Oceans of Opportunities, Rivers of Ideas

"How to become a change agent in aquatic sciences?"

Event organized in the framework of the MSc programme

Marine and Lacustrine Science and Management ('Oceans & Lakes")

www.oceansandlakes.be

5 December - 9 December, 2018

Universiteit Gent and the Vrije Universiteit Brussel

WEDNESDAY 5 December, Colonial Palace, Paleizenlaan 1, 3080 Tervuren

Opening of the OORI event

13:30-14:00
Registration
14:00-14:30
Welcome by **Ann Vanreusel** & **Nico Koedam**
14:30-16:00

- **Marc De Meyer**, Head of Biology department and of Entomology section, AfricaMuseum, Belgium
- **Romain Meeusen**, Vice-Rector International Policy, Vrije Universiteit Brussel (VUB), Belgium
- **Kristien Verbrugghen**, Director, VLIR-UOS, Belgium
- **Jacqueline Uku**, Scientific Director, Kenya Marine and Fisheries Research Institute (KMFRI), Kenya
- **Jan Mees**, General Director, Flanders Marine Institute (VLIZ), Belgium
- **Falko Buschke**, Researcher, University of the Free State, South Africa, University of Oxford, United Kingdom
  "Post-normal conservation science fills the space between research, policy and implementation"

16:00-18:00
Networking Reception, Colonial Palace

THURSDAY 6 December, Universiteit Gent (UGent), Aula, Voldersstraat 9, 9000 Gent

8:30-9:00
Registration | Welcome coffee/tea
9:00-9:15
Introduction to the morning session (Chairperson **Magda Vincx,** UGent, Belgium)
Welcome by the Director of Internationalisation **Guido Van Huylenbroeck,** UGent, Belgium
9:15-10:45
Keynote presentations (15' per presentation): "Ecosystem resources and management"

- *Towards establishing fisheries co-management plans along the Kenya coast: progress and successes,* **Cosmas Munga** (Technical University of Mombasa (TUM), Kenya)
- *The Future of Fisheries Resources Research,* **Angela Nankabirwa** (National Fisheries Resources Research Institute, Uganda)
- *Mapping the ocean seafloor: the "uncharted" world*, **Amon Kimeli** (KMFRI, Kenya; University of Bremen, Germany)
- *Marine spatial planning in Belgium: from Ghent University to the World*, **Frank Maes** (UGent, Belgium)

10:45-11:15
Coffee break
11:15-11:45
Pitch presentations (7' per presentation): "Ecosystem resources and management"

- *Being a marine scientist at WWF*, **Sarah Vanden Eede** (WWF Belgium)
- *Investigate the origin of carbon buried underneath seagrass meadows in a tropical mangrove-seagrass ecosystem*, **Riccardo Pieraccini** (Oceans & Lakes student)

- *Offshore development in the North Sea: interactions between fish, scientists and the industry*, **Inge van der Knaap** (UGent, Belgium)
- *The parasites in mariculture and wild fishes from the Gulf of Tonkin, Vietnam,* **Ngo Thi Thuy Huong** (Vietnam Center on Karst and Geoheritage (VCKG), Vietnam)

11:45-12:30
Interactive session: *"Policy makers and scientists do (not) listen to each other, do(n't) they?"* (moderators **Diana Di Nitto, Jean Hugé & Nico Koedam**)
12:30-13:30
Lunch break
13:30-14:30
Introduction to the afternoon session (Chairperson **Cosmas Munga**, TUM, Kenya)
Keynote presentations (15' per presentation): "Education, leadership and communication"

- *Dialogue on some critical leadership concepts and how they matter in aquatic sciences and in life in general,* **Ibrahima Thiam** (Wetlands International Africa, Senegal)
- *Research-education coupling in changing perspectives of aquatic study in Vietnam*, **Hien Thanh Nguyen** (University of Science and Technology of Hanoi, Vietnam Academy of Science and Technology, Vietnam)
- *Opportunities and challenges for marine scientists in the dredging world,* **Thibaud Mascart** (DEME, Belgium)

15:00-15:30
Coffee break
15:30-16:00
Pitch presentations (7' per presentation): "Education, leadership and communication"

- *Bridging the gap between marine education and policy-making: the European Marine Training Platform,* **Evelyn Paredes Coral** (UGent, Belgium)
- *Combine science and education for better conservation actions: an example in Nicaragua*, **Joëlle De Weerdt** (ELI-Scientific, Belgium)
- *MACOPSproject: from PhD project to networking opportunity and development of new guidelines for a better sanitary monitoring program in Peru*, **Iván Loaiza Alamo** (UGent, UAntwerpen, Belgium; Universidad Cientifica del Sur, Peru)
- *Mapping ecosystem services in African biosphere reserves of Benin*, **Devonne Goad** (Oceans & Lakes student)
- *The impact of social media in communicating a world of science,* **Tom Janssen** (Tom's Odyssey, Belgium)

16:00-17:00
Panel discussion: *"How to frame –marine- conservation: a story of doom or a story of hope?"* (moderators **Ann Vanreusel & Diana Di Nitto**): **Sarah Vanden Eede**, **Thibaud Mascart**, **Jacqueline Uku**, **Ibrahima Thiam**, **Mohamed Omar Said Mohamed**

FRIDAY 7 December, Vrije Universiteit Brussel (VUB), U-residence, Generaal Jacqueslaan 272, 1050 Elsene

8:15-9:00
Registration | Welcome coffee/tea
9:00-10:30
Introduction to the morning session (Chairperson **Judith Okello,** KMFRI, Kenya)
Keynote presentations (15' per presentation): "Conservation and monitoring"

- *How to become a change agent in the Western Indian Ocean Region,* **Harifidy Olivier Ralison** (WWF Madagascar)
- *Science for marine conservation in Peru: lessons and challenges*, **Eliana Alfaro-Cordova** (Pro Delphinus, Peru)
- *Biodiversity conservation - a consideration of endangered marine species*, **Mohamed Omar Said Mohamed** (Kenya Wildlife Service (KWS), Kenya)
- *Biodiversity and development: challenges for capacity building*, **Luc Janssens de Bisthoven** (Royal Belgian Institute of Natural Sciences (RBINS), Belgium)

10:30-11:00
Coffee break
11:00-11:30
Pitch presentations (7' per presentation): "Conservation and monitoring"

- *The science behind the blue label: how science delivers positive change across the world's oceans through certification*, **Marcus Nelson** (Marine Stewardship Council (MSC), United Kingdom)
- *Dwarf brooder versus giant broadcaster: combining genetic and reproductive data to unravel cryptic diversity in an Antarctic brittle star*, **Quentin Jossart** (VUB, Belgium)
- *Getting more out of the marine equipment budget by applying open source technology*, **Katrijn Baetens** (RBINS, Belgium)
- *EMODnet – gateway to marine data from & for users*, **Nathalie Tonné** (European Marine Observation and Data Network (EMODnet), Belgium)

11:30-12:30
World Café: "*What is the role of scientists in raising public awareness, and what are mechanisms to achieve it?*" (moderators **Diana Di Nitto & Jean Hugé**)
12:30-13:30
Lunch break
13:30-15:00
Introduction to the afternoon session (Chairperson **Eliana Alfaro-Cordova**, Pro Delphinus, Peru)
Keynote presentations (15' per presentation): "Social-Ecological Systems"

- *Scientists as agents of change: working with the local community along the coast of Kenya,* **Judith Okello** (KMFRI, Kenya)
- *Integrating science with community: the case of mangrove conservation in Kenya,* **Amina Juma Hamza** (KMFRI, Kenya)
- *Improving Peruvian fisheries management*, **Silvana Denisse Fajardo Perez** (Sustainable Oceans, Water and Cities (SOWAC), Peru)
- *Ocean observations, data and science in support of policy and society: the example of EU's Marine Knowledge 2020 strategy in the context of its Integrated Maritime Policy,* **Jan-Bart Calewaert** (EMODnet, Belgium)

15:00-15:30
Coffee break

15:30-16:00
Pitch presentations (7' per presentation): "Social-Ecological Systems"

- *Better-informed policy-making - Mangrove conservation in Malaysia, Southeast Asia,* **Katherine Vande Velde** (Université Libre de Bruxelles (ULB), Belgium)
- *Storytelling through brushstrokes: Using art to communicate science,* **Meenakshi Shankar Poti** (ULB, Belgium)
- *Agents of change in Colombia,* **Paula Tatiana González Sanchez** (Monitoreos Ambientales (MoAm), Colombia) (video)
- *Using information and communication technology to find and share community owned solutions to sustainability challenges*, **Julia Jung** (IMBRSea student, Cobra Collective, UK)

SATURDAY 8 December: venue: VUB, U-residence, Generaal Jacqueslaan 272, 1050 Elsene

9:15-10:00
Registration | Welcome coffee/tea
10:00-11:30
Introduction to the morning session (Chairperson **Mohamed Omar Said Mohamed,** KWS, Kenya)
Keynote presentations (15' per presentation): "From science to policy"

