

## ISBW13 Workshop Timetable

Date	Time	Session A	Session B	Session C	Session D	Session E
15 June 2018, Friday	0500 - 0900			<b>WS5A:</b> Seagrass Restoration and Engineering: Engineering a better future for seagrass (Fieldtrip)		
	0900 - 1230	<b>WS2:</b> IUCN Seagrass Red Listing Re-evaluation Venue: SR8	<b>WS4:</b> Initiating an Indo-Pacific Seagrass Network (IPSN) Venue: SR3	<b>WS5A:</b> Seagrass Restoration and Engineering: Engineering a better future for seagrass Venue: GLR	<b>WS6:</b> Towards an international seagrass science, policy and conservation agenda Venue: ALR	<b>WS11:</b> Plant-animal interactions in seagrass reproduction Venue: SR4
	1330 - 1700	<b>WS3:</b> Human dimension of seagrass use and management Venue: SR8		<b>WS5B:</b> Seagrass Restoration and Engineering: Successful Results in Southeast Asia Venue: GLR	<b>WS7:</b> Virtual Reality (VR) for Science Communication Venue: ALR	
16 June 2018, Saturday	0900 - 1230	<b>WS8:</b> Mapping and analysis of drone imagery Venue: ALR	<b>WS9:</b> Using in situ physiology techniques to better understand seagrass capacity and resilience Venue: SR3	<b>WS10:</b> Embedding resilience into monitoring and management frameworks Venue: GLR	<b>WS1:</b> Southeast Asian Seagrass Network Venue: SR8	
	1330 - 1700					
17 June 2018, Sunday	0600 - 0900	<b>WS8:</b> Mapping and analysis of drone imagery (Fieldtrip)	<b>WS9:</b> Using in situ physiology techniques to better understand seagrass capacity and resilience (Fieldtrip)			
	0900 - 1230	<b>WS8:</b> Mapping and analysis of drone imagery Venue: ALR	<b>WS9:</b> Using in situ physiology techniques to better understand seagrass capacity and resilience Venue: SR3	<b>WS10:</b> Embedding resilience into monitoring and management frameworks Venue: GLR	<b>WS1:</b> Southeast Asian Seagrass Network Venue: SR8	
	1330 - 1530	<b>Sharing session and concluding remarks</b>				

Coffee/tea and snacks will be available at 1000 and 1600, while lunch will be served between 1230 and 1330.

## **WS1: Southeast Asian Seagrass Network**

**Facilitators:** Serina Rahman, Jillian Ooi, Pimchanok Buapet, Siti Maryam Yaakub, Ow Yan Xiang, Samantha Lai, Cheok Zi Yu, Jeffrey Low

**Date:** 16 and 17 June, 2018

**Venue:** Seminar Room 8, Education Resource Centre

This Southeast Asian Seagrass workshop aims to bring together all seagrass researchers working in Southeast Asia to map out common research interests and thematic research gaps. This workshop is the first step towards creating a platform from which we will be able to find opportunities for collaboration and improve communication across Southeast Asia. We will also introduce participants to the new Southeast Asian Seagrass Website, and discuss how it can be enhanced to improve information dissemination. Other useful segments within the workshop include grant proposal writing, science communication and community engagement sessions. The projected outcome of this workshop will be the formation of working groups based on research areas or areas of transdisciplinary collaboration, as well as short term goals and timelines for furthering seagrass research in Southeast Asia. This workshop is targeted at researchers who work in Southeast Asia, and who wish to expand their regional networks with the aim of initiating collaborations. Sign up now to strengthen Southeast Asia's voice for seagrass research!

Workshop format:

This 1-day workshop will consist of presentations and group discussions. It will also include skill-based mini-workshops on grant proposal writing and science communication and engagement to help build up research capacity within the region. Participants from different countries and research groups will be encouraged to work collaboratively to initiate regional projects with common goals.

