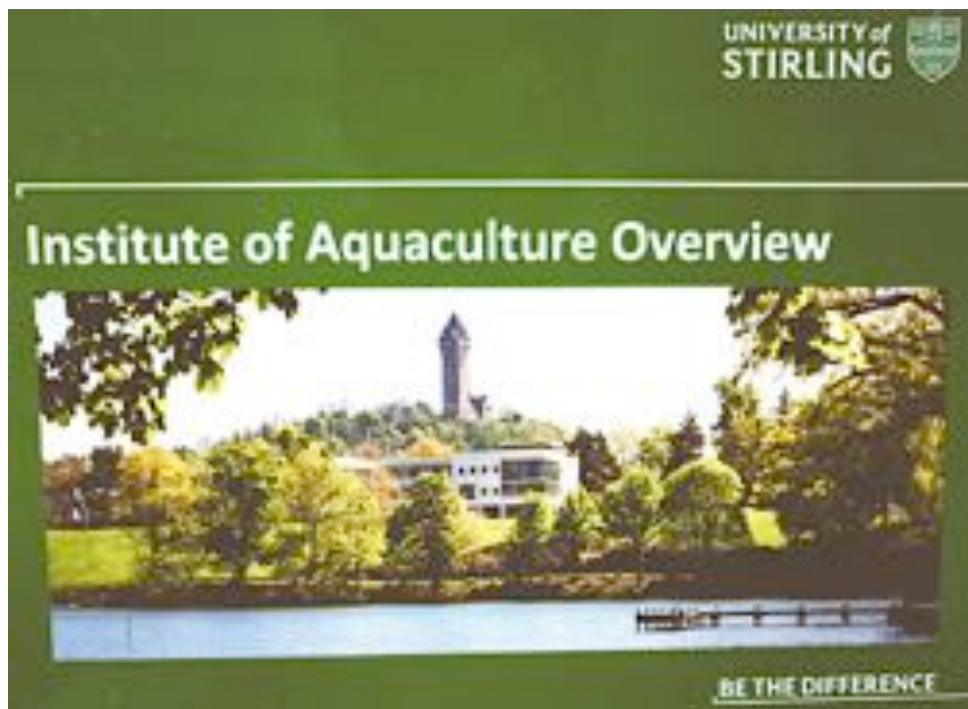




# **Curriculum Development for Sustainable Seafood and Nutrition Security (SSNS)**

Report:  
Study Trip to  
University of Stirling, UK  
Feb 11-15, 2019



Report prepared by:  
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Polymeros, Tran Minh Phu, Nam Kha, Roni Nugrah and Ilham

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# **Curriculum Development for Sustainable Seafood and Nutrition Security (SSNS)**

Report of the Study Tour (February 11-15. 2019)  
to University of Stirling (UoS), Scotland, UK

## **Summary**

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The second and the last weeklong study tour and training workshop was organized as part of Workpackage 2 i.e. Development under the SSNS project entitled, “Curriculum Development for Sustainable Seafood and Nutrition Security (SSNS)” funded by the European Union under Erasmus+ programme.

The Study Tour and Training Workshop was organized and hosted by the University of Stirling, Scotland, UK during February 11 – 16, 2019. The main objectives of the event were to learn about the courses and innovative teaching and learning methods practiced at the University of Stirling, observe laboratory facilities, equipment, and teaching-learning methods and the environments. A total of 33 lecturers from Asia and Europe participated in the event (Fig 1). About 10 instructors of UoS gave talks and seminars during the 5-day programme in classroom sessions. About five instructors explained the laboratory systems, equipment and procedures. More importantly, five UoS students talked about their experiences on courses and research work. Participants had some practice of writing learning outcomes of their respective courses, a group discussion to design three laboratory classes and several sessions of questions and answer (Q&A). A field salmon farm visit was also organized to understand the salmon farming in Scotland. All the participants expressed their good impression about the programme mentioning that overall programme was very informative and useful.

This report covers the day-to-day activities of the programme at UoS, Scotland, UK.



**Fig. 1** Lecturers participating in Study tour and training workshop at University of Stirling

## February 11, 2019 (Day 1):

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Report by Dr Ram C. Bhujel  
SSNS Project Coordinator, AIT

All 33 lecturers from Asia and Europe arrived on time i.e. 09:00 for program registration in the Halls 4C1-C2 of the Cottrell Building of the University of Stirling (UoS). Amaya Albalat served as MC, introduced her team, explained agenda/programs and the logistics. The participants were welcomed by **Prof Maggie Cusack**, Dean of Faculty of Natural Sciences, **Prof Simon MacKenzie**, Deputy Head of Institute of Aquaculture, Research at the Institute of Aquaculture (IoA), and also by **Prof Rachel Norman**, Chair of Food Security and Sustainability, UoS.

In addition to welcoming the participants, Simon gave an overview of the Institute of Aquaculture within the University of Stirling (Fig 2). According to him, IoA was established in 1971. There are 30 academic and 25 support staff, 18 external facility staff, 40+ PhDs, 40+ MSc, and 100+ under-graduate students. IoA has partnership with 50 countries, annual operating budget of over 10 million Sterling pounds. Government funding aquatic food security is 17 million pounds and 5 million pounds for international environment centre.



**Fig 2** Prof Simon MacKenzie giving overview of IoA.

Prof Rachel Norman presented an overview of the global food security research program. According to her, food security research program is a global interdisciplinary programme and priority areas for seafood consumption programme are:

- How do food choices evolve?
- Why do people choose seafood? (or not)
- Changing relationships with food and food consumption practices.
- Aging populations and children's nutrition and development- attitudes/relations to seafood

At the end of the first session of the morning, Dr Ram C. Bhujel, SSNS Project Coordinator highlighted the aims or purpose of the Study trip.

During the second session of the morning, **Dr John Bostock**, Director of MSc Aquaculture Programmes of IoA presented the structure of the course MSc program of IoA. According to him, masters programme is flexible, 1 year but it can be completed over the period of up to 5 years. Two new MSc programmes; Marine Biotechnology and Aquatic Food Security were introduced in 2012 and 2015, respectively. There is also a new post-graduate certificate in Aquaculture Health Management based on Aquatic Veterinary Studies modules. The MSc student number has steadily increased after 2011-12 from 20 above 40 per year mainly due to new program introductions and flexible programmes. According to him, MSc programme at IoA has three main streams as shown in Table 1.

**Table 1.** MSc program at IoA, UoS.

Programs	Foundation subjects	Advanced subjects
1. Sustainable aquaculture	Aquatic animal biology and health, Environment, nutrition, reproduction, production systems, aquaculture in practice	Env. Management, Env. Systems modeling, advanced engineering, ecotoxicology, practical feed production, non-fish aquaculture, bloodstock management and genetics, epidemiology and health control
2. Aquatic Pathology	Same as above	Systemic pathology & histology, parasitic diseases, microbial diseases, immunology, ecotoxicology, epidemiology and health control
3. Aquatic Food Security	Same as above	Seafood safety and quality assessment, aquatic food security in context, food chain & legislation, policy and planning management, livelihoods and aquatic management, business and financial management, bloodstock management and genetics, epidemiology and health control

1. Teaching uses a wide mix of lectures, field trips, workshops, tutorials, practical sessions, group work, case studies, problem-based learning, presentations and individual assignments
2. All teaching supported through “Canvas” the University Virtual Learning Environment

**Prof. Simon MacKenzie** gave a talk on CPD (Continuing Professional Development) on behalf of Alexandra Pargana, CPD Coordinator, IoA. According to him, there is one Core Course in fish health and welfare and there are multiple Advanced Courses on specific subjects e.g. cleaner fish, zebrafish, RAS, water quality, nutrition, etc. Courses are taught by in-house world-class researchers, invited speakers from across the industry using excellent facilities and networking opportunities on-campus. One of the best courses is 2-day course, “Fish Health Management”. The first part includes theoretical base on stress, health, diseases, animal welfare, then it includes practical dissection, tissue and bacterial sampling, key parasites, vaccines, etc. They get very good feedback.