- *From Science to Policy: a scientist/administrator experience,* **James Njiru** (KMFRI, Kenya)
- *From Science to Action & Policy: Experience of the WIO Region,* **Jacqueline Uku** (KMFRI, Kenya)
- *Payment for Ecosystem Services,* **Khuong Tran Chinh** (United States Agency for International Development (USAID), Vietnam)
- *Ecological monitoring of rivers and lakes: are we measuring the right aspects for policy?,* **Ludwig Triest** (VUB, Belgium)

11:30-12:00
Pitch presentations (7' per presentation): "From science to policy"

- *Marine science in the European Parliament*, **Leonie Buschbeck** (intern, European Parliament, Belgium)
- *Science and climate change,* **Mike Olendo Izava** (Conservation International, Kenya)
- *Nature conservation: the role of politics & business*, **Soraya Candido** (Antwerp Management School (AMS), Belgium)
- *The perception of the United Nations' Sustainable Development Goals*, **Christine Rundt** (Oceans & Lakes student)

12:00-13:00
Lunch break
13:00-14:00
Keynote presentations (15' per presentation): "Ecosystems and their services" (chairperson **Farid Dahdouh-Guebas**, VUB-ULB, Belgium)

- *The intertidal mudflats and coastal wetlands of Zamboanga Sibugay, Philippines - Lessons learned from a forgotten ecosystem,* **Georgina L. Fernandez** (Provincial Environment and Natural Resources Office, Zamboanga Sibugay, Philippines)
- *Blue diatoms as a potential for sustainable shellfish aquaculture*, **Fiddy Semba Prasetiya** (Institut français de recherche pour l'exploitation de la mer (IFREMER), France)
- *Some interesting news about the mangrove horseshoe crab in penninsular Malaysia* , **Satyanarayana Behara** (Universiti Malaysia Terengganu - UMT, Malaysia)

14:00-14:30
Pitch presentations (7' per presentation): "Ecosystems and their services"

- *The exceptions to the rule? Metal bioaccumulation in macroinvertebrates from metal polluted sites with a good ecological status*, **Bart Slootmakers** (UAntwerpen, Belgium)
- *TROPIMUNDO: studying tropical biodiversity and ecosystems under the EC educational excellence label Erasmus Mundus,* **Farid Dahdouh-Guebas** (VUB-ULB, Belgium)
- *Extension of community carbon offsetting project in Kenya*, **Ahmed Mohamed** (KMFRI, Kenya) (video)
- *A range of opportunities, from sea level to mountaintops*, **Loïc Gillerot** (Eidgenössische Technische Hochschule Zürich (ETH), Switzerland) (video)

14:30-15:00
Coffee break
15:00-16:00
Panel discussion: *"Caught in the net – marine & lacustrine scientists: drivers of change"* (moderator **Farid Dahdouh-Guebas**): **Nico Koedam**, **Judith Okello**, **Cosmas Munga**, **Satyanarayana Behara**, **Karolien Van Puyvelde**
16:00-17:00
Poll everywhere & Wrap up

SUNDAY 9 December

10:00-13:00
Visit of BIGH Farm - a sustainable aquaponic urban farm in Anderlecht, Brussels

ABSTRACTS

Science for marine conservation in Peru: lessons and challenges

Alfaro-Cordova Eliana;
elianaalfarocordova@gmail.com ;
Prodelphinus, Universidad Científica Del Sur, Peru

When I decided to study marine biology, my focus was on learning about life in the ocean and on how to contribute to its conservation. However, the uniqueness of the Peruvian sea, its richness and importance concerning socio-economical aspects, shaped my interests towards a much more complex objective. Although conservation is not easy anywhere, marine conservation in Peru poses particular challenges and concerns. I could identify two main aspects that contribute to this. (1) The presence of many stakeholders with particular and opposing interests that work separately to solve conflicting issues, and (2) the different ideas of what does conservation mean. As a biologist and Peruvian citizen, I do not represent only one stakeholder, so my identification within the group of scientists or academia, should not exclude necessities and responsibilities of consumers, tourists or other actors. So I propose conducting my work on a different way: (1) Researching with others, Including fishers and local population, (2) Sharing results within different audiences, including kids, local people and decision makers, and (3) working from the inside, which includes feeling myself part of the problem and looking for national funds to conduct projects on the priority lines defined by decision makers. Considering the moral crisis Peruvians are going through, this way of working is not easy. One study case could be the project in a MPA recently conducted by ProDelphinus and all the difficulties concerning social, economical and ecological aspects of the proposed co-management. I really do not know how to be an agent of change, neither if I will be one for my country. However, I can say you won't change anything if you are not willing to change yourself.

Getting more out of the marine equipment budget by applying open source technology

Baetens Katrijn;
kbaetens@naturalsciences.be; Royal Belgian Institute of Natural Sciences, Belgium

Gathering data to feed, test and validate marine models is a time and cost consuming activity. Open source technology provides the possibility to develop a low-cost sensor system for marine applications. The first condition of such a sensor is that it must be cheap, so several devices can be deployed at the same time. Further on it should be easy to attach several sensor types to the system so its application is flexible. The system should be able to realize measurements at multiple depths. Lastly it should be sturdy and easy to handle.
In the frame of the CEBioS project (capacity building for biodiversity) a cheap thermometer for marine research will be developed by combining a sensor, a microcontroller that steers the sensor and translates its analog data, a WiFi transmitter and an energy source. Waterproof thermometers can be bought online for only € 1 each, and be controlled by Arduino nano clone microcontrollers (with SD card and WiFi access) that collect, store and broadcast the measurements. They come at a low cost of € 5 each. Four rechargeable A4 batteries in serial are sufficient as a source of energy.
Waterproof casings must be developed for the microcontrollers. The system will be optimized for environmental friendliness, efficiency and data accuracy in the calm waters of Lake Nokoué (Benin). Once this first test is passed, the methodology will be applied in a study of the habitat of some commercial shrimp species, and in improving the marine prediction methodology of IRHOB (Institut de Recherches Halieutiques et Océanologiques du Bénin) and RBINS (Royal Belgian Institute of Natural Sciences).
These developments of a cheap sensor should support both the operational activities of IRHOB and RBINS in the future.

Marine Science in the European Parliament

Buschbeck Leonie;
leonie.buschbeck@gmail.com; intern
European Parliament

Communication between scientists and policy-makers is critical to shape effective legislation and to create successful ocean governance. However, science is not always integrated effectively in policy making. Even though governmental research and advisory bodies exist to advice international environmental conventions, the ongoing debate on the science policy interface shows that methods on how to translate science more successfully into policy remains questionable. Scientists struggle to understand why it takes years, sometimes up to decades, until scientific results are translated into an effective piece of legislation, creating the perception that scientific advice is not or only partly taken into consideration. In order to understand why this is, I would like to delve into the political processes of creating legislation at the European Union level and what role marine scientists play in advising policy makers in the European Commission and in the European Parliament.
Keywords: science-policy

Post-normal conservation science fills the space between research, policy and implementation

Buschke Falko; falko.buschke@gmail.com ;
University of the Free State

The view that conservation is a linear exchange of knowledge between scientists and practitioners has led to the conceptualisation of a 'research-implementation gap'. However, conservation is not only about translating science into action, but also includes an interplay of values, cultural norms, social interactions and political consequences. In response, an alternative conceptualisation is one where research and implementation exist in a 'space', where conservation partners can interact. Here we argue that post-normal science (PNS) can fill this space. PNS is used when information is incomplete, values are pluralistic, stakes are high and decisions are urgent. It relies on an extended community of practice that aims to produce knowledge fit for end-users, without the constraints of settled scientific paradigms. We advocate for the wider use of PNS in conservation by showing how aspects of PNS have been useful in mainstreaming conservation planning in South Africa. By following an approach typical of PNS, South Africa has made considerable progress in creating an implementation space for conserving biodiversity despite its limited resources, cultural heterogeneity and controversial history. We outline the interventions used in South Africa to facilitate PNS and, based on this, propose an operating model that can be applied elsewhere.
Keywords: Conservation planning, extended peer community, post-normal science, research-implementation gap, scientific paradigms, South Africa, transdisciplinary

Nature conservation: the role of politics & business

Candido Soraya; soraya.candido@ams.ac.be;
Antwerp Management School (AMS), Belgium

Putting a price tag on nature will not always protect her. The replacing cost of nature will be underestimated through lack of knowledge and data. In addition the willingness to pay will drop when people live further away. In the face of rapid environmental change, all biodiversity is needed. Danger is that we only conserve species with a high economical value and those that benefit human well-being. My master thesis on the integration of biodiversity in development corporation revealed that the main reason behind the integration of biodiversity in development cooperation is for the sake of human well-being. However through the strong focus on human well-being, the less visible and tangible aspects of biodiversity seem to be given a lower importance. The challenge for politics and business is to not only focus on high value nature, as this will be counterproductive for human well-being itself.

The private sector today seeks for win-win outcomes between economic, social and ecological objectives, through which they can do good both for the environment and their economic performance. Despites 20 years of CSR, global challenges keep rising. Company's today will often only shift to sustainable alternatives if its proven that this will also increase their revenue. The success of sustainability can however not only be measured in terms of losses and wins, but has to be measures in terms of well-being for the planet and people. Both are difficult to put in monetary value, and will therefore be underestimated. CSR distract us what we really need to do to save the world; the main challenge for businesses is to shift to value base organizations, where profit is subordinate to the well-being of humans and the planet.