## **WS2: IUCN Seagrass Red Listing Re-evaluation**

**Facilitators:** Brooke Sullivan

**Date:** 15 June, 2018

**Venue:** Seminar Room 8, Education Resource Centre

IUCN Red List of Threatened Species™ is widely recognised as the most comprehensive and objective approach for evaluating the conservation status of plant species. The IUCN Species Survival Commission is specifically tasked with measuring the relative risk of extinction for described species around the world. The IUCN Species Survival Commission has tasked the Seagrass Red List Authority (RLA) Seagrass Specialist Group (SSG) with updating the IUCN Red List status for seagrasses in 2017-2020. Risk assessments are prepared to determine the conservation status for each seagrass species. This is achieved through standardization of assessment methodologies, participation of leading global scientists, and a rigorous review of best available science.

The specific issues for the Seagrass Red List are: what to do about the listings for *Zostera* vs. *Nanozostera* and *Hetrozostera* species; revision of species status for several *Halodule* species; and discussion of the Red Listing for some *Halophila* species. In addition to ideas on the Seagrass Red Listing, the SSG will discuss the status of seagrass conservation activities and create an updated list of activities worldwide to submit to IUCN.

Workshop format:

The Expert Assessment for the SSG will commence through an introductory session at WSC led by the SSG Chair, Dr. Fred Short and RLA Coordinator, Brooke Sullivan. They will introduce key topics and methodologies employed by the IUCN to identify the conservation status of global seagrasses. Following WSC, this workshop will facilitate widespread participation of global seagrass experts in identification and qualification of specific IUCN criteria, including the collection and citation of key biological parameters. The workshop will begin with a brief introduction to the IUCN Red List and Criteria, leading to facilitation of taxonomic focus groups, discussion and identification of key resources and finally review of existing species profiles. The goal of the sessions will be to collate existing data generated by global seagrass experts so that we can effectively reassess and update the current IUCN Red List. Dr Short and Ms Sullivan will oversee the final qualification and collation of data for all seagrass species profiles generated by the workshop participants and use those assessments to establish and update the status of all described species of seagrass world-wide.

### **WS3: Human dimensions related to seagrasses: adding gender for better management and conservation**

**Facilitators:** Maricela de la Torre-Castro, Madeleine Gustavsson, Miguel Fortes

**Date:** 15 June, 2018

**Venue:** Seminar Room 8, Education Resource Centre

During the last 2-3 decades advances have been done regarding increasing the knowledge of people relations with seagrasses (the plant itself and the associated goods and services). Special emphasis has been done to develop the social-ecological systems approach for better seagrass management. The overall objective of the proposed workshop is to advance and tune down the knowledge on gender and seagrasses related to management and conservation. To date, it is well known that both men and women are key actors in seagrass meadows, but there is a paucity in this knowledge and most of it is in anecdotal form. There is a need to map and understand the links between gender and seagrasses in a systematic way.

In this workshop, we want to continue this line of work by addressing three specific dimensions:

1. Diversity of seagrass resource users with special attention to gender
2. Conservation measures such as, for example, Blue carbon initiatives and their differential effects on women and men
3. Inclusive management for better seagrass use and conservation

Workshop format:

The workshop will be open to all participants encouraging that all seagrass bioregions will be represented. Key presenters will introduce the three main points by giving a micro lecture. Questions will be prompted by the presenters and key terms clarified in each heading (e.g. what do we mean by gender, conservation and seagrass management, why gender is important to achieve better management, how can we link the scientific knowledge about gender and diversity to promote better management). After the micro lectures, group work and discussion will take place. Participants will be divided into seagrass bioregions and they will discuss specific questions regarding 1) mapping and analysing resources users, who is doing what and where in the seagrasses in each bioregion; 2) what conservation initiatives are at place and what are the consequences of them?; 3) what ways men and women are affected differently or similarly from those conservation measures?; 4) given the knowledge about gendered actors and differential effects, how can we promote better and inclusive management in each respective bioregion?; 5) what are the difficulties and opportunities that each bioregion has regarding the possibilities to develop/apply inclusive management?