Five PhD students; namely, Bernat Morro, Callum Howard, Chris Payne, Dimitar Taskov and Steph Horn presented their experience. Callum Howard mentioned the following several points which are the major cause why he chose IoA, UoS i.e. reputation, industry focused, flexible course, good facilities, nice campus and its location, great choice of modules, field trips, friendly atmosphere and practical value. Chris Payne mentioned that he was searching Google, and found University of Stirling: MSc in *Aquatic Pathobiology* on top of the results. He liked the study tour, industry applicable experience, practical; however, courses were

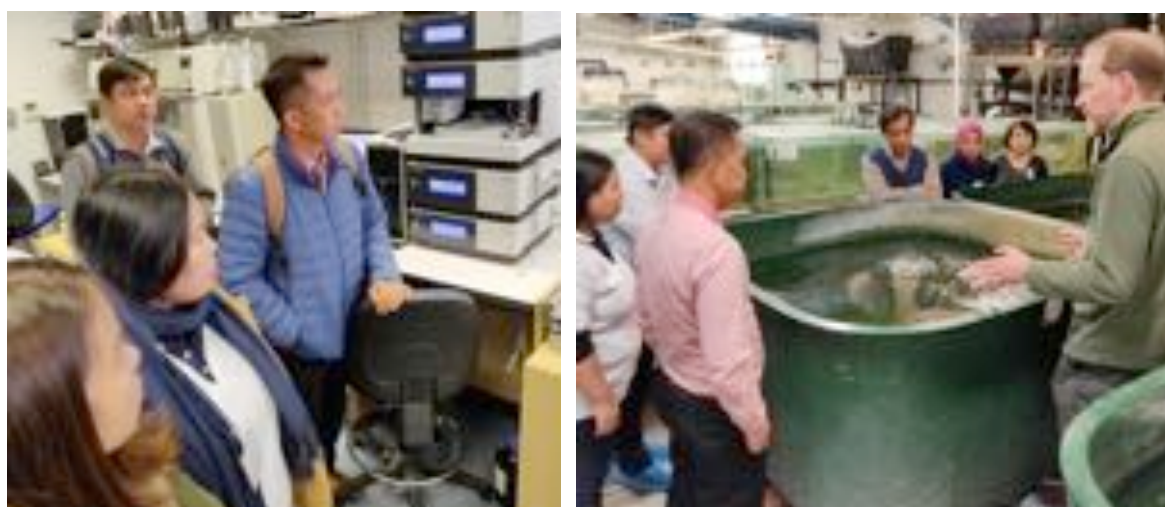


taught in the form of module (2 weeks) which are too short and he wanted to have more in-depth expertise on molecular biology, pathogen detection, immunology. Whereas Steph with an MSc degree in applied bioscience at University of the West of Scotland mentioned that two-week sub-module on aquaculture, location/campus and IoA reputation were the major appeals.

In the afternoon, participants were split into four groups (Table 2). Each group visited the all the three labs (histology, molecular and nutrition) and tropical aquarium facilities (Fig. 3). The group allocation is shown in the table below:

**Table 2.** Group division for IoA lab and facility visit

Group 1 (MC)	Group 2 (AA)	Group 3 (CP)	Group 4 (FL)
Dr Ram C. Bhujel	Dr Salin Krishna	Dr John Kuwornu	Dr Udomluk Sornpong
Dr Watinee Intharapongnuwat	Mr Karn Tippayakraisi	Dr Anueepong Srisathaporn	Dr Somsamorn Gawborisut
Dr Parichard Sangkumchallang	Dr Tati Nurhayati	Dr Asadatul Abdullah	Dr Roni Nugraha
Dr Ratih Ida Adharini	Dr Siti Ari Buddhyaniti	Dr Munwantoko	Dr Jorgen Lertfai
Dr Anita Anita N. Jakobsen	<del>Dr Katerina Kucharska</del> Cosmas Deloras	<del>Dr Konstantinos Polymenou</del>	Dr Ioannis Karapanagiotidis
Dr Itham	Dr Fitriksa Hapsari	Dr Mochammad Nurhudah	Dr Sirung Rahardjo
Prof Nguyen Thanh Phuong	Dr Tran Minh Phu	Dr Vu Ngoc Ut	Prof Phan Thi Van
Dr Dang Thi Lua	Dr Tran Thi Thuy Ha	MSc Vu Thi Ngoc Lien	Dr Nguyen Nhu Tri
Dr Nguyen Hoang Nam Kha	Dr Nguyen Phuc Cam Tu		



**Fig. 3.** Organized visit to lab (left) and tropical aquarium facility (right)

## February 12, 2019 (Day 2):

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Report prepared by

Ioannis Karapanagiotidis and Konstantinos Polymeros, University of Thessaly (UTH)

The morning session of Day 2 was about “**Linking teaching with research and industry**”. Firstly, **Prof. Neville Wylie**, Deputy Principal Internationalization of the University of Stirling welcomed the participants.

**Presentation 1: Dr. Eunice Atkins**, Employability Manager of the Faculty of Natural Sciences, University of Stirling presented the “**Making the Most of Masters (MMM) at the University**”. MMM (<https://www.stir.ac.uk/study/postgraduate/making-the-most-of-masters/>) is an initiative that aims at building links between universities and businesses (public, private and third sector). Many of the postgraduate courses of UStir provide opportunities for Masters students to undertake collaborative dissertation projects with businesses for mutual benefit. These projects are usually the same length as a university-based dissertation, usually running from May/June to September across a wide range of economic sectors. Students can either work at the organisation, or the project can be based at the university, or students may move between both locations as required. Up till now, the UStir has created around 300 University of Stirling student collaborative projects across over 200 different local, national and international business organisations.

### **Benefits of MMM:**

The project aims to provide real benefits to organisations/businesses, the University and postgraduate Masters students. MMM collaborative projects equip students with real-world experience, preparing them for working life. It is also an important step in students career development.

Greater links between industry and universities can be created. The MMM project offers an ideal opportunity to work together, sharing knowledge and expertise that can lead to consultancy, continuing professional development and knowledge transfer opportunities.

- It's cost effective for the business/organisation as the project forms part of the Masters student's degree assessment, so the students do not require payment.
- Businesses involved in MMM have highlighted that collaborative projects provide an excellent opportunity to audition future potential applicants, reducing the costs and risks of recruitment. It also provides the opportunity to address the skills gap often identified by employers.
- Students can provide fresh perspectives to problems and contribute towards new solutions, perhaps providing training opportunities for the employees. Feedback shows that the students may identify gaps in business practices providing opportunities for future development.
- Help the business/organisation to meet Corporate and Social Responsibility objectives with the opportunity to raise public and community profile.

UStir has also developed the **MMM toolkit**:

(<https://www.stir.ac.uk/study/postgraduate/making-the-most-of-masters/making-the-most-of-masters-toolkit/>) including forms specific to the University of Stirling and the degree

courses. The toolkit include a number of guides for those involved in implementing **Collaborative Projects with Business (CPBs)** in taught postgraduate courses. Specifically it includes:

- Student Guides - for Sourcing a Collaborative Project with Business and for Making the Most of a Collaborative Project
- Introducing Making the Most of Masters: a general flyer for businesses.
- MMM Poster for Business Organisations: a useful poster to increase awareness and advertise MMM at business events.
- Making the Most of Masters Case Study: presented at the UIIN Conference (April 2016), Amsterdam.
- Case Study Template - to be used for any Making the Most of Masters case studies.
- Project Proposal Form: this provides organisations an opportunity to suggest Masters projects. It is the first step of the conversation in developing a project and will be used to advertise opportunities to courses/postgraduate students. It can also be used by students and staff for scoping projects with a business. The Project Proposal includes details on how a collaborative project will support the organisation. The proposal can be developed by the organisation or in collaboration with staff and/or students.
- Project Agreement Form: this form is used to set expectations, agree roles, responsibilities and project outcomes in advance of the start of the project, ensuring best practice. It's an essential component of MMM. It poses questions to prompt stakeholders about specific aspects of project management, and has been developed as a template for students to use. The agreement is implemented with the standards for "Quality Commitment for Taught Postgraduate Collaborative Projects with Business".
- Confidentiality Agreement Form: this form is an agreement between the student, the University and the business.

The University of Stirling was a founder member of Making the Most of Masters, funded by the Scottish Funding Council. MMM was award winner (2013 THE AWARDS, outstanding employer engagement initiative). The MMM process and toolkit is now used by many Universities in Scotland and beyond.