A healthy economy and society can only exist within planetary boundaries. The role of business and policy makers must be to serve the common good. Business as usual does not take these ecological and social boundary's into account. Species die 100 to 1000 times faster than before the industrial revolution, and inequality keeps rising both within and between countries. The ecological boundary's visualized by SDG 13 (climate action), SDG 14 (life below water) and SDG 15 (life on land) are not prioritizes by policy makers nor business (SDG Barometer, 2018). The challenge for policy makers and business is to address the systemic challenges and act accordingly in order to transition towards a sustainable society. By not taking the planetary boundary's into account sustainability efforts will not succeed to counter global challenges we are facing.

Ocean observations, data and science in support of policy and society: the example of EU's Marine Knowledge 2020 strategy in the context of its Integrated Maritime Policy

Calewaert Jan-Bart; janbart.calewaert@emodnet.eu; European Marine Observation and Data Network (EMODnet), Belgium

TROPIMUNDO: studying tropical biodiversity and ecosystems under the EC educational excellence label Erasmus Mundus

Dahdouh-Guebas Farid; fdahdouh@vub.ac.be; Vrije Universiteit Brussel (VUB), Université Libre de Bruxelles (ULB), Belgium

TROPIMUNDO is an Erasmus Mundus Masters Course in Tropical Biodiversity and Ecosystems funded by the European Commission's excellence programme Erasmus Mundus. It is the first MSc program (2 yrs, 120 ECTS) that integrates the knowledge and skills related to four adjacent interlinked tropical ecosystems under threat (tropical rainforests and woodlands, wetlands, - both terrestrial and coastal such as mangrove forests, seagrass beds and coral reefs). Study of these ecosystems is crucial to understand, protect and manage tropical biodiversity in an era characterised by an international biodiversity crisis with imminent risks of extinction of species due to global warming and anthropogenic impacts such as habitat destruction and changes in land use. TROPIMUNDO is unique in incorporating a 2nd semester (with theoretical courses and a significant field course) in the tropics in Guadeloupe, France (Université des Antilles – UdA), Cameroon (Université de Dschang – Udsch), Madagascar (University of Antananarivo – UNIVANTA), Sri Lanka (University of Ruhuna – RUH), Malaysia (Universiti Malaysia Terengganu – UMT) or Hong Kong (University of Hong Kong – HKU). These institutions cover specialisations in Caribbean insular ecosystems, Central African terrestrial ecosystems, Malagasy forest ecosystems, Sri Lankan terrestrial and aquatic ecosystems, Malaysian mangrove ecosystems and other South-East Asian terrestrial and coastal ecosystems, covering a wide choice of skills and qualifications in tropical biodiversity and ecosystems. Furthermore TROPIMUNDO brings together European expert higher education institutes, with long-standing worldwide expertise in tropical rainforests and woodlands and in coastal ecosystems in Belgium (Université Libre de Bruxelles – ULB, Vrije Universiteit Brussel – VUB), France

(Sorbonne Université, Muséum National d'Histoire Naturelle – MNHN and Université de Guyane – UdG) and Italy (Università degli Studi di Firenze – UNIFI). They integrate world class scientific education and research expertise on the aforementioned tropical ecosystems and experience in designing and teaching in international MSc programs. The 1st semester primarily aims at teaching basic courses in Europe, whereas the 3rd semester focuses on specialised courses at one of the European partners. The 4th and final semester is dedicated to the thesis. Graduates obtain multiple degrees or a joint degree, a joint Europass Diploma Supplement, a Europass Mobility and a Europass Language Passport. TROPIMUNDO's learning outcomes stretch far beyond academic knowledge and insight, but also aim at demonstrating enhanced capabilities in effective analysis and communication, independence, creativity and assertiveness, critical judgement, and ethical and social understanding. During the two years of the Master program TROPIMUNDO students can concentrate on botany, zoology and integrative ecosystem approaches in institutions worldwide. Multiple specialisations are included, such as the evolution of tropical flora and vegetation; faunistic assemblages; informatics tools to treat and manage biodiversity data and databases (biogeographical, genetic, geographical information systems) including the management and conservation of historic collections such as herbarium sheets; the study of diversity, dynamics and evolution of tropical and subtropical ecosystems (with a focus on four related systems, namely tropical rainforests and woodlands, mangrove forests, seagrass beds and coral reefs, including the interactions between flora, fauna, man and the environment within and between each of these adjacent ecosystems);conservation and restoration ecology of natural habitats and their biodiversity including competences in sustainable management and governance of biodiversity, and finally, in tropical ethnobotany, exploitation and valorisation of the functions, goods and services of natural habitats and their resources, and conservation of traditional ecological knowledge.

TROPIMUNDO maximises the inclusion of European languages by offering a content and language integrated learning program (English or English + French), and it is delivered in a society that is French, English, Dutch, Italian, Malagasy, Singala, Tamil, Bahasa Malaysia or Cantonese-speaking, which is valorised using buddy programs and Tandem Learning. This aims at improving the students' language capabilities for which facilities are provided by all partners. TROPIMUNDO management is handled by a multi-level and shared responsibility involving 5 decision bodies (Steering, Selection, Jury, Internal Evaluation and External Evaluation), and 1 main execution structure (Coordination Office), all operating with equal commitment by the partners. A series of Associated Partners, including scientific institutes, governmental and non-governmental organisations responsible for conservation or management of tropical ecosystems and their biodiversity, and public authorities, agreed to advertise the program, to provide or to communicate existing placements, jobs, internships or thesis perspectives and scholarships, and to assist in evaluating the program. This links TROPIMUNDO to the real and professional world. References
http://www.tropimundo.eu/.
Keywords: tropical, biodiversity, ecosystem, coral, seagrass, mangrove, rocky shore, rainforest, island, wetland

Combine science and education for better conservation actions: an example in Nicaragua

De Weerdt Joëlle; Eliscientific@gmail.com ; ELI-Scientific, Belgium

The cetacean conservation project of Nicaragua is a science-based conservation project that aims to combine scientific research and education activities to make conservation actions effective in collaboration with decision makers.
Keywords: Whale, dolphin, Nicaragua, conservation, science, education

Improving Peruvian fisheries management

Fajardo Perez Silvana Denisse; silvanadfajardo@gmail.com; Sustainable Oceans, Water and Cities (SOWAC), Peru

The presentation goal is to show how an ex-student of the ECOMAMA Program has been involved in the improvement of the fishery, coastal-marine and environmental management of Peru after her Master studies and whole experience in Belgium.
Peru´s Fisheries is one of the most important of the world. It is due to the industrial sector, mainly because fishmeal and fish oil obtained of Peruvian anchovy. But what about artisanal fisheries? What is the key factor for improving local community's subsistence based on artisanal and traditional fisheries? The case of traditional fisheries at the mangroves of north Peru, Tumbes Mangroves, and how Community Based Fisheries Management (CBFM) could lead to sustainable results, would be presented. Also, some cases of working in a diagnostic of Marine Spatial Planning and Ocean Health Index in the south of Peru, Ica Region, would be showed.

The Intertidal Mudflats and Coastal Wetlands of Zamboanga Sibugay, Philippines-Lessons learned from a forgotten ecosystem

Fernandez Georgina L.; ginazambo9@gmail.com;Provincial Environment and Natural Resources Office, Zamboanga Sibugay, Philippines

Mudflats are wetlands often overlooked, undervalued and are taken for granted. In the Philippines, these areas are subject to land conversion at an alarming rate as there is no National Policy that directly deals on wetland conservation and protection. As a signatory to the Ramsar Convention, attempts have been initiated at the national level to come up with a National Action Plan on wetlands which will hopefully lead to enactment of a national policy on wetlands. At the height of the Avian Influenza outbreak in 2006, the Department of Environment and Natural Resources Central Office through the Biodiversity Management Bureau initiated the identification, assessment and monitoring of wetlands in different parts of the country. From among the eighteen wetland sites being monitored in Zamboanga Peninsula, the intertidal mudflats and coastal areas of Sibugay Wetlands has emerged as a significant staging site for migratory waterbirds from Russia, Siberia, Mongolia, and China as thirty-two species were documented with leg flags and bands during the three quarter of 2018. The flagging origins of six species have been confirmed by the Australasian Wader Studies Group (AWSG). *Arenaria interpres* with E-11 inscription on its yellow flag was banded in Nan Pu mudflat, China on April 25, 2016, the Endangerd *Calidris tenuirostris* with 5k inscription on its left left leg yellow flag was tagged in Khairusova and Belogovaya Rivers estuary, Russia on July 23, 2017 while the other two *Calidris tenuirostris* species as well *as Calidris ruficollis* were banded from Chongming Dao, Shanghai, China. A significant number of the Endangered *Numenius madagascariensis* was documented in the wetland during the 2018 Annual Waterbird Census making it an important stop-over area for migratory birds along the East Asian Australasian Flyway. The vast mangroves within the wetland hosts the largest roosting population of flying foxes in the country while its coastal waters serves as foraging grounds for marine turtles, whale sharks and sea cow. Intensive information campaigns, dialogues, meetings, capacity building of local stakeholders led to passage of local policies and directives to conserve and protect Sibugay Wetlands. It is now being nominated to be designated as a Ramsar Site as well as a Flyway Site.
Keywords: Intertidal mudflats/coastal wetlands/Sibugay wetlands