The discussions will be caught in conceptual diagrams for each bioregion capturing the key information for the three main themes, and subsequently shared in an interactive plenary session. In this part, we will try to capture key similarities and differences of each bioregion. We will also put emphasis to extract the key points to promote a positive management change (to actually push for action). We close with concluding words and the performance of a short questionnaire using the cell/mobile phones facilities of each participant.

#### **WS4: Initiating an Indo-Pacific Seagrass Network (IPSN)**

**Facilitators:** Lina Mtwana Nordlund, Johan Eklöf, Benjamin Jones, Richard Unsworth and Leanne Cullen-Unsworth

**Date:** 15 June, 2018

**Venue:** Seminar Room 3, Education Resource Centre

During this workshop we will launch the Indo-Pacific Seagrass Network (IPSN); a collaborative research network aimed to build capacity, foster knowledge exchange and conduct collaborative research on seagrass biodiversity, ecosystems and their associated fisheries across the Indo-Pacific. We are inviting researchers, practitioners and resource users interested in seagrass and associated fisheries in the Indo-Pacific to this workshop and to join IPSN. Please express your interest to attend by e-mailing: [IndoPacificSeagrassNetwork@gmail.com](mailto:IndoPacificSeagrassNetwork@gmail.com)

Seagrasses are diverse and productive ecosystems that constitute important fishing grounds, used by men, women and children, targeting a wide range of species. The IPSN first year's theme is "seagrass gleaning": fishing/collecting invertebrates and/or fish with no or very basic gear in water where it is possible to stand.

The structure of the collaborative network (IPSN) is such that data will be shared within the network to allow for larger-scale analysis (cross-site comparison), while each contributing team still owns their data. Each collaborating site is encouraged (and will be supported through the IPSN mentor program) to publish and share its collected data with local and national fisheries and environmental authorities.

Workshop format:

The workshop will consist of two parts: 1) an introduction to IPSN, and 2) discussing, refining and practicing the research protocol for the first year's data collection to enable replicated data gathering across sites. This one-day workshop will include two health breaks and one lunch break.

## **WS5: Seagrass Restoration and Engineering**

**Part A: Engineering a better future for seagrass** (Facilitators: Emma Jackson, Andrew Irving)

**Part B: Successful Results in Southeast Asia** (Facilitators: Anitra Thorhaug, Jennifer Verduin, Michael Yap, John Gallagher, Ejria Saleh)

**Date:** 15 June, 2018

**Venue:** Global Learning Room, Education Resource Centre

This two-part workshop examines the utilization of seagrass restoration technologies in large scale ecological engineering projects, and the potential for seagrass habitat creation to be part of the growing “working with nature” approaches to coastal development. In the afternoon we examine the fundamentals of restoring seagrasses, the lessons learned from programs conducted within Southeast Asia and the Indian Ocean, and parts of Oceania as “State of the Art” for successful restoration.

### **Part A. Engineering a better future for seagrass**

Seagrass are often described as ecosystem engineers, providing a wide variety of ecosystem services that drive our blue economy, but are vulnerable to coastal development and port activities. As such, there is a strong incentive for “working with nature”, as an ecological engineering approach to sustain and enhance the economy.

Ecological engineering is not a new idea, but its application in marine systems is only recently gaining momentum, and primarily in hard structure and reef ecosystems. Whilst seagrass restoration research still has a long way to go, recent advances in seagrass restoration techniques, greater understanding of the ecological feedbacks that promote successful seagrass restoration, and a wide acceptance that scaling up restoration is critical, all set the stage for utilizing seagrass ecosystems in sustainable ecological engineering design (e.g. coastal protection, capping sediment and dredge spoil, creating fish habitat, biodiversity offsetting, carbon farming) and working with natural seagrass dynamics to promote resilient seagrass populations. From a seagrass restoration, creation and enhancement research context, this workshop will examine the “could we and should we” of utilizing seagrass in ecological engineering design. To facilitate timely outcomes from the workshop, workshop attendees will be asked to provide the following ahead of the workshop (where available):

1. Examples of where seagrass has been utilized through restoration or habitat creation to perform a specific function in relation to coastal developments, whether industrial, urban or other.
2. Detail three reasons for eco-engineering with seagrass meadows and three reasons against.
3. List three priority research areas for translating science into action with regards to utilising seagrass in working with nature and ecoengineering projects.

