contribution of fisheries in achieving SDGs: Perspectives of women researchers <i>Yumiko Kura</i>	Country Director, WorldFish Cambodia
14:45-15:10	R&D for sustainable aquaculture development towards food and nutrition security in Southeast Asia <i>Evelyn Grace de Jesus Ayson</i>	Scientist, Southeast Asian Fisheries Development Center/Aquaculture Department

15:10-15:30	Development of new aquaculture and seed production technology for commercially-important shrimp species: Research at JIRCAS	<i>Bong Jung Kang</i>	Research Scientist, Fisheries Division, JIRCAS
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15:30-15:55 * * Photo session & coffee break * *

Session 2: Women On-site in Fisheries and Aquaculture

Chair: Masayoshi Saito Director, Research Planning and Partnership Division, JIRCAS

15:55-16:20	Activities of women in fishing communities starting businesses in Japan	<i>Izumi Seki</i>	Professor, Tokai University
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16:20-16:45	Women in aquaculture: Stories from the field	<i>Bonnie Waycott</i>	Writer, The Fish Site, 5M Publishing
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Panel Discussion

16:45-17:20	<i>Moderator: Marcy Wilder</i>	Senior Research Scientist, Fisheries Division, JIRCAS
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Closing

17:20-17:30	Closing Remarks <i>Osamu Koyama</i>	Vice-President, JIRCAS
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*Abbreviations found in program

JIRCAS: Japan International Research Center for Agricultural Sciences

MAFF: Ministry of Agriculture, Forestry and Fisheries

SDGs: Sustainable Development Goals

Co-organized by:

- Japan Fisheries Research and Education Agency

In cooperation with:

- Agriculture, Forestry and Fisheries Research Council (AFFRC) Secretariat of the Ministry of Agriculture, Forestry and Fisheries (MAFF)
- Fisheries Agency of Japan
- Tokyo University of Agriculture and Technology
- Tokyo University of Foreign Studies
- National Agriculture and Food Research Organization (NARO)
- Greater Tokyo Initiative
- Japan Forum on International Agricultural Research for Sustainable Development