Rapid ecosystem services assessment & conceptualization of conservation effectiveness in Pendjari National Park, Benin

Goad Devonne; dv980169@dal.ca ; Oceans & Lakes student

Understanding the threats and temporal trends of ecosystem services in the Pendjari National Park is essential for the sustainable management of natural resources. The 'Nominal Technical Group (NGT)' was used to identify threats and trends, as well as the changes following a recent shift in management in the national park. NGT is a focus group variation that consists of individual brainstorming following by group discussion and ranking, yielding both qualitative and quantitative results. The preliminary results of this study will be presented.
Keywords: Natural resource management, ecosystem services, nominal group technique

A range of opportunities, from sea level to mountaintops

Gillerot Loïc; loic.gillerot@hotmail.com; Eidgenössische Technische Hochschule Zürich (ETH), Switzerland

Opportunities can take you anywhere, from oceans to mountain peaks, literally. The challenge is to discover the options, for example by proactively talking about it with students, researchers or practitioners, because you might end up with ideas for grants, jobs or projects. And if you're a hesitation-champ like me, here's a first tip already: just try it out, apply and procrastinate the actual decision-making until you actually get selected! In the last two years, this lead me to have fantastic research-related experiences in Kenya, Tanzania, Brazil and Switzerland. A bit more than a year ago, I graduated from the master in Ecology and Biodiversity at the VUB, and I now just started with a PhD project in Zürich. During this short talk I hope to illustrate how one's path is definitely not restricted to specific options, and I hope to motivate you to pursue your most treasured ideas!

Agents of change in Colombia

González Sanchez Paula Tatiana; ptatiana.gonzalezs@gmail.com; Monitoreos Ambientales (MoAm), Colombia

Regional connectivity should be one of the pillars for ecosystem-management. Along the Colombian Caribbean coast, the FAO has aligned private and public institutions to pilot and evaluate the feasibility that require reconnecting marine, coastal and terrestrial habitats. For these initiatives to be successful, communities must be involved in all processes. In the northern tip of the Gulf of Morrosquillo (Sucre), we are training people to monitor their own resources and ecosystems. By acquiring these practices, they will have the means and motivation to become agents of change in their communities; all to ensure a more sustainable future.
Keywords: community work, coastal, marine, terrestrial connectivity, Caribbean, Sucre, Colombia

Integrating science with community: the case of mangrove conservation in Kenya

Hamza Amina Juma; amina_j2002@yahoo.com ; Kenya Marine and Fisheries Research Institute (KMFRI), Kenya

There is continued research work by scientists all over the world on resource use and conservation. However, the research work and scientists' solution are not being applied to bring direct solutions to conservation. This is due to the communication breakdown between scientists and the community. Local communities need awareness creation and incentives for them to accept the solutions and understand the issues in resource utilization. The awareness is created through policies and community education while incentives include developing innovative projects for community development. I will discuss working examples in Kenya, carbon financing and use of ecotourism for mangrove conservation. These incentives cultivate ownership to the natural resources thus bringing up the aspect of conserving these resources. Even with awareness and

incentives, patience is required to achieve sustainable solution to conservation. The community is already used to particular way of life, thus changing this does not only require patience but also policy involvement and monitoring over time to establish if solutions are working. Another important aspect of science is networking, there is need to learn from others and bring scientist together to pool in resources and ideas. Networking leads to learning from other cultures and regions which is mind opening and create stimulation.
Keywords: Science, community, mangroves, innovation and networking

Seagrass Mapping for extension of carbon offsetting project from

mangroves to seagrass beds in Gazi Bay, Kenya

Hussein Mohamed Ahmed; mzeejunior@yahoo.com; Kenya Marine and Fisheries Research Institute (KMFRI), Kenya

Global climate change as a consequence of increasing anthropogenic emissions is one of the most contested yet more pervasive threats to marine ecosystems. However, the ocean's ability to sequester and store significant amounts of carbon due to coastal ecosystems collectively labeled "coastal blue carbon ecosystems" makes it possible for us to mitigate this problem. Of particular interest are seagrass meadows, which are recognized as important carbon sinks reported not only to trap and store organic carbon generated within the seagrass beds but also to trap and bury allochthonous carbon. Nonetheless, seagrass beds are the least well-studied blue carbon ecosystems currently threatened to further decline due to changes caused by anthropogenic activities. A possible way of seagrass protection would be to access the climate finances under the "blue-carbon initiative" set out by United Nations Framework Convention on Climate Change (UNFCCC) for restoration and conservation of seagrass beds. This study takes advantage of the free and open access satellite data to investigate the contemporary and historic cover of seagrass bed in Gazi Bay (Kenya): archived Landsat data from 1987 to 2017. Overall the seagrass beds in the bay have declined by 12 hectares in a period of almost 10 years giving a loss rate of 1.1%. The causative factors for this loss cannot be precisely attributed to known factors by this study, however it is not unlikely that destructive fishing practices, erosion and sedimentation play a role in the observed trends. The results of this study are used to establish stable areas within the seagrass beds with the assumption that they will result in long term storage of carbon and therefore can be protected as suitable areas for a carbon offset project. This study identified 3 km2 north of the bay as a proposed area for the extension of the present mangrove carbon trading project in the Gazi Bay.
Keywords: Seagrasses, mapping, carbon sequestration, Gazi Bay

The impact of social media in communicating a world of science

Janssen Tom; info@tomsodyssey.com ; Tom's Odyssey

- Why social media?
- Importance of building a (personal) brand as a scientist.
- What do you need to get started?
- Think outside of the box
- Twitter isn't the only platform?!
- Q&A

Biodiversity and development: challenges for capacity building

Janssens de Bisthoven Luc; ljanssens@naturalsciences.be; Royal Belgian Institute of Natural Sciences, Belgium

Capacity building is a bit like a black hole: whatever information you add, disappears. Is this just a boutade? Yes, fortunately even black holes emit some signals, and not the least, may redefine space and time! Another biological definition of capacity building, is that it resembles a medusa: you try to prick it

to the wall, but to no avail. The best metaphor for capacity building is finally the good old flip chart with the coloured cards perhaps? This and more will be presented to illustrate the model used by CEBioS of the Royal Belgian Institute of Natural Sciences and financed by the Belgian development Cooperation, DGD. CEBioS targets policy makers, scientific institutions, ministries and their agencies in nature conservation to promote the local biodiversity in developing countries by linking it to development in a sustainable way. The trick is to look at it from a utilitarian perspective, through what nature offers as benefits to the local populations, the countries and the international global village. In orther words, the so-called 'ecosystem services (ES)' play not only a physical role in the nature-people interface, but also a psychological role in the science-policy-development multiple interfaces. It offers justification to a system based on motivation (to conservation) by benefits, be it in cash or in social, health or other benefits. This led also to the implementation of a Belspo-funded project on 4 Unesco-MAB sites in Africa on the rapid assessment of ES and their valuation, which can be seen as a spin-off of CEBioS.

Dwarf brooder versus giant broadcaster: combining genetic and reproductive data to unravel cryptic diversity in an Antarctic brittle star

Jossart Quentin; qjossart@gmail.com; Vrije Universiteit Brussel, Brussels, Belgium

Characterizing a species reproductive mode (brooder, broadcaster) is key to understand the evolution and resilience of Southern Ocean organisms as reproductive mode affects connectivity and demographic patterns. Distinct reproductive modes might sometimes suggest unrecognized speciation that can be confirmed through genetic or morphological investigations. The brittle star *Astrotoma agassizii* was previously characterized by two reproductive modes: as a brooder in South America and as broadcaster in Antarctica. Here we investigated together the genetic and reproductive mode variation from individuals collected in South Georgia (SG) and around Antarctica (208 samples). Two CO1 clades were found, one restricted to SG (clade 1) and another shared between SG and Antarctica (clade 2). Size investigations revealed a dimorphism at SG: only small individuals (disc diameter < 2.5cm) were found in clade 1 while all the largest specimens (up to 6cm) were found in clade 2. Moreover, five specimens of clade 1 were brooding, whereas clade 2 included seven Antarctic specimens exhibiting broadcasting. These results suggest that there are different species in SG: a large broadcaster (shared with Antarctica) and a smaller brooder (specific to SG). This might have consequences for conservation management, particularly in South Georgia where clade 1 appears to be endemic.