The outputs of Part A will be a review article on seagrass ecological engineering potential. The framework and initial text for this will be part completed prior to the work shop and those participants interested and with content to contribute, will be invited to co-author.

## **Part B. Successful Results in Southeast Asia**

Recent progress in restoration, techniques, analysis, and policies needs to be disseminated in SE Asia to scientists, NGO's and especially resource managers and decision makers. The aim of second part of the workshop we will attempt to teach not only about new techniques and monitoring, but also policy and seagrass services. We also aim to create a network of Southeast Asian results of seagrass projects open to attending members so that publications can be derived. Topics covered include:

1. Need to restore seagrass
2. Methods to plant seagrasses and which work in tropical and temperate areas
3. Best methods for harvesting, transport, holding, planting, anchoring, monitoring, and final success, and how these best methods work in Southeast Asian tropics
4. Case studies from Indo-Pacific temperate zones
5. "Non-planting techniques" which have provided large scale sustainability for seagrasses
6. How to site your project
7. What is required for monitoring

The proposed outputs from Part B will be: 1) a group paper of the techniques, methods and results of Southeast Asian seagrass restoration and present policies; 2) a second more creative paper on plans for futures of cost-efficient and sustainable methods for government to retain seagrass while increasing coastal activities.

Proposed format: The workshop will be presented in two complimentary halves which attendees can choose to attend both or just one. The format will include an early morning field trip\*, then short presentations and group discussions.

\*Low tides during this period occur in the early morning, and the fieldtrip will thus require participants to leave for the trip before dawn (~5AM). Participants are advised to be both mentally prepared and well-equipped with headlamps/torches to work in the earlier hours.

## **WS6: Towards an international seagrass science, policy and conservation agenda**

**Facilitators:** Gabriel Grimsditch, Maria Potouroglou

**Date:** 15 June, 2018

**Venue:** Active Learning Room, Education Resource Centre

Seagrass meadows are critical to the functioning of healthy and productive coasts around the world, but unfortunately, they are often overlooked and unappreciated. UN Environment in collaboration with GRID-Arendal aims to convene an International Seagrass Working Group in order to enhance scientific knowledge, consolidate management best practices and develop policy recommendations. The International Seagrass Working Group will be posed various challenges for increasing the impact of seagrass scientific knowledge on coastal management or national policy-making.

The [United Nations Environment Programme](#) (UN Environment) is the leading global environmental authority that sets the global environmental agenda, promotes the coherent implementation of the environmental dimension of sustainable development within the United Nations system, and serves as an authoritative advocate for the global environment. [GRID-Arendal](#) is a non-profit foundation established by the Norwegian Government to support the United Nations in the field of environmental information management and assessment, capacity-building and communications and outreach, and works to synthesize environmental data into information products accessible to policy-makers and the public.

The International Seagrass Working Group will develop a global synthesis document that will serve as a call to action to managers and decision makers and highlight the range of values of seagrasses to people around the world. More specifically, the report will achieve the following:

- a) provide an overview of global seagrass distribution as well as associated biodiversity, and present the most significant threats and drivers of seagrass loss;
- b) highlight the key ecosystem services and their link to human well-being;
- c) compile the existing knowledge and identify data gaps, where future research efforts should focus in order to gain a full understanding of the status and value of seagrasses both to the marine environment and human wellbeing;
- d) explore the different management options and develop policy recommendations to support seagrass conservation, sustainable management and restoration.
- e) analyze the viability, barriers and potential for seagrass ecosystems to access carbon markets or other payment for ecosystem services schemes.

Workshop format:

This workshop will kick-off with presentations of the main themes of the global synthesis report. Participants will then engage in break-out groups chaired by core members to plan the global synthesis report, their involvement and contribution, future steps and activities. This workshop will take half a day.