**Presentation 2: Dr Andrew Desbois** (Fig 4), Lecturer of the Institute of Aquaculture, UStir, introduced the project '**Blue Technology Master for a Blue Career**' (<https://www.bbmbc.eu/>). This action aimed to create a second year of a Master degree named "Applied Blue Biotechnology Master II" entirely focused on blue biotechnologies and dedicated to their application particularly in the health, nutrition and aquaculture domains. This second year of the Master degree hosts students with 4 years of higher education and takes place at the University of la Rochelle. The consortium gathers academic organisations and SMEs from France, Portugal, Spain and the United Kingdom as well as specific structures like the Apprenticeship Formation Unit and the Lifelong Training and Employability Department from the University of la Rochelle and the Conference of Peripheral Maritime Regions, in particular its Atlantic Arc Commission.

Applied Blue Biotechnology Master II students receive academic and practical knowledge, in addition to soft and technical skills, to become efficient in for example the production,



extraction, characterisation and evaluation of marine molecules with biological activities. The Master also focus on developing communication, language and management skills to help the graduates with their careers as scientists. The project includes innovative education and training: work-linked training takes place for at least six weeks and combines practical approaches (working skills learning) on qualified material with the latest scientific knowledge. Each student is associated to a project led by a blue biotechnology industrial partner, which hosts the apprentice or intern. Workers wanting to increase their knowledge or people seeking employment also benefit from this training. Skills assessments are done through a specially-designed skill acquisition logbook. A winter study school is organised including conferences and courses on Blue Biotechnology. A campaign on career opportunities in the Blue Biotechnology field and the importance of ocean resources is organised for secondary school to higher education students.

This experimental project of European dimension is aimed at transferability from the outset. It identifies and expands good practices from each country involved and encourages mutual learning between European industries and academics in the Blue Biotechnology field.



**Fig 4.** Andrew Desbois presenting his project Blue Biotechnology Masters programme

**Morning session: “Discussion on linking teaching with research and industry in the new developed courses by Asian partners”.**

The participants asked questions and discussed with the presenters about the linking teaching with research and industry in the new developed courses by Asian partners.

**Break-up sessions: opportunity to observe “live” teaching on the University and module discussions**

At the evening session, the participants were divided into two groups and had the opportunity either to observe “live” teaching on the University of Stirling or to watch related videos available on different teaching formats currently used in MSc Programmes. The one-hour “live” teaching was held on a Lecture Theatre at Cottrell Building and was given by the Lecturer of the Institute of Aquaculture Dr. Amaya Albalat. Her talk entitled “Fisheries and Food Security” was within the “Hungry Planet” module, an elective module for undergraduates. Thus, participants had the opportunity to witness “live” teaching, teaching environment and the digital teaching tools that are commonly used in the UStir. At the same time, a different team of participants had the opportunity to watch videos available on different teaching formats currently used in MSc Programmes. After the videos were shown, Asian partners discussed formats that will be most likely used in the new developed modules for SSNS.

### **Lab session demonstration**

At the afternoon session, the participants were divided into two groups. A team of participants followed a lab session demonstration run by Dr. Margaret Crumlish Senior Lecturer in the Institute of Aquaculture and by Dr. Amaya Albalat. The lab session was given at the Pathfoot building of UStir, and specifically at the laboratory facilities of the Institute of Aquaculture. The lab session include techniques of fish anatomy (rainbow trout), fish vaccination, microbiology etc.

### **Module and Course development - Discussions led by Dr Ram C Bhujel**

At the afternoon session, a team of participants joined the discussion led by Dr. Ram C. Bhujel, Coordinator of SSNS project that was about the module and course development. Firstly, Dr. Ram C. Bhujel reminds the participants about the D2.4 Deliverable about the Teacher’s Guidebook. This should contain practices about how to teach effectively. The D2.4 Deliverable will have to be about 20-30 pages coordinated by the European partners, with its first draft to be completed by the end of March 2019. Then the teacher’s guidebook will be translated to all languages of the Asian partners, which is expected to be finalized by end of May 2019, while the submitted deliverable to the EU is expected to be by the end of June 2019.

Dr. Ram C. Bhujel in his presentation mentioned some facts regarding the teaching within the higher education institutes. For example, most of the academics became teachers by default without having an approved teaching certificate, although some Indonesian partners mentioned that it does exist such a certificate in their country. Another consideration about teaching is the fact that usually no one questions about the teaching capacity of the academics. Usually, students are afraid of criticizing the teachers or they even do not bother. But teaching is a profession or art, which requires special skills. At the discussion, some questions raised e.g. how many of the participants have any course or training on teaching methods or pedagogy? How many of the participants have designed the course by themselves? Do we do any needs assessment before starting the course? Do we have feedback-evaluation from students? Dr. Ram C. Bhujel also presented some principles for adult learning vs children learning (Fig 5), for examples, adults focus on “real world” problems, emphasize how members can apply, relate the teaching/learning to their goals, relate their past experience/knowledge, allow debate and challenge their ideas, listen and respect opinions of students/trainees, encourage members to share resources/knowledge, treat everyone adult-like manner.

Ram also presented the 17 methods of teaching and learning methods (Fig. 6), their effectiveness such as power point presentation, reading, demonstration, video, note taking,

discussion, questionnaires, fishbowl, case study, in-basket card sort, role play, role play case study, games, clinics, critical incidents, structured closure activities, open-closed book exams etc. The ones that involve all three senses; sight, sound and hands-on stay longer.

DIFFERENCES BETWEEN CHILDREN AND ADULTS AS LEARNERS	
CHILDREN	ADULTS
Rely on others to decide what is important to be learned	Decide for themselves what is important to be learned
Accept the information being presented at face value	Need to validate the information based on their beliefs and experiences
Expect that what they are learning will be useful in their long-term future	Expect that what they are learning is immediately useful
Have little or no experience upon which to draw—are relatively <u>"clean slates"</u>	Have much past experience upon which to draw—may have fixed viewpoints
Have little ability to serve as a knowledgeable resource to teacher or fellow classmates	Have significant ability to serve as a knowledgeable resource to the facilitator and group members
Are content centered	Are problem centered
Are less actively involved	Actively participate
Learn in an authority-oriented environment	Function best in a collaborative environment
Planning is teacher's responsibility	Share in planning

**Fig 5** Differences in child vs adult learning

	Content Determined by		Learners' Role		Senses		
	Trainer	Learner	Passive	Active	Sight	Sound	Hands-on
STRUCTURED WARM-UP ACTIVITIES		✓		✓			✓
PRESENTATION	✓		✓		✓	✓	
READING	✓		✓		✓		
DEMONSTRATION	✓		✓	✓	✓	✓	✓
VIDEO	✓		✓		✓	✓	
NOTE-TAKING		BOTH		BOTH	✓		✓
DISCUSSION		BOTH		BOTH		✓	
QUESTIONNAIRES	✓			BOTH			✓
FISHBOWL		BOTH		✓		✓	
CASE STUDY	✓			✓		✓	✓
IN-BASKET/ CARD SORT	✓			✓			✓
ROLE PLAY	✓			✓			✓
ROLE PLAY A CASE STUDY	✓			✓			✓
GAMES	✓			✓	✓	✓	✓
CLINICS		✓		✓			✓
CRITICAL INCIDENTS		✓		✓			✓
STRUCTURED CLOSURE ACTIVITIES	✓			✓			✓

Fig 6. Training techniques that involve more senses are more effective.

Moreover, participants also presented and discussed the suggested modules in each HEI. It was agreed that each participant will provide a course outline by Friday 16<sup>th</sup> and each HEI

should develop at least six (6) course outlines at first and after being back to home HEI they should develop all course outlines, as many as the suggested courses are. In addition, each HEI should prepare an outline for each suggested VET course. Dr. Ram C. Bhujel should prepare and send the formats for the course outline and VET course in terms of uniformity. There was a discussion and suggestions about what these outlines should include such as course objective, learning outcomes, pre-requisite, course outline, laboratory session, field visits, case studies, learning resources, teaching & learning methods, time distribution and study load, evaluation scheme, names of instructors etc. An example of a course outline format is given at Annex 1.