Keywords: Southern Ocean – Reproductive modes – Ophiuroid – *Astrotoma agassizii* - Mitochondrial DNA

Using information and communications technology to find and share community owned solutions to sustainability challenges

Jung Julia; JJEduOcean@Gmail.com; IMBRSea student, Cobra Collective, UK

Challenges within a community can be better solved by identifying positive practices from within that community and trying to promote their use, as opposed to focusing on behaviours that are negative and trying to fix them with solutions that have emerged from outside of the community. While strategies such as the Convention on Biological Diversity (CBD) have clear recommendations for action that include the respect and recognition of governance of natural resources by Indigenous peoples and traditional communities, in practice, many scientists, policy-makers and professions, and their associated institutions, manifestly lack the skills and knowledge for operationalising such recommendations. The Cobra Collective has developed the concept of 'community owned solutions' and we train facilitators in supporting communities in using smartphones and tablets to record local solutions so that

they can share these with other communities, professionals and policy-makers, so that these solutions can be promoted and supported, rather than undermined. Since 2011, we have raised in excesses of 2.5 million euros to successfully apply our approach to helping communities confront challenges using community owned solutions, including food security, biodiversity conservation, environmental crime, renewable energy, vector-borne diseases, and mental health. Our talk will showcase key concepts, techniques, impact and upcoming projects.
Keywords: education or socio-ecological system categories

Payment for Ecosystem Services

Khuong Tran Chinh; tranchinhkhuong@gmail.com; United States Agency for International Development, Vietnam

Payment for environmental services - It's wildly recognized that ecosystems including biodiversity are life-support systems and very important for sustainable development. International communities have been working hard in order to conserve ecosystems and biodiversity. Despite those efforts, biodiversity and ecosystems' health have been degrading at an alarming rate particularly in developing countries. Many challenges that hinder conservation successes are identified and discussed. One of the most pressing issues is securing resources to finance for conservation of ecosystems and biodiversity. Payment for environmental services has been considered as a great solution to help generate resources for conservation. Vietnam has been applying this approach for almost 10 years. Hundred of millions of US Dollars were generated to finance for improved management of over 5 million hectares of forests and enhanced livelihoods for thousand of ethnic minority and poor forest dwelling communities. The presentation will provide the event's participants with detailed information on how to develop and operationalize the system at the national level to effectively manage forests and biodiversity. In addition, it will also discuss what we need in order to help advance conservation of ecosystems and biodiversity at our home countries.
Keywords: Ecosystem Services, Watershed, Forests, Biodiversity

Mapping the ocean seafloor: The "uncharted" world

Kimeli Amon Kibiwot; kimeli.k.amon@gmail.com; Kenya Marine and Fisheries Research Institute (KMFRI), Kenya; University of Bremen, Germany

Bathymetry is the measure of ocean's depth with respect to sea level and can be defined as submarine topography. Accurate and up-to date bathymetry information is fundamental in marine resource exploration, extraction and management. Bathymetry data is also important in science especially in tsunami propagation modelling and in deep sea fisheries research. Additionally, it is vital for safety of navigation and coast-based infrastructural developments. However, bathymetry data acquisition has been and still is highly expensive mainly due to cost of equipment, technology (software) and man hours needed. The cost is further exacerbated by the vastness and depth of the oceans and limited expertise especially in developing countries. From the above limitations, only 15% of earth's ocean sea floor has been mapped to required high resolution standards. Progress is however being made especially with most coastal countries endeavors to harness their blue economies for sustainable development and future economic growth. Kenya for example with RV Mtafiti (formerly Zeeleeuw) acquired through donation by the Flemish Government has embarked to undertake deep sea research in Kenyan waters. The research is geared towards understanding and gaining knowledge on Kenya`s EEZ. It currently entails acoustically collecting data on fish biomass, environment and bathymetry. International efforts are also being made to map the vast ocean and better understand our planet. For example, the Seabed 2030 through nonprofit General Bathymetric Chart of the Oceans (GEBCO)

project is currently putting together research ships that will map the entire sea floor in the next 12 years. This is indeed massive considering the scale of the task but nonetheless there is no doubt that the future is "blue and deep".

MACOPSproject: from PhD project to networking opportunity and development of new guidelines for a better sanitary monitoring program in Peru

Loaiza Alamo Ivan; ivan.loaizaalamo@ugent.be; Univeristeit Gent, Universiteit Antwerpen, Belgium, Universidad Cientifica del Sur, Peru

'MArine MAcrobenthic COmmunities associated to Peruvian Scallop Argopecten purpuratus culture: structural and functional diversity, feeding ecology and contaminant exposure' or MACOPSproject is a CONCYTEC project that aims to evaluate the environmental conditions of the Sechura Bay and Illescas Reserved Zone - Piura during summer and winter 2016. Ghent University (UGent) in association with Universidad Científica del Sur (UCSUR) started the project in December, 2015 with the first sampling campaign, but more institutions (i.e. University of Antwerp) got involved as more sampling locations and periods were added to the project. A monitoring program was building up. MACOPSparacas in cooperation with Universidad Nacional Agraria La Molina (UNALM) was the first spin-off of MACOPSproject which was conducted during the second sampling campaign in 2017. Two more locations in Paracas Bay - Ica were added to the PhD project, and more species were studied for ecotoxicology and trophic interaction approaches. In 2018, a successful VLIR-UOS cooperation called TRACEseafood started with Universidad Peruana Cayetano Heredia (UPCH). TRACEseafood added four more locations from the Punta San Juan Protected Area – Marcona. In total, 2 to 9 locations were included in MACOPSproject in 3 years (2016-2018) instead of 1 year, and in cooperation with 4 important Peruvian universities, which are involved in marine research. On the other hand, the first results of shellfish' metal concentrations that exceeded the maximum residue levels (MRLs) for human consumption made an alert to institutions such as Organismo Nacional de Sanidad Pesquera (SANIPES). This lead to the establishment of more intensive monitoring evaluations has been established from the moment that our first results were elucidated in 2017 (https://macopsproject.wordpress.com/).

Keywords: Monitoring program, Peruvian institutes, shellfish, metal concentrations

Marine spatial planning in Belgium: from Ghent University to the world

Maes Frank;Frank.Maes@UGent.be; Universiteit Gent, Belgium

Although planning at sea is not a new concept, marine spatial planning (MSP) in Belgium, as developed by a multidisciplinary team of researcher in 2003-2005 has been rapidly taken over by scientists, UNESCO, the EU and some major coastal states in the world. Cooperation with stakeholders and authorities contributed to this success. Science became visible to the public and governmental leadership secured implementation. Key elements for a successful MSP will be introduced.

The science behind the blue label: how science delivers positive change across the world's oceans through certification

Marcus Nelson; nelsonm9191@outlook.com; Marine Stewardship Council, UK

Marcus Nelson – Student of the Master of Science in Marine and Lacustrine Science and Management programme between 2013 and 2015. Been employed at the international Marine Stewardship Council - https://www.msc.org/ - since 2016 within the Science & Standards and I.T. teams with a focus on reporting and data management. The MSC's vision is for the world's oceans to be teeming with life – today, tomorrow and for

generations to come. The MSC works across the fishery supply chain including government agencies, commercial fisheries and shops and restaurants to encourage the establishment and use of sustainable fisheries. A major part of its work is to "certify" both sustainable fisheries and the seafood produced, thus reassuring consumers about the source of their fish. Behind the blue label found in supermarkets & restaurants across the globe is an integrated process for setting the standard that includes detailed scientific analysis. I will explain the MSC fisheries standard and how scientific methodologies underpin the MSC fisheries standard and provide examples of the changes that various fisheries have made to achieve MSC certification, together with the benefits to marine ecosystems. The MSC fisheries standard is just beginning the next standard review, which occurs every 5 years, and poses an opportunity to ensure the MSC program reflects new science and evolving global best practice. I will show how my Masters in marine science is being applied to the scientific analysis being conducted by MSC. My role at the MSC is to manage the vast quantity of data that is being collected to ensure that it is of high quality and to use the technology associated with "big data" to ensure that MSC certification keeps up with the latest science, but also is driven by data of a high quality. I help the MSC to strive towards becoming a hub of expertise and data that can drive science and collaboration forwards. The MSC ensures that the certification programme is available to all fisheries across the globe. I will explore the ways that the programme is made accessible not only to the large multi-national fisheries, but also the small-scale coastal fisheries. Finally, I will give a brief overview of next steps for the MSC and the current research collaborations at the MSC, including how current students & recent graduates can benefit from MSC funding for their research.

Keywords: fisheries, certification, sustainable fishing, fisheries standard, ecolabel

Opportunities and challenges for marine scientists in the dredging world

Mascart Thibaud; mascart.thibaud@deme-group.com; DEME (Dredging, Environment and Marine Engineering), Belgium

Whether it is by creating a new harbor, maintaining a channel, installing renewable energy, or creating new land for port development, dredging plays a vital role in today's and tomorrow's economic development. In the past dredging has often been underestimated or misunderstood. The main concerns have been environmental issues such as the disturbance of contaminated sediments, turbidity while dredging, noise propagation and disposal of dredged materials. Today's dredging industry has met the challenge and has carefully addressed these issues with large investments in technology, know-how and equipment. These developments are made by men and woman having an interdisciplinary background understanding all aspects of the challenges at hand. Currently, dredging is not a purely strict civil engineering field anymore. Dredgers world-wide are looking for multidisciplinary teams to develop innovative solutions tackling environmental challenges and opportunities. Consequently, environmentally sound dredging can be taken to the next level, if key aquatic scientists incorporate their best practices into state-of-the-art technologies from the inside of the industry. Therefore, Dredging, Environmental & Marine Engineering (DEME) welcomes future change agents to join our team to make a difference.