## **WS7: Virtual Reality (VR) for Science Communication**

Facilitators: HiverLab

**Date:** 15 June, 2018

**Venue:** Active Learning Room, Education Resource Centre

Looking for new and interesting ways to communicate science and research? Find that conventional methods of outreach fail to engage a technology-obsessed generation? Let us show you how to expand your communication toolbox with immersive technology and media. Through our workshop, you will learn to create your own interactive virtual fieldtrips for educational purposes, which can help bridge the gap between academia and the general public.

Our creative content, applications, and proprietary system Storyhive has been widely used for training, education, and virtual tourism regionally and globally. This system has been used to create virtual trails to showcase the beauty of coral reefs to the public at the Sisters' Islands Marine Park Public Gallery in Singapore, as well as to train volunteers in coral monitoring and identification. We will show you how you can harness this technology to create your very own training and outreach materials.

Workshop format:

This workshop will include both theory and hands-on practical components. We will introduce to you the use of immersive technology and media through several case studies for science exploration, communication and research. We will also cover production tips and storyboarding, and allow participants to try out VR content, our 360 camera and the Storyhive platform. At the end of the workshop, we will provide each organisation with a 1-month Storyhive trial licence.

Maximum class size: 40 pax

## **WS8: Mapping and analysis of drone imagery**

**Facilitators:** Milica Stankovic, Erickson Lanuza

**Date:** 16 and 17 June, 2018

**Venue:** Active Learning Room, Education Resource Centre

In the past few decades, there has been increasing use of remote sensing technologies in mapping of the coastal marine habitats. The rapid non-destructive surveys of the habitats can obtain valuable information about the status of the ecosystem and their frequent, continuous use can provide baseline for proper ecosystem management, conservation and restoration. Use of the small unmanned vehicle (sUAV) for obtaining the imagery of the seagrass ecosystems has been used in the past few years, improving the knowledge of the seagrass area size, species, coverage and biomass. With the fast-growing field of remote sensing technologies in marine science, the aim of this workshop is to introduce the mapping techniques of the seagrass ecosystems using drone and to provide basic knowledge of the analysis of the obtained images.

The output of the workshop is to introduce participants to novel technologies and to develop manual for seagrass mapping using drone.

Workshop format:

This workshop will consist of the fieldtrip\* and image analysis.

1. Fieldtrip will involve:
  - introduction to the drone flight plan and flying over the seagrass meadow
  - capturing the images of the ecosystem
  - obtaining ground-truth data
2. Image analysis will be conducted in the computer room and it will include:
  - introduction to the mapping software
  - stitching the images obtained from the drone
  - habitat classification
  - accuracy assessment

Finally, we will illustrate how participants can present the gathered information and what can be done in the further analysis.

\*Low tides during this period occur in the early morning, and the fieldtrip will thus require participants to leave for the trip before dawn (~5AM). Participants are advised to be both mentally prepared and well-equipped with headlamps/torches to work in the earlier hours.

Maximum class size: 25 pax

## **WS9: Using in situ physiology techniques to better understand seagrass capacity and resilience**

**Facilitators:** Sven Beer, Mats Björk, Pimchanok Buapet, Ow Yan Xiang, Sutinee Sinutok

**Date:** 16 and 17 June, 2018

**Venue:** Seminar Room 3, Education Resource Centre

**Note: The original workshop has been altered due to unforeseen circumstances, and will now be led by Prof. Sven Beer (Tel Aviv University) and Prof Mats Björk (University of Stockholm). The objectives of the workshop have been revised**

Seagrasses are under threat around the world, largely as a result of human activities that lead to reduced water clarity, elevated nutrient concentrations and possibly other forms of contamination (e.g. heavy metals, herbicides, urban and industrial runoff). The consequences of these stressors are reduced depth limits, increased fragmentation of seagrass meadows, reduced growth rates and a general loss of seagrass cover.

While the quantification of seagrass distribution and abundance is a vital part of seagrass assessment, understanding the physical processes that lead to reductions in these metrics is important. This is because these processes can be directly linked with specific stressors like turbidity and heat stress.