The group agreed to develop the six course outlines and the VET courses outlines, and to submit these to the VLE platform by the end of February. Dr Ram showed an example of VET course (Annex 2)

The group also discussed about the suggested internships. None of the HEIs has an internship for the MSc programmes that they are running. Dr. Ram C. Bhujel presented some previous internship projects developed by AIT (Thailand) and gave an example format (2 pages maximum, see Annex 3). It was agreed that each HEI should develop at least three (3) internships (with companies, farms etc.) for their SSNS centers. It was agreed that the outlines of the internships should be ready by the middle of March.

### **February 13, 2019 (Day 3):**

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Trip to Loch Leven salmon farm

Mowi, former Marine Harvest, Scotland

Report prepared

by Jorgen Lerfall and Anita Jacobsen, NTNU

Mowi Scotland (formerly Marine Harvest Scotland) employs 1250 people within its fully-integrated value-chain that includes feed milling, farming, processing and sales (Fig 7). The company holds RSPCA (Royal Society for the Prevention of Cruelty to Animals) and an ASC (Aquaculture Stewardship Council) certificates. The certificates required that the salmon has been produced to certain standard when it comes to environmental impact, disease-related mortality, therapeutic treatment, quality of feed, location for the farm, animal welfare, escapes etc. The company performs therefore detailed weekly environmental monitoring of sediments at the production site seafloor to assess their potential impacts on biodiversity and nearby ecosystems. The RSPCA welfare standards have been developed to represent good practice in the care and welfare of commercially farmed Atlantic salmon at all stages of their lives. Key welfare issues of fish farming are: water quality (temperature, pH, oxygen level), handling procedures, stock densities, transport procedures and slaughter methods.





**Fig. 7** Salmon cages (left) and feeding control room via under water CCTV camera

At this trip, we visited Loch Leven salmon farm that is located close to Fort William on the west coast of Scotland, approximately 2 hour driving from Stirling. We arrived the farm at 10.30 am and was met by the production manager Andy Martin who gave us a thorough review of the company (Mowi) and the history of the location. After the introduction, we was dressed up and transported by ribs to the cages that were located approximately 100 m from the littoral zone. Andy gave us an interesting and thorough tour of the facility. He did moreover tell us about the production cycle of the fish, and about challenges in the salmon farming industry. The well boat Ronja Commander was simultaneously operating at the facility, which gave us a close view to study the catching/harvesting of slaughter ready fish.

The Loch Leven salmon farm is a seawater facility producing Atlantic salmon from smoltification to slaughter ready Atlantic salmon. To reach commercial size (range between 3-7 Kg) the fish was fed between 11 to 21 months, where the feeding time was affected by several factors including age of the smolt at start of production (0+ versus 1+ smolt), water temperature, genetics etc.

The farm consist of 16 square cages ( $24 \times 24$  m) with a total depth of 15 m included a net pen in the bottom of each cage to collect dead fish. Due to fish welfare regulations of the specific farm, the maximum fish density was set to 1.8% that is lower than commercial regulations elsewhere (e.g in Norway where the maximum biomass is 2.5% of the total volume). The capacity of the farm were moreover build to comply with regulations on fallowing (3 months) before a new production cycle could be started.

One of the major problems regarding salmon welfare is sea lice and mortality. On-farm testing for sea lice was carried out and maximum approved level in Scotland is 0.5 mature female lice on average per fish (as a comparison the maximum level set by the Norwegian government is 0.2). If the monitored levels of sea lice reach higher levels than 0.5, the company must act to reduce those levels. The delousing processes used are normally cleaner fish during spring, summer, autumn, and a system based on warm water (ThermoLaser) during winter. Cleaner fish is less effective due to reduced appetite and high mortality in the winter season. The most used cleaner fish is lumpfish (*Cyclopterus lumpus*) or Ballan wrasse (*Labrus bergylta*) (Fig 8). The cleaner fish is an alternative to chemical and mechanical treatments for sea lice and is a sustainable and environmentally friendly way to control the sea lice. The animal welfare standard also applies for the cleaner fish.



Lumpfish (*Cyclopterus lumpus*)



Ballan wrasse (*Labrus bergylta*)

**Fig. 8** Cleaner fish used for controlling the sea lice in salmon cages

The company makes monthly reports on mortality. Average mortality the last month was approximately was between 1.68 and 2.49%. Normal mortality throughout the seawater cycle is between 2-6% of the population. The overall mortality during the seawater production cycle is highly dependent on the robustness of the smolt used.

#### Feeding and feed costs

Fish feed constitute 60 % of the company's costs. Monitoring and proper feeding are therefore crucial both in an environmental and a cost perspective. Manual camera monitoring was performed to assure correct feeding. The exact feeding factor the last month range between 1.029 and 1.104 between the different cages of the farm. Controlling feeding was ranked as the most important job at the farm.

#### Slaughtering

The fish was transported by well boat to a slaughterhouse or the company could slaughter the fish themselves at the cage. Slaughtering at the cage could be effective to produce high quality salmon adapted to small costumers. It was moreover done because of economic reasons. Since the farm was located beyond a low bridge, only the smallest available well boat could operate the farm and increases costs related to transport of fish between the farm and the slaughterhouse. After visiting the Loch Leven Salmon farm, the group went for lunch in Fort William before returning back to Stirling.

### **Day 4 – February 14, 2019**

#### **Report prepared by**

Dr Minh Phu, Can Tho Univ., Vietnam  
and Nam Kha, Nong Lam Univ., Vietnam

The session started with a brief review of the activities of the Day 2 & 3 by the Dr Ram C. Bhujel.

The session on the **ethical procedures for research and teaching in UoS** started from 9.30 am as usual. Dr Margaret Crumlish gave overview of ethical procedures for research on behalf of Alex Pargana. A handbook of the University of Stirling Procedures Associated with Animal Experimentation is available in pdf format. According to Margaret presented. All research at UoS should perform to the highest ethical standards for better scientific outcomes and social trusts. Research involving live animals has particular legal requirements.

Legal context: animal experiment is controlled by the Home Office – of the UK Government. Researchers need to work through licensed establishment. Need to work under a project license and personal license (PhD student). Need to follow all procedures for requesting facilities and animals (Fig 9. Supervisor needs to train student. Any procedure conducted for scientific or regulatory purposes, which may cause pain, suffering, distress or lasting harm to a protected animal. Any non-human vertebrate and any cephalopod. Fish and amphibians are protected from the time they become capable of independent feeding but procedures conducted earlier, which may affect them in later life are also controlled. Cephalopods are protected from the time of hatching.