Keywords: Dredging, Habitat restoration, Building with nature, Nature based solutions, Environmental conservation

Biodiversity conservation - a consideration of endangered marine species

Mohamed Omar Said Mohamed; msaid26474@gmail.com; Kenya Wildlife Service (KWS), Kenya

Towards Establishing Fisheries Co-management Plans along the Kenya Coast: Progress and Successes

Munga Cosmas Nzaka;
cosmasnke2001@yahoo.com; Technical University of Mombasa, Belgium

The fisheries sector is an important component of the blue economy especially in the developing world where millions of people depend on fish for their livelihood. Fish is a vital source of protein and in some communities, more than half of animal protein is derived from fish. In Kenya, the fisheries sector is made up of three sub-sectors: inland capture fisheries, coastal and marine capture fisheries, and aquaculture. For over four decades, the Malindi-Ungwana Bay in north coast Kenya has supported a small fleet of semi-industrial bottom prawn trawlers with substantial contribution of fin fish by-catch. For many years since Kenya's independence in 1964, fisheries management was top-down approach with legislation provided by the then Fisheries Act with very poor compliance from resource users. This was mainly because such exploitation of inland and coastal capture fisheries, and the bottom trawl prawn fishery was free access characterized by overfishing, use of illegal fishing gear, resource-use conflicts, and degradation of nearshore habitats. Until recently in the late 2000s initiatives of sustainable management of these fisheries resources was began with the first ever consultative Prawn Fishery Management Plan 2010 formulated to manage bottom trawling in Malindi-Ungwana Bay. Since then, fisheries co-management in Kenya and the Western Indian Ocean region at large has become promising with more initiatives of both gear and area management plans being developed. Through my training in Ecological Marine Management, and with my experience in research, I have so far been one of the key resource persons and overseen the development of the Small-scale Purse Seine Fishery Management Plan, Pate Island fisheries co-management plans, Malindi-Ungwana Bay Fisheries Area Co-management Plan, and the Shimoni-Vanga Fishery Co-management Plan. Lessons drawn from this experience include a good understanding of the marine ecosystems, knowledge on resource users, and a good network with stakeholders both from government agencies and non-governmental agencies. This presentation is therefore to showcase the success stories of the development of fisheries co-management plans along the Kenya coast that will ultimately promote community-led ecosystem management for improved human livelihoods, biodiversity conservation and enhanced fisheries management, and ultimately strengthens fisheries governance in this changing climate.

Keywords: Coastal artisanal fisheries, Co-management plan, Sustainable fisheries, Kenya coast

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The Future of Fisheries Resources Research

Nankabirwa Angela;
angelenankabirwa@gmail.com; National Fisheries Resources Research Institute, Uganda

The term change agent has been overused that it has, unfortunately, become a chestnut that's losing its nutritional benefits. How can we overcome this? What does it really mean to be an agent of change? In addition, how can we actually make the change happen? There is a need to embrace the idea of theory of change in order to become agents of change. Have your eyes open. Identify the change that is needed and work to spread the idea of creating that change. Recent threats to our aquatic systems include; pollution, eutrophication, climate change, habitat degradation, sea level rise, etc. What is known about trying to solve each of the threats? What are the waves of change in managing aquatic resources? What can be your role as an agent of change in contributing to solving the problem? Identify the efforts in place and your niche as an aquatic scientist…….. TIPS 1. What is my strength as a student of aquatic sciences? – STARTS FROM SCHOOL, what interests you the most among your course units? what lecture do you always look forward to? 2. Develop a model to create the change, BUT FIRST • Embrace the fear of failure • Be cautious about defensive reasoning • Commit to making the change • Know the status quo of the threat • Look for

partnerships • Be a team player • MAKE A DIFFERENCE.
Keywords: Agent of change, aquatic resources, niche, interests

From Science to Policy: a scientist/administrator experience

Njiru James; jamnji@gmail.com; Kenya Marine and Fisheries Research Institute (KMFRI)

Scientists as agents of change: working with the local community along the coast of Kenya

Okello Judith; judith_okello2003@yahoo.com; Kenya Marine and Fisheries Research Institute (KMFRI), Kenya

Change is all about making a difference and in this case we talk about positive change. This could imply ensuring a transformation or adaptation towards a more efficient lifestyle including but not limited to working towards environmental sustainability. As a scientist, I believe in the power of coming up with science based solutions to effect positive change especially in the lives of women and the marginalized groups. These groups of people face unique challenges round the globe with the issues being escalated in developing countries. A glaring example is in the face of climate change and the associated challenges that the world is facing in every aspect of lives, thus calling for a complete shift in the way we conduct our businesses. Other than collating evidences on climate change, and warning the world on the projections of extreme weather that would threaten lives and property, scientists have come up with fact based 'to-do list' to combat climate change. A number of factors however, impede this noble course amongst them being the deeply rooted cultural beliefs and gender imparities. Women are still subjected to societal gender based discrimination thus limiting their participation even as scientists in contributing to coming up with sound policies that would drive a given nation. Further, driven by culture, people will always want to do different things in the same way. This makes it difficult for scientists to put their thoughts into action. There are however a host of opportunities in helping drive science home by working with the people rather than for the people. In this case study, an example of local community mangrove conservation groups who believed entirely in planting mangroves (as the only way to reverse degradation) are taken through baby steps to reap the fruits of ecological mangrove restoration.
Keywords: cultural beliefs, local community, gender, mangroves

Science and Climate Change Reporting

Olendo Mike Izava; izavamike@gmail.com; Conservation International, Kenya

Enhancing transparency in climate change reporting for developing countries. Why science is missing out in national communications and Biennial Update Reports. What we can do about it.

Keywords: Paris Agreement, Climate Change, National communications, Biennial Update Reports

Bridging the gap between marine education and policy-making: the European Marine Training Platform

Paredes-Coral Evelyn; evelynbio22@gmail.com; Universiteit Gent, Belgium

A wide gap exists between knowledge and competences provided by educational establishments and the Blue economy's future workforce requirements. Therefore, the Marine Training Platform created a database to map all the marine and maritime training programmes in Europe in order to know the current landscape of marine education. The platform brings together all available marine trainings at a European scale, and provides a series of services towards training organizers and policy makers. Services in the Marine Training Platform include advertising

possibilities, practical services to trainees and training organizers (application and registration) and the support of marine dedicated e-learning initiatives. This comprehensive and up-to-date database includes programmes from higher education institutes, courses, workshops and non-accredited training initiatives via involvement in other European Projects and networks. The platform is expanding gradually by including also vocational trainings (VET). Currently, we are actively working in two EU funded projects such as MATES and RIGHT Project. By doing this, we are contributing to develop a skills strategy that addresses the main drivers of change to the marine and maritime sectors, which require new capacities to succeed in an increasingly digital, green and knowledge driven economy.

Keywords: marine, education, VET, blue economy

Investigate the origin of carbon buried underneath seagrass meadows in a tropical mangrove-seagrass ecosystem

Pieraccini Riccardo;
riccardo.pieraccini@vub.be ; Oceans & Lakes student

Blue carbon ecosystems, such as mangrove forests and seagrass meadows, are amongst the most productive ecosystems on the planet. Substantial amounts of organic carbon are exported from the mangrove forests to the adjacent ecosystems. Seagrass meadows are estimated to bury up 50% of allochthonous organic carbon within its meadows. The interlink between mangroves and seagrass can results in a great fraction of allochthonous mangrove-derived carbon trapped in the seagrass meadows, by the dense maze of leaf canopy, rhizomes and creeping roots. The protection and conservation of this blue carbon ecosystem can also generate incomes for the local communities through the sale of carbon offsetting credits. Understanding the seagrass role in trapping and buried carbon represent a further contribute to the community-led project, Punguuza, in Gazi bay. This project will support locally, coastal protection and conservation, and globally, with the mitigation of climate change. In this study we evaluated the potential contribution of mangrove derived carbon in the seagrass meadows in the western creek of Gazi bay. The use of stable isotopes was crucial to determine the possible sources present in the seagrass meadow sediment. The plant materials (leaves) were used to determine the isotopic signature of the different species encountered. Mangrove leaves had an average signature of -27.5 ± 2.9 ‰, seagrass leaves -19.6 ± 2.7 ‰, roots-rhizomes -24.23 ± 0.9 ‰, epibionts -25.39 ± 0.6 ‰ and macroalgae -21.7 ± 4.5 ‰. The seagrass meadow sediments were found to been riched in mangrove-derived carbon, with an isotopic signature between -24 and -27 ‰. A mixed-model was performed to estimate the contribution of the various sources on the seagrass buried organic carbon on different scales. On a small scale, in a shallow and larger creek sections, the seagrass autochthonous buried carbon is significantly dominant, around 69 %. However, on a large scale, (on upstream-downstream gradient) the main contribution in the system is given by allochthonous carbon: mangrove-derived sources accounted for 37 % while the seagrass autochthonous contribution is 24 %. To draw a better picture of the system, the data of carbon (%), nitrogen (%) and nitrogen isotope facilitated the interpretation of the sources present in the seagrass meadow's sediment. These results provide, together with other recent papers, consistent insights on the inter-links between mangrove vegetations and seagrass meadows, and the important role of seagrasses on trapping and burying high percentages of allochthonous organic carbon. Hence, seagrass meadows further contribute to the carbon storage of the linked ecosystems. In this perspective, conservation and restoration of seagrass meadows contribute through the carbon sequestration potential of the complex.