This will largely be a discussion workshop where we together can tackle questions and evaluate various strategies to use physiology techniques to understand seagrass capacity and resilience. The discussion part will be followed by demonstrations and practical measurements using the equipment available for the workshop. This will include:

- How to correctly perform, and evaluate, short-term photosynthetic measurements (using PAM fluorometry and/or gas exchange and/or other techniques) in order to learn about seagrass productivity;
- How to assess a seagrass species' capacity to e.g. "invade" new habitats by measuring photosynthetic responses e.g. to irradiance;
- How to evaluate specific photosynthetic properties of one seagrass species in terms of its ability to alter the environment and, thus, influence the metabolism and growth, and resilience, of other species (both seagrasses and macroalgae).

Workshop format: Classroom lectures and discussion, followed by demonstrations in the field and classroom.

\*Low tides during this period occur in the early morning, and the fieldtrip will thus require participants to leave for the trip before dawn (~5AM). Participants are advised to be both mentally prepared and well-equipped with headlamps/torches to work in the earlier hours.

Maximum class size: 40 pax

## **WS10: Embedding resilience into monitoring and management frameworks**

**Facilitators:** Kathryn McMahon, Paul Lavery, Catherine Collier, Kiernyn Kilminster

**Date:** 16 and 17 June, 2018

**Venue:** Global Learning Room, Education Resource Centre

Incorporating resilience into management frameworks is increasingly recognised as critical to halt the degradation of our coastal ecosystems. A framework identifying the important aspects of resilience for seagrass ecosystems has recently been proposed (Unsworth et al 2015). This includes features of a resilient seagrass system such as genetic diversity or continuous habitat, as well as biological (e.g. connectivity) and biophysical (e.g. water quality) features of the supporting ecosystem. Within the seagrass system, the ability of seagrass species to resist or recover from a disturbance varies linked to the different life-history strategies of the species. So the features necessary to understand resilience have been identified but ideas on how to embed this into monitoring programs is still developing. This workshop aims to translate the science of resilience into action by developing a best practice guide to operationalize the concept of resilience into the design of seagrass monitoring and management programs. We welcome scientists involved in resilience research, managers and practitioners actively incorporating or seeking to incorporate resilience concepts into monitoring and management to attend this workshop.

The workshop aims to produce a best practice manual for embedding resilience into seagrass monitoring and management.

Workshop format:

- Introductory session to summarise background of the concept and identify aspects that should be considered in the best practice guide.
- Breakout groups will work on different sections and report back such as: Modelling resilience; Scoring resilience (i.e. integrating among indicators of resilience); Environmental conditions and feedbacks; Reproduction (sexual and asexual, seed banks etc); Diversity (genetic and species)
- Summary information will be provided before the workshop to interested participants.

## **WS11: Plant-animal interactions in seagrass reproduction**

**Facilitators:** Brigitta I. van Tussenbroek, Ricardo Wong

**Date:** 15 June, 2018

**Venue:** Seminar Room 4, Education Resource Centre

Plant-animal interactions have been understudied for seagrasses; especially at the level of flowering (floral predation) and pollination (pollination by mesofauna). The reason for this maybe that until recent it was thought that seagrasses exclusively were pollinated by water. However, new findings indicate that small crustaceans and polychaetes pollinate flowers of *Thalassia testudinum*. Thus, flower-animal interactions may be more common than thought and may possibly have influenced the evolution of reproductive structures in seagrasses.

To test this hypothesis, it needs to be established how common flower-animal interactions are for seagrasses. But most geographical areas only have few seagrass species; and a network studying these aspects of reproductive ecology of seagrasses is paramount to establish flower-animal interactions in more seagrass species.

The proposed output for this workshop is a workplan to study flower-animal interactions for different seagrass species in different areas, with the final goal to publish the results with all participants as co-authors.

Workshop format:

The participants of the workshop have an interest in studying the flower-animal interactions for seagrass species in their area. In the workshop, relevant questions and approaches will be discussed, with the ultimate goal to elaborate a workplan.