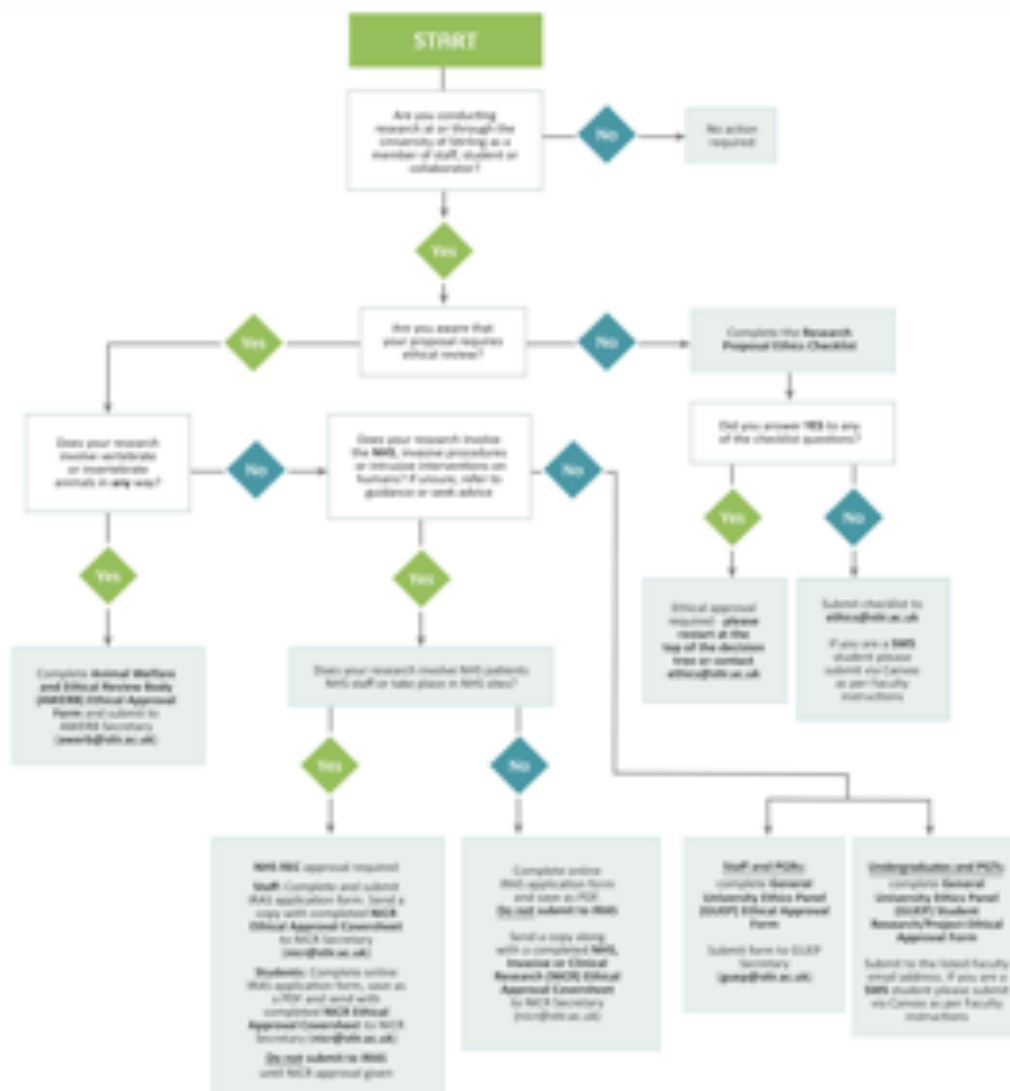
PELH (Procedures Establishment License holder) involves the Deputy Establishment license holder, NVS (Named Vet Surgeons), and NACWO (Named Animal Care and Welfare Officer). Approval is needed well in advance before experiment starting time.

To plan work with fish, we have to:

- ensure appropriate project and personal licenses are in place
- check project license conditions and discuss with license holder
- check availability of facilities and discuss with NACWO
- prepare and submit a project document for review by AWERB (animal welfare and ethical review body)
- respond to AWERB comments
- submit a request form for facilities to NACWO
- ensure all necessary training and supervision has been completed and recorded
- NACWO will report to NVS if everything is ok

She explained, if a student plans to work with fish the following is the process:

1. Ensure appropriate Project and Personal Licenses are in place
2. Check Project License conditions and discuss with license holder
3. Check availability of facilities and discuss with NACWO
4. Prepare and submit a project document for review by AWERB (Animal Welfare and Ethical Review Body)
5. Respond to AWERB comments
6. Submit a request form for facilities to NACWO
7. Ensure all necessary training and supervision has been completed and recorded



**Fig. 9** Steps in obtaining the approval for doing research with live animals.

Application is submitted to AWERB@stir.ac.uk AWERB is the animal welfare and ethical review body (NVS and NACWO)

1. Reviewed weekly by Lay Chair, Deputy chair, NACWOs, Lay statistician, NVSs and Scientific members
2. Approval or request for resubmission with modifications

Generally approval following this but some applications can undergo several rounds of review. For application, need to use template not online

Section A: General information

Section B: Project/protocol details

Section C: Experimental protocol

Section D: Research involving human participants

Section E: Data protection, copyrights and other considerations

Giving an example, Dr Ram shared a case with a student York University in UK who planned to work in tilapia fry to carry out an experiment with small tilapia fry. The student was from USA who was not very much aware of about the requirements. The plan was to conduct a trial to develop a protocol for the adaption to salinity considering the salinity

intrusion in freshwater. But it was too late to get approval, and they asked if there were any Ethical Guidelines implemented at AIT. Unfortunately, they were not there. As a result the student could not do the experiment, and she had to change her topic of research and design survey research, which did not need to handle/touch the fish. She was shocked from the decision of the committee on Environment as she was already on her way to Thailand hoping that she will be allowed to do her experiment. She then came up with an idea to write an article “Perception about aquaculture in the UK and Thailand”. It shows that the ethical guidelines are becoming important and needs to have in Asia as well. A committee should be established to develop “Animal Welfare and Ethical Guidelines for Researchers” and a course might be needed on this.

More importantly, if things changes need to include those changes in the new form and submit again with new starting date, number of fish, species, age, location etc.

UK license is only applied within UK have to apply the document before travelling

3R: Working with non-protected species (larvae, invertebrates etc.),

During the Discussion, a question was asked about the time for student to get permission. It was mentioned that 10 working days, or up to month but in case of human medicine it may take 6 month. Another question was whether they also have onsite monitoring? Answer was “Yes”, they may go and observe, check records, e.g. feed, animal, etc.

11.00-11.30

**Health and safety procedure, by Fiona Strachan**, Responsible for health and safety at the Institute of Aquaculture (IoA).

### **Section 3: Health and safety at Work Act:**

Health and safety at Work Act 1974, which embraces required regulations such as work equipment, personal protective, manual handling, electricity substance hazardous to Health (chemical, biochemical, infectious agents). Others include genetic manipulation and radioactive substance.

Duties and responsible staff and students need to be informed and agreed to follow

→ stick on the introduced items. No person shall intentionally or recklessly interfere with or misuse anything provided in the interests of health or safety. There is a safety hand book online in PDF form which has more 17 sections such as Contents and safety policy, departmental organization, general safety, COSHH, Radioactive chemicals, Waste disposal, bacteriology Code of practice, Virology, COWP, Field work guidance, working overseas, GM Work, Use of VDUs, Electrical equipment and life jackets.

In the Lab and field, clear signs should be there for First aid, eye wash station and safety shower, door notices, labeling, hazard labels, personal protective equipment, pipetting, acid cupboard, flammables cupboard, waste solvent, waste disposal, decontamination of equipment, fume cupboard with scrubbing unit, tissue culture, biological safety cabinet, gas cylinder etc.

MSc students will have to fill up the safety induction sheet.

Before starting any experimental work students have to make sure to:

- obtain a copy of the risk assessment
- understand the working procedures and control measures to be used – read, sign and obtain counter signature



- follow the controls specified.

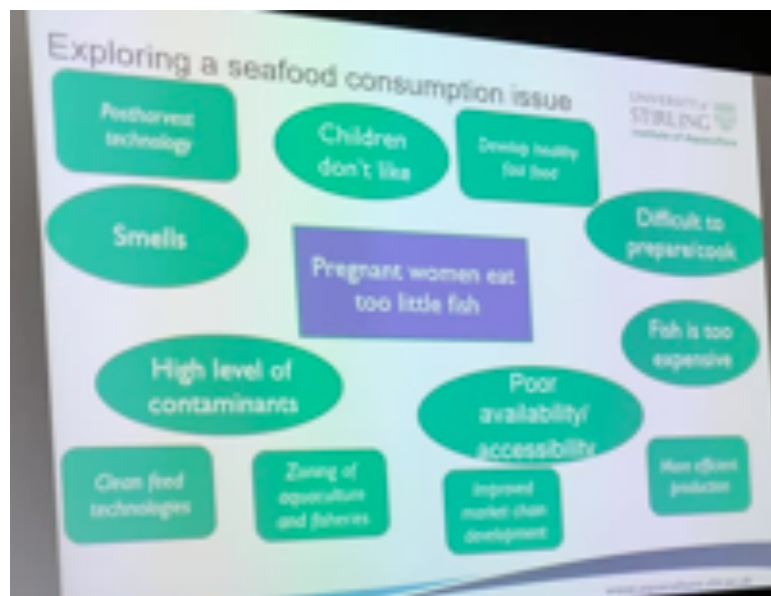
Risk assessment for new procedures needs to be done. Similarly, risk assessment for Fieldwork FW1 TO FW8, starting from Travel to and from site to livelihood survey. Safety during Fieldwork is done in terms of Physical fitness, working alone etc.