Keywords: blue carbon, carbon sources, mangroves, seagrass, Gazi bay

Storytelling through brushstrokes: Using art to communicate science

Poti Meenakshi; meenakshipoti@gmail.com; Université Libre de Bruxelles, Belgium

In current times, it is critical for scientists to actively engage with society and decision makers to address conservation issues. Visual storytelling is being increasingly recognised as a valuable tool in science communication. A compelling story can resonate with the audience and empower them to take action. Through a visual story, context is provided to the audience and complex scientific concepts are made easier to understand and analyse. Through my project, 'Storytelling through brushstrokes', I use art as an awareness-raising tool to help bridge the gap between science and society. My passion for visual storytelling originated a few years ago, in the remote Indian island cluster of Lakshadweep. It was appalling to know that most local women and children had poor knowledge of the diverse marine life they were coexisting with. These islands are vulnerable to various anthropogenic threats and face increasing human-wildlife conflicts. As a scientist, I felt the need to communicate my knowledge of conservation to the locals and to collectively work on solutions. Illustrations enabled me to overcome my handicap of not knowing the local language. I introduced the inhabitants to the local wildlife, basic science and relevant anthropogenic threats. These interactive sessions were a huge success and a fantastic way to educate and empower the local community. I shared my experience on these islands through illustrated articles in conservation magazines and contributed to a children's storybook. Stemming from this, I recently published a comic version of my MSc thesis on sea turtle egg consumption in Redang Island, Malaysia, which is available in both English and the local Bahasa Malay language. I am actively looking for collaborations with researchers and organisations to help visualise their scientific research. My goal is to integrate my understanding of science with my art skills to produce outreach material in the form of infographics and storybooks.

Keywords: Science communication, conservation education, outreach, art, storytelling

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Blue diatoms as a potential for sustainable shellfish aquaculture

Prasetiya Fiddy Semba; Fiddy.Semba.Prasetiya@partenaire-exterieur.ifremer.fr; Institut français de recherche pour l'exploitation de la mer (IFREMER), France

Microalgae have been considered as a promising alternative not only to substitute animal-derived proteins but also because they have prophylactic and antibacterial properties that may contribute to sustainable aquaculture. Among microalgae species, the blue diatom that refers to *Haslea ostrearia*, is a marine diatom known for its particularity in producing a water-soluble blue pigment, marennine, responsible for the greening of oyster gills. In the French' Atlantic Coast, this phenomenon has a significant economic impact in oyster aquaculture. Moreover, recent studies revealed that pigments produced by other species of the genus Haslea (marennine-like pigment) have comparable characteristics and biological activities, such as prophylactic and antimicrobial agent against shellfish pathogens that are responsible for mass mortality events. The present work is part of the H2020 GHaNA program, which aims to highlight the assessment on potential utilization of this diatom to support sustainability of molluscan shellfish industry. The interaction of Haslea and its pigment with commercially important bivalve species is also discussed. We found that marennine can alter the functional responses of the bivalve at certain concentrations. It also appeared that the effect of this pigment was species and age dependent. Therefore, further studies are required to enhance our understanding between the upside and downside effects of marennine as prophylactic agent to reinforce sustainable shellfish aquaculture.

Keywords: blue diatom, bivalve, *Haslea ostrearia*, marennine, sustainable shellfish aquaculture

How to become a change agent in the Western Indian Ocean region

The struggle towards sustainable development in the Western Indian Ocean / East Africa - Linking the global and regional processes to conservation on the ground

Ralison Harifidy Olivier; horalison@wwf.mg; WWF Madagascar, Madagascar

Hear what it takes to become a change agent in marine conservation in some of the African world's relatively intact and rich marine region. In one of the world's poorest region I built my career with the World Wide Fund for Nature (WWF), and have now a 12-year experience behind me with boom and bust along the way. From running project on the ground with local communities until handling delicate policy situation at the regional level in front of government official representing several countries, I had to face difficult times particularly with an organization characterized by heavy administrative procedures. To start, it would be good to provide you an insight on the context of the Western Indian Ocean at several levels (ecological, social, economic, institutional, and political). We will scan through the challenges and opportunities at national and regional levels, including the importance of marine environment for countries and stakeholders. We will also shed light on how WWF and its partners participate meaningfully in and influence various regional processes (such as the Nairobi Convention, WIOMSA, SDG14 process, etc.). This presentation will then relate how the NGOs, civil society organizations, and local communities evolve in that complex dynamics, taking account of all issues around corruption, weak governance, political instability, low capacity, low funding availability, etc., while they are working hard to secure high conservation value areas, MPAs, LMMAs, community-based management best practices, local livelihoods and food security.

The second part of the talk will focus on the tricks and advice that helped the presenter become a change agent in marine conservation: how he evolved throughout his career and how he did to influence the policy in the Western Indian Ocean region. Along the story, we will highlight some key recommendations for today's students stemming from this former ECOMAMA graduate's experience.

Keywords: Western Indian Ocean, East Africa, career, marine conservation, regional policy, NGOs

The perception of the United Nations' Sustainable Development Goals

Rundt Christine; Christine.Rundt@vub.be ; Oceans & Lakes student

The Sustainable Development Goals (SDGs) were set by the United Nations in 2015 under their agenda for sustainable development towards 2030 as a universal call to action to end poverty, to protect the planet and to ensure that all people enjoy peace and prosperity. The 17 goals with their 169 targets also include a goal on the conservation and the sustainable use of the oceans, seas and marine resources (SDG 14).
Surveys and scientific publications indicate that SDG 14 – 'Life below water' and its targets are related to and contribute to the achievement of many other SDGs. However, several surveys investigating priority development goals of leaders and citizens rate SDG 14 as the goal with the lowest priority. The project will investigate how the perception of priority SDGs changes with education and will try to identify and evaluate possible ways to raise the awareness of SDG 14 in society and politics.

Some interesting news about the mangrove horseshoe crab in penninsular Malaysia

Satyanarayana Behara;
satyam2149@gmail.com; Universiti Malaysia Terengganu, Malaysia

The mangrove horseshoe crab, *Carcinoscorpius rotundicauda* has a restricted distribution throughout Asia. In light of the existing knowledge gaps on its mixing populations within Peninsular Malaysia, a collaborative research work, between UMT and VUB, aimed at analysing the genetic diversity of *C. rotundicauda* (through CO1 sequencing) from Pahang (on the east), Perak (on the west) and Johor (in southern) states was conducted. For this purpose, the freshly deposited eggs (6-8 nos.) and adult crab blood (0.5 ml) samples were collected every month (Jan 2016 – Jan 2017) from each sampling area. Due to no observed nesting activity at Perak, only blood samples - from the crabs found as bycatch by local fishermen, were considered. The isolated data were analyzed against to GenBank® of the NCBI and found similarities with the DNA sequences of *C. rotundicauda* from India, Thailand and Vietnam. From the phylogenetic tree of resemblance between the samples, it was possible to distinguish two major clades separating West and East Malay Peninsula. While West Malay Peninsula with Perak (Straits of Malacca) population has a lineage of Odisha (Bay of Bengal) and Phuket (Andaman Sea), the East Malay Peninsula with Pahang (South China Sea) population has a lineage of Bac Lieu (South China Sea) and Bang Pu (Gulf of Thailand). The southernmost Johor (Straits of Johor) population was found to be a sub-clade of the East Malay Peninsula and suggests a historical connectivity with the South China Sea, but separated from the direct influence. Overall, *C. rotundicauda* populations on the west and the east coasts of P. Malaysia are distinctly separate for which local topography on the south (as land barrier) along with sea surface currents could be responsible. In addition, the year-long observations held at Perak reveals the truth of this place as only a feeding ground for *C. rotundicauda*. Still there is a need for distinguishing the other areas in P. Malaysia as nesting and/or feeding grounds of *C. rotundicauda*.

Keywords: genetic diversity, horseshoe crab, Malaysia, mangrove

The exceptions to the rule? Metal bioaccumulation in macroinvertebrates from metal polluted sites with a good ecological status

Slootmaekers Bart;
Bart.Slootmaekers@uantwerpen.be;
University of Antwerp, Belgium

Surface waters are continuously facing a variety of anthropogenic stressors, including pollution, habitat degradation, and loss of connectivity. In such complex and dynamic environments it is challenging to unambiguously establish the effects of trace metal contamination on the resident organisms. The European Water Framework Directive (WFD) obliges member states to set specific water quality guidelines for surface waters, in order to reach a good ecological water quality status for all water bodies. Nevertheless, many rivers and streams are still experiencing trace metal concentrations that exceed the current Environmental Quality Standards (EQS). In combination with other stressors, this situation may lead to an unfavorable shift in the composition of the ecological community due to a variety of direct and indirect effects. The range of concomitant contributing processes means that it is not straightforward to predict the way in which an aquatic environment and community will respond to the presence of a stressor(s). To gain insights into the contributing factors, we are investigating eleven sites for which apparently contradictory effects are observed. That is, based on monitoring data (www.vmm.be/geoview) gathered by the Flanders Environment Agency (VMM), the sites that have an exceedance of the EQS, yet a good ecological quality is observed as expressed by the Multimetric Macroinvertebrate Index of Flanders (MMIF).

We hypothesize that the macroinvertebrate communities at these locations have (i) adapted to high trace metal concentrations and/or (ii) experienced a lower metal bioavailability due to the water chemistry. To sort out the involved processes, we will systematically characterize the bioaccumulation and exposure patterns of trace metals in a suite of macroinvertebrate taxa collected at these sites and determine the trace metal concentrations in the different ecological compartments (water, sediment and biota). The results, together with general water quality parameters (pH, conductivity, temperature, DOC and macronutrients) will identify whether the ecological quality is primarily governed by chemical or biological factors, or a combination of the two. The outcomes of our research will provide mechanistic insights into the determinants of ecological quality and facilitate development of a more differentiated basis for the setting of EQS.

Keywords: Metals, Mixtures, Toxicity, Risk assessment

Research-education coupling in changing perspectives of aquatic study in Vietnam

Thanh-Hien Nguyen; hien2603@yahoo.com ; University of Science and Technology of Hanoi (USTH), Vietnam

Affected from two consecutive destructive wars, Vietnam showed a remarkable need for economic development, particularly, economy-related labor resources. This fact has oriented most of the young students to choose studying economy over science. Therefore, despite of possessing large and diverse aquatic ecosystems, there is challenging to the Vietnamese authorities on how to exploit and manage such systems efficiently and sustainably due to the deficiency of experts in this aspect. Recently, though aquatic science started drawing more attention in Vietnam since many environmental hazards have been occurred coinciding with rapid establishment of new industrial zones along the coast, the voice of ecologists in media, public debate, especially in decision making has not been as strong as it should be. Furthermore, the linkage between ecological scientists and stakeholders remain loose. This talk, therefore, is introducing the integrated approach which is using high quality research and education activities towards the improvement of ecologist communities in regard to gaining both expertise and attraction to the policy maker.

Keywords: Education, research, ecologist, stakeholder, decision making

Dialogue on some critical leadership concepts and how they matter in aquatic sciences and in life in general

Thiam Ibrahima; ithiam@wetlands-africa.org; Wetlands International Africa, Senegal

Proper leadership in some sort of form is necessary to reach meaningful achievement in any area including in aquatic sciences. In this presentation I would like to share with alumni and other participants my reflections on a couple of major concepts in leadership that I found very useful over the course of my life, and how they can help us navigate a complex and fast paced world.

Keywords: Leadership, future, change, personal development

Environmental pollution in Vietnam and its relation with aquaculture and ecosystem management

Thi Thuy Huong Ngo; ngothithuyhuong@gmail.com; Vietnam Center on Karst and Geoheritage (VCKG), Vietnam

The Gulf of Tonkin located in the Northwest of the Vietnam East Sea/South China Sea, is known as a region with a high marine fish biodiversity and intensive mariculture. However, more comprehensive marine fish parasite studies or fish parasite applications are still missing in Vietnam. Therefore, an investigation of parasites in mariculture and wild fishes in this location was necessary. This sampling was carried out from June 2013 to October 2015. The general object of this study

is to investigate the parasite fauna from commercially important mariculture and wild fishes in the Gulf of Tonkin, to develop applying parasitology to assess aquaculture systems in Vietnam. 303 fish specimens from cultured and wild fishes in the Gulf of Tonkin (164 Epinephelus coioides, 40 Acanthopagus latus, 47 Protonibea diacanthus and 52 Trachinotus blochii) were investigated. In total, 39 parasite species have been recorded (including one new species (sp. nov.) and nine species firstly reported in Vietnam). The detailed morphology of five different species of trematode genus Prosorhynchus (Odhner, 1905) (including P. tonkinensis sp. nov.) from E. coioides have been described and discussed in a submitted manuscript in Zootaxa journal. The analyzing of molecular genotypes of chosen parasites and the applying parasitology to assess aquaculture systems are in process.

Keywords: parasites, mariculture, wild fishes, Gulf of Tonkin, Vietnam

EMODnet – gateway to marine data from & for users.

Tonné Nathalie; nathalie.tonne@emodnet.eu; European Marine Observation and Data Network (EMODnet), Belgium

Marine data are needed for many purposes: for acquiring a better scientific understanding of the marine environment, but also, increasingly, for decision making as well as supporting economic growth. Data must be of sufficient quality to meet the specific users' needs and be accessible in a timely manner. However, this timely access to high-quality data proves challenging. Much of the marine data are scattered and/or are not interoperable.

To tackle those problems, the European Commission through its Directorate General for Maritime Affairs and Fisheries (DG MARE) initiated the development of the European Marine Observation and Data network (EMODnet), in the framework of the EU's Integrated Maritime Policy and Marine Knowledge 2020 Strategy (2014).

EMODnet is a long-term marine data initiative in which currently more than 150 organisations are involved. These organisations work together to observe the sea, process the data according to international standards and make that information freely available as interoperable data layers and data products across seven disciplines (bathymetry, geology, seabed habitats, physics, chemistry, biology, human activities). By doing this, EMODnet supports researchers, public & private users and civil society by, among others, reducing costly and expensive sampling campaigns, enabling effective and efficient marine spatial planning, and stimulating competition and innovation in established and emerging maritime sectors.

To further increase the quantity and quality of available European marine data, the EMODnet Data Ingestion Portal was launched in 2017 which welcomes marine data across the mentioned disciplines. It also takes a pro-active and strategic approach, to target datasets that can fill key gaps by reaching out to other initiatives or specific communities that are collecting data.

Ecological monitoring of rivers and lakes: are we measuring the right aspects for policy*?*

Triest Ludwig; ltriest@vub.be; Vrije Universiteit Brussel, Belgium

In many countries there is a tradition of measuring the ecological water quality of rivers and lakes using the biodiversity and abundance of representative groups of organisms. These usually encompass macroinvertebrates, phytobenthos, macrophytes, phytoplankton and fish. The water framework directive in Europe has initiated many studies to compile indices and use these ecological quality ratios as an indicator of an overall aquatic habitat quality. These signals of either good or bad water quality, are reported to higher levels of policy such that , e.g. in the case of bad ecological quality, a member country formally can be asked to undertake restoration measures and to make a plan for improvement.

These biological indicator methods are also gaining in popularity among the scientific community in the South and need to be looked at in a critical way. We should ask the question whether the abovementioned organisms groups really can be used in tropical rivers and lakes to the same extent as temperate aquatic habitats? Are we measuring the right groups of organisms? How can bio-indicators be convincing to policy makers? And if bio-indicators and their indices are too much a kind of specialist biological information, then could there be an alternative proxy for ecological water quality? Could one think of separating effects of point pollution and urban pollution from the very diffuse pollution within a catchment, when reporting – usually non-formal - to a governmental agency.

Kenya Marine and Fisheries Research Institute: the past, present and future

Uku Jacqueline; juku988@gmail.com; Kenya Marine and Fisheries Research Institute (KMFRI), President, WIOMSA, Kenya

KMFRI was established to conduct research on aquatic systems covering both marine and freshwater. The Institute has grown from staff strength of two Research Scientists at inception to the current 122 scientists. KMFRI's approved staff establishment stands at 1,350 employees but the current staffing position is 839 for both research and support staff which creates a gap of 511 employees. KMFRI infrastructure capacity has also expanded from two research stations based in Mombasa and Kisumu with acquisition of seven additional stations.
KMFRI headquarters is based in Mombasa, with eight (8) other stations at Kisumu, Turkana, Baringo, Naivasha, Sagana, Kegati, Sangoro and Nairobi. The Institute has two Research Centres based in Mombasa and Kisumu. The Mombasa Centre coordinates Ocean and Coastal Systems Research in the coastal hinterlands, the territorial waters and the Exclusive Economic Zone (EEZ) in the Indian Ocean. As a maritime state, Kenya has proclaimed the 200 nautical miles (nm) EEZ as provided for by UNCLOS and has an ocean area of about 142,000 km2 as per the 200 nm EEZ limit. Kenya has further applied for an extra 150 nm EEZ extension for exploitation of bottom ocean bed resources. This makes a total ocean area of 245,000 km2 which is 42% of her total land area making Kenya a significant maritime state.
The Kisumu Centre coordinates research on Lake Victoria and the other inland water bodies through three stations at Lake Baringo, Lake Turkana and Lake Naivasha, while Sagana Aquaculture Research and Development station coordinates Kegati and Sangoro stations.
KMFRI has adopted a multidisciplinary approach in research which is internationally recognised and has been a major strength especially in attracting research funding from development partners. KMFRI's Research activities are organized into three directorates namely; Ocean and Coastal Systems (OCS), Freshwater Systems (FWS), Aquaculture Research and Development (ARD), and a sub-directorate on Socioeconomics (SE). The OCS has two departments; marine and coastal fisheries, and oceanography and hydrography, the FWS has two departments; inland fisheries and limnology, ARD has two departments; freshwater aquaculture and mariculture, while SE is cross-cutting. Each research directorate also has technical support services which are organized in to three departments namely laboratory, maritime and information and communication technology.
The talk will be highlighting KMFRI's current organization structure