IoA has ISO 17025, GLP, internal calibration, MSDS safety datasheet. Discussion on laboratory safety of students, specific cases, NaOH pellet use, volumetric flask use

**A seafood consumption initiative** at Stirling: *interdisciplinary research towards societal impact* by Prof. David Little

Dave gave an overview of Scottish seafood industry. Scotland exports 80% of the seafood it produces (value of GBP 613 million i.e. nearly 1 Billion USD). But it imports 80% of the seafood it consumes. In Europe, only meat portion of Salmon is consumed. Head, skin and bones which are more nutritious, are sent to Vietnam or Asian markets. Therefore, more needs to be done to educate and encourage consumption of Scottish fish within Scotland/EU – and it needs to be easily identifiable as Scottish” as fish consumption is relatively low as compared to other EU countries. Seafood is more environmental friendly which needs to be promoted. Asian countries are having diverse species and eating aquatic products more often than EU country people. Small self-recruiting species have more nutritional value to the poor than large commercially farmed fish. Aquaculture is an alternative livelihoods and rural economy. He presented the issues of seafood consumption, which is shown in Fig. 10.

He presented findings of a project called, “MefANIG: metric for aquaculture nutritional impact for Girl. Pregnant women who need good nutrition do not eat fish. One of the reasons mentioned was pollutant especially mercury which causes abortion. Whereas pangasius catfish, only 30-35% comes as fillet and is exported (while white meat), remaining still in Vietnam which can be processed to valuable nutrients especially micronutrients from the seafood which can be useful to pregnant women.



**Fig. 10** Seafood consumption issues

### Design a Practical / Lab Sessions- by **Margaret Crumlish and Amaya Albalat**

The aim of session was to do some practice of designing. Participants were divided into three groups; aquaculture, fisheries and seafood technology. They were asked to design one laboratory class writing background, learning outcomes, necessary equipment and materials, timetable, budget etc. One of the members from each group was assigned to present their outcomes (Fig 11).



**Fig. 11** Dr Ilham presenting the Practical class developed by his group.

#### Group Discussion on Practical course

1. DO measurement: learning outcomes, consumable, internal organization, cost, Health and safety consideration, guidelines,
2. Fish quality determination using sensory technique
3. Fisheries monitoring

#### **Discussion:**

Proposed course: “Ethical considerations in aquaculture research”, done the first draft by Prof Phuong, CTU, VN then get support from EU partners, Margaret will contribute. This would be a separated course. Course would be specified for each Asian partners country. Check livestock regulations and may take template for aquaculture.

How we can address the micronutrient from seafood to community? From our perspective we need to design a course. Iron in fish for pregnant women, nutrient deficient → malnutrition or deficiency disease

Therefore, proposed: “Seafood and human nutrition” course as an outcome of the project should be the long-term solution. The course should include Fish Composition, human nutrition requirement, correlation between Seafood and human nutrition, seafood cooking methods, and so on.

It was reminded that the following day (Friday, 15-2-2019) is deadline for delivering the draft of course outline.

### **February 15, 2019 (Day 5)**

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Report prepared by  
Dr Roni, Univ of Gadj Mada  
Dr Ilham, JFU, Indonesia

Friday session started with the presentation from Kimberly Wilder (Email: [Kim.wilder1@stir.ac.uk](mailto:Kim.wilder1@stir.ac.uk) or [academicdevelopment@stir.ac.uk](mailto:academicdevelopment@stir.ac.uk)), talking about theoretical aspects of module design: learning outcomes, assessment and feedback.

According to her, module should be clear for the students helpful to the students to understand why they should take the particular module. Teachers should expect that the student would come with some expectation of developing new skills and demonstrate what they learned after completing the module. Constructive alignment: module, assessment should align to each other to obtain the outcome of the module. In order to get the best of the students during the learning journey we need to think of different criteria. They are several key words for each criteria e.g. to test the knowledge we can ask the students using the word “define”, etc. For the master degree, the learning outcomes cover the higher degree of the boom’s taxonomy (Fig 12). The lower skills should already have been obtained from the undergraduate. We can cover the knowledge, comprehension or application during the class but after the assessment, we want the student to be able to analyze, synthesize and evaluate. Start for the end: what do I want to achieve from the lecture, then start climbing up by designing the activities and methods of lecturing. In other words, knowledge is arranged to give to students in the form of course, then it passes through various steps of comprehension, application, analysis, synthesis and evaluation. She presented about how to design learning outcomes with constructive alignment (Biggs, 1996) with learning activities and teaching methods, and assessment tasks and criteria.

Learning outcomes should be specific, measurable, achievable and recognizable. For examples, the followings should be avoided which are not measurable.

- Students will learn how to develop a well-designed argument.
- Our program provides students with opportunities to learn about contemporary problems in the field of biology.

Instead of these, she suggested the followings:

- Students will identify an issue, develop an arguable thesis about the issue, locate relevant supporting evidence, analyze the evidence, and draw a well-supported conclusion.
- Students will evaluate the challenges associated with solving a contemporary biological problem, the importance of finding a solution for the problem, and the validity of the scientific evidence currently used in pursuit of solutions for the problem



**Fig. 12.** Boom's model

As an exercise, participants were asked to write at least two learning outcomes for their modules/courses. She also suggested considering the learning activity or assessment that you could do that would allow your students to demonstrate that they have met the learning outcome. At the same time, it was suggested to share learning outcomes and assessment activities with a partner or friend asking for peer-critique and peer-encouragement to colleagues.

Feedback – Kim's presentation also included importance of assessment of student's ability. Students need to fully understand the assessment process – it should be transparent. Tacit understanding should be made explicit – it should not be assumed that they know how it works, or that understanding how assessment works is part of the assessment, i.e. that they should work it out for themselves. At the same time, she also explained about the need of feedback to the teachers about the courses and delivery methods so that teachers can improve it. At the same time, teachers should give feedback to the students about their work/performance. So we need to create an environment where students not only know what feedback is and how to use it, but a space for them to have the chance to practice using it and have open dialogues with their lecturers, with their peers, or even with themselves about the feedback they receive.

## Q&A

Q: learning objective should be something measurable?

A: yes, learning objectives should be measurable

Look at the draft and look into the content and could it answer all the questions. In Stirling, a review board assesses the course whether it can fulfill the learning outcomes. The lecture should send the description of the course to the review board.

**Dr. Ram** said that We are creating new program in seafood sustainability to address the problem of real world. The knowledge we have should be transferred to the students using this program. Within the program we have three categories: Aquaculture, postharvest and fisheries. In aquaculture, the program should cover Breeding and genetics, Disease, Environmental topic, Nutrition, Production systems, Socioeconomics, Seafood and human nutrition

**Dr. Kim:** start from what the students want to know, what is important for them and what we can do to achieve it.

**Dr. Ram:** The module should be more advance because we are going to teach master students. If the courses have been delivered in the undergraduate program, they should not be given again in master degree.

**Dr. Phuong:** In Vietnam, master program in aquaculture focus on the production and less on the seafood safety or ethical issues. Therefore, these should be included.

**Nong Lam:** Need to add a course in seafood and human nutrition; socioeconomics.

**Q:** how we evaluate the summative assessment if we have students with different background

**A:** the assessment should be designed as general as possible. We can't make assessment for each individual student. However, we can consider the background of the students to some extent when creating the assessment.

**Q:** how we structuring the assessment for example combining presentation and exam

**A:** we can combine different type of assessments. For example, the student give presentation and the student understanding is assess in the exam.

In the afternoon, a presentation on funding landscape for research and innovation presented by a representative from the Research and Innovation Office of the UoS. She showed a number of funding opportunities / possibilities existed in the UK to develop new proposals for further collaboration which is of interest to UoS and SSNS project partners.

The remaining afternoon was devoted to plan fro the Project: **Dr. Ram C. Bhujel as Project Coordinator** gave a presentation stimulate discussion. Major highlights are:

1. SSNS program is still in the beginning of the process i.e. course development: development of list of MSc courses & their outlines, list of training courses and their outlines, and list of internship placements and their details.
2. Training courses and internship hosts or field works should be targeted to international students from Europe in addition to offering to local students.
3. Lecturers of all partner universities need to visit the field frequently to collect real time information and should take some pictures and video clips so that they can teach students using them, which make courses more interesting. Teaching merely using PPT slides prepared from books and internet or previous universities from where they graduate may not serve the purpose.
4. As a part of WP3, a SSNS Centre or unit needs to be created forming SSNS group of people as a SSNS team or unit within their existing organization so that its activities will be prominent in the university or even at higher level such as country wide, especially for MSc and VET course training or internship programme.
5. Another step, Asian partners have to get some sort of accreditation or approval for the courses developed from their respective institution (WP4).



6. They advertisement of the program, offering, and implementation. During implementation of the courses each semester, feedback from the students and other stakeholders would be useful to improve them regularly.

**The Project Coordinator asked to do Group work at each Asian partner universities for the followings:**

Each Asian partner needs to meet, discuss and produce the followings:

1. A complete list of courses suitable for MSc specialized in SSNS
2. A list of VET courses on SSNS program
3. A list of placement for internship

Vietnam partners mentioned that it would be difficult to open new program because of many regulations from the government. The Thailand's also experiencing similar problem as well as Indonesians'. Thus "specialized" Seafood Security program within the existing programs is more appropriate based on which partners are going through selecting the missing courses. Examples were shown prepared by Khon Kaen Thailand, Can Tho University and IPB Indonesia and discussed whether their course lists were adequate.

The course list from Khon Kaen is missing "Sustainability" related course

One of the teachers mentioned that sustainability might have already included in the other courses as we are going to teach master degree students who should have previous knowledge. At least it was agreed that "Seafood and human Nutrition" course was agreed to add which was included in the list of Can Tho University. Some of the lectures mentioned that expertise may not exist in Asian partner universities. However, it was also agreed that they should invite a teacher from nutrition program, if necessary, as it should be taught by someone who knows about human nutrition.

Program and course names should be attractive and they should be designed with good thought that it can attract more and smart students.

**Planned activity plan:**

Each Asian partner is encouraged to send a representative to join the in-country training which are tentative planned in September (2019), November (2019) and February (2020) in Thailand, Vietnam and February respectively as shown in the Table 3 along with other deadlines. Doodle will be used to find the suitable dates for these programs.

**Table 3.** Important deadlines discussed and agreed for SSNS project activities.

Activities / outcomes	Deadlines
A course outline by each participant attending study tour	February 15
A VET course & trip report by each participant	March 1
An internship host by each participant	March 15
Full list of course by each university partner	March 15
Complete course outlines by each university	June 30
At least 3 VET courses by each university	March 30
At least 3 internship hosts per university (in the form of letter of agreement from the hosts)	June 30
In-country training:	
Thailand	September
Vietnam	November
Indonesia	February

In-country training: European partners will observe the teaching process, the facilities and talk to the students. The European partners will also talk to the higher authorities i.e. Dean, Rector or Director of International office. The European partners will explain and discuss the importance of the program. The new proposed programs should be able to generate some income for the program/unit.

**Dissemination activities:**

1. Project Coordinator (Dr Ram) asked every one to search and join the Social media/Facebook group: **Sustainable-seafood-net**) post news, and share them so that it can reach as many people as possible.
2. At the same time he also asked every participant to check project webpage frequently for new information/activities: www. <https://www.seafood-security.org>
3. The brochure can be downloaded in <http://www.seafood-security.org/brochure>
4. Original ppt format of the brochures should be distributed to all participants so that they can translate into their languages and produce to distribute locally.
5. Present SSNS in every conference, print the brochure and distribute to as many participants as possible.

At the end, organizers were thanked for their hard works, and representative from the participants expressed their good feelings. Everyone agreed the program was very successful, and will have good impacts. They were also asked to fill up a brief questionnaire or feedback form. The Study tour and training workshop was closed after having group photos.

Trip report edited by the  
Dr Ram C. Bhujel, Project Coordinator

## **ANNEX 1. Example of course outline format**

### **ASIAN INSTITUTE OF TECHNOLOGY SCHOOL OF ENVIRONMENT, RESOURCES AND DEVELOPMENT**

**ED71.xx Sea Food Business**

**2(2-0)**

**Semester: January**

**Course Objective:** Seafood products are highly traded items in both the local and global markets. Seafood production, processing and trading have been highly commercial and globalized activities, which have resulted in a competition tougher than before. More recently, regulatory requirements are becoming stricter and often more complex. This course provides students with practical Seafood business management tools in the production, processing, quality control, and marketing of Seafood products in both the local and global markets to ensure the long-run sustainability of seafood production.

#### **Learning Outcomes:**

On completion of this course, students will be able to:

- identify suitable types of Seafood products for business
- explore the local and international markets for aquatic products
- apply seafood safety measures and certification processes
- carry out cost-benefit analysis of Seafood business
- develop a business plan for start-up seafood business

**Pre-requisite:** None

#### **Course Outline:**

##### **I. Introduction**

1. Scope of seafood business
2. Feeding the world in 2050 & trends in food supply chains
3. Entrepreneurship in seafood industry
4. Seafood products (live, fresh and processed fish)
5. International seafood trade

##### **II. Context of Seafood Business**

1. Financial resources and institutions
2. Inputs and technical support services
3. Research and development
4. National and international food safety standards and hygiene requirements

##### **III. Clients, Consumers and Product Development**

1. Markets: domestic and international
2. Consumer behavior and expectations
3. Food crisis, customers' food scares
4. New product development and deployment

##### **IV. Quality Certification and Industry Standards**

1. Principles of certification
2. Certification vs. branding
3. Overview of major families of standards
4. Organic Seafood standards
5. Fair trade standards and traceability
5. Industry standards (ASC, MSC, GLOBALGAP etc.)
6. ISO standards (ISO 9000, 14001, 22000)

#### **V. Cost-Benefit Analysis**

1. Cost, revenue, gross margin, and net profit
2. Partial budgeting of seafood businesses
3. Benefit-cost ratio
4. NPV, IRR, Payback period etc.
5. Decision making / choosing the right businesses

#### **VI. Planning and Management of Seafood Business**

1. Business plan development
2. Human resource management and team building
3. Management of cooperative/contract farming (clusters, farmers groups etc.)
4. Implementation phases
5. Regular monitoring and evaluation plan
6. Lessons learned and continuous improvement
7. Expansion and growth

#### **Laboratory Session:**

1. Sensory testing of seafood items
2. Microbial testing of seafood items

#### **Field visits:**

1. Fish farms – Sea bass, Tilapia, Shrimp etc.
2. Seafood processing factory
3. Fish markets - fish landing site, traditional village and supermarket

#### **Case studies:**

1. Tilapia hatchery business – Nam Sai Farms, Prachinburi
2. Sea bass farming – Song Sawang Farm, Chachongsao
3. Shrimp farm – Sib Saen Farm, Chonburi

#### **Learning Resources:**

Textbooks: No designated textbook, but lecture notes will be provided.

#### **Reference Books:**

1. Bhujel, R.C. 2014. A Manual for Tilapia Business Management. CABI Publishing. 216 p.
2. Engle, C. 2010. Seafoodculture Economics and Financing: Management and Analysis, Wiley-Blackwell. 272 p.
3. Leung, PS. and Engle, C.R. 2006. Shrimp Culture: Economics, Market, and Trade. Wiley-Blackwell. 335 p.

4. Washington, S., and Ababouch, L., 2011. Private standards and certification in fisheries and aquaculture. Current practice and emerging issues. FAO. 181 p.

**Journal and Magazines:**

1. Aquaculture economics: An overview, Springer
2. Aquaculture Economics & Management, Taylor & Francis
3. Global Aquaculture Advocate magazine, Global Aquaculture Alliance, USA
4. Aqua Culture Asia Pacific magazine, Corporate Media Services, Singapore
5. Aquaculture Magazine by World Aquaculture Society, USA
6. Aquaculture Asia by NACA, Bangkok

**Teaching and Learning Methods:** Lectures, field visits, case studies and presentations (description attached)

**Time Distribution and Study Load:**

Lecture hours = 15 h.

Field visits = 8 hrs x 3 days

Case study assignments = 8 h. (1 day)

Self-studies = 50 h.

**Evaluation Scheme:**

Case Study report and presentation 1 = 20%; Case Study report and presentation 2 (Trip) = 20%; Mid-semester examination = 20%; and Final examination = 40%.

Students who display a thorough knowledge on aquaculture business management during the examinations, and show excellent analytical skills in evaluating case study reports (written report + presentations) are given an A grade, and those who display a good understanding and analytical skills are given a B grade. Grade C will be awarded for those who show below average knowledge and analytical skills on the subject matter, and the grade D will be given to students who show poor understanding/ analytical skills on the subject matters.

**Instructor:** Dr Ram C. Bhujel

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School Recommendation: \_\_\_\_\_

ADRC Approval: \_\_\_\_\_

Academic Senate Approval: \_\_\_\_\_

**Annexes:**  
**(Select only which you are going to use)**

1. **Needs Assessment:**  
One-page form to be developed and given to students on the first introductory class
2. **Lectures** – lecture notes, 2 hours each, PDF file of the lectures and also reference materials to be provided in advance via online / VLE system
3. **Group discussions**
  - Topic / issues / problems
  - Group plan
  - Date and venue
  - Presentation & Report
4. **Videos**  
Title of the videos, where and how long
5. **Laboratory work** – a lab manual with clear learning objectives to be prepared and provided to the students.
  - Methodology
  - List of equipment, materials and chemicals
  - Reports to be submitted by students (format with deadline)
6. **Field visit / study tours**  
One-page description with the followings:
  - Background
  - Objectives
  - Date and transportation details with do's and don'ts
  - Report with deadline
  - Presentation (date and format)
7. **Internship / field work**  
Full description of the program with the followings:
  - Background and objectives
  - Date and transportation/residences details with do's and don'ts
  - Report (weekly) with deadline and final
  - Presentation (date and format)
8. **Case studies**  
One-page description with the followings:
  - Background description
  - Objectives
  - Report and presentation
9. **Evaluation and Feedback** -  
An evaluation form to be developed to give to the students to get feedback. Scoring methods for each chapter and teaching methods etc, and also open questions can be included what they like the most, what they did not like and what are missing.



## **SSNS Training Course 2:**

### **Sea Bass Farming: Breeding and Nursing and grow-out**

#### **Background**

Asian Seabass (*Lates calcalifer*) by name itself is considered as one of the best seafood items. Its white meat has a good taste and with no bones. It is as high value commercial species in Asia and the Pacific. Many countries have tried seabass culture with little success. Thailand is one of the most successful countries in farming seabass. Techniques of induced spawning, larval rearing/nursing and grow-out farming have been successfully practiced by commercial farmers. As a result fry are readily available, and food fish is also available in almost all the restaurant and markets in Thailand. Grow-out farming is done in brackish water cages. But recently it is also grown in freshwater ponds. Fish is either sold fresh or on ice or exported to neighboring countries such as Malaysia, Singapore, Hong Kong Australia etc. Several countries are interested to develop its farming. This training course has been designed to provide up-to-date knowledge about seabass farming and skills in induced breeding, larval rearing, nursing and grow-out.



#### **Learning outcome**

- Enhanced knowledge about sea bass farming
- Acquired skills of breeding, nursing and farming
- Ability to develop a business plan

#### **Lectures – 4 hours (3+3) – Classroom**

1. Current trends and scope for farming and biology of Sea bass
2. Breeding, nursing methods and grow-out farming (feeding, water quality management etc.)

#### **Practical – 15 hours (3+3+3+3+3) –**

- Fish (4-5 pairs of min. 3 kg in size) and
- Tanks with plenty of aeration and saline water (28-30 ppt)
- Breeding (hormone injection) and larval rearing by doing in a private farm (use hormone 1 cc suprefact/20 cc sterilized water or normal saline water for 10 brooders, 2.5 ml/brooder). (OR- 1 ml suprefact/9 ml sterilized water and use only 1 ml/brooder).

**Final report including business plan:** by each participant – max. 5 pages

#### **Presentation of results by the group of students (Seminar Room)**

- Techniques and lessons learned
- Wrap-up by Instructor (1 hour)

**Feedback and evaluation by** students / participants

**Resource persons:** Dr Ram Bhujel & Dr Renu

## Annex III: Template of the community devilment

### Internship Placement:

#### Organization:

Women's Fish Farming Cooperative, Kathar-1, Chitwan, Nepal

#### Address:

Kathar Ward No. 1, Chitwan District, Narayani Zone, Nepal  
Contact: Tel. +977 (985) – 1075 404

#### Location:

It is approx. 700 feet elevation from mean sea level located in a plain area of Chitwan district approx. 160 km south-west from Kathmandu.



1. **Project type:** Women's Fish Farming Cooperative, the first women's cooperative in Nepal for specially established for fish farming, initiated by the Asian Institute of Technology ([AIT](#)) and supported by WDP-German committee and Canadian Cooperation Office in Kathmandu, Nepal.
2. **Project description:** The project site is close to Chitwan National Park, Sauraha where tiger tops to see tigers in the night and elephant ride to see Rhinos and other wild animals. It is about 30 km from Narayangaghat/Bharatpur municipality. The village is predominantly ethnic group called "Tharu". They are basically farmers; grow rice, raise buffalos, cattle, goat and chicken for milk, meat and draught purposes. They used to catch fish from streams and swamps never farm fish before. Fish farming project was started since 2000. More than 100 women are in two groups for farming fish. One of them with 63 members has been registered as cooperative two years ago. The cooperative give loan and even grants to poorer families in need. Women pay membership fees, interest of the loan, and certain fraction of the sales. This way they are running themselves now. This project has been regarded one of the most successful project in Nepal and various NGOs and Government offices take their farmer groups there for demonstration.
3. **What interns/volunteers can do to help local community?** Although people in the area used to catch fish from rivers, they had never culture fish in the past. Many of them still need technical backstopping for digging ponds, filling, stocking, feeding, harvesting and so on. Therefore, help for these families of rural Nepal is highly in need. Interns/volunteers will visit farmers on a regular basis, see their systems, understand about resources use, and provide suggestions and help in their work, whenever necessary. Collection of information or survey can be done for research. However, nature and the amount of work depend largely on the season. Some of the examples are preparing fish pond for the next stocking, assisting fingerling purchase, feeding/caring fish, harvest, processing, marketing etc.

4. **How to get there:** You can fly with local airline to Bharatpur from Kathmandu (20 min for US\$65). But can also catch a public bus, tourist van etc. (cost less than US\$10) but it takes about four hours road from the capital, Kathmandu. Take a bus that goes to Bharatpur or Narayangargh (district headquarters of Chitwan). Then meet Local Coordinator (Dr. Mathav at +977 985 1075 404 for orientation and further arrangement.
5. **Living conditions:** Be prepared to live in rural setting. Very few people can speak English; only some students and local primary/secondary school teachers. It will be a life-time experience in living with a local family as its member and learning local culture, language and adapting a different way of life. Mr. Jiyan Chaudhary (General Secretary of the Rural Integrated Development Society, a local NGO) and his relatives are happy to offer free accommodation to our interns/volunteers. Normally, their families are extended families. They have basic facilities. There is electricity but it is on and off quite frequently. Land line and cellophone services are there. Cell phone works in the area but you have to have machine and SIM card purchased from other towns. Internet services and ATM/cash machines are not available in the village. Food will be prepared by the family at a reasonable cost.
6. **Climate:** sub-tropical with wide range of temperature that varies from about 15 up to 33°C. Winter (Dec-Feb) is quite cold (need sweater, jacket etc.) and foggy, spring is dry and dusty then rain may start from June reaching heavy in July-Sept. The best season for trekking and panoramic view of Snow Mountains is October-November.
7. **Culture:** It is important to respect local culture and traditions. Cover-up dresses are required. Shoes or sandal does not matter but most of the time you will need to walk; therefore, light sport shoes/trainers will be suitable.
8. **Miscellaneous:** travel medical kit, light mosquito net, sleeping bag, flash light, umbrella or rain coat, few books, towel and other toiletries are suggested to bring.
9. **Interns are responsible for the followings:**
  1. International airfare and local travel
  2. Visa fees for visa/passport
  3. Medical /LIFE insurance
  4. Food and drinks (Approx. US\$1/meal)
  5. Any costs of trips, trainings, and others arranged personally
  6. Cost of damages due to negligence

Note: you will be paired with students of our local partner institution, as far as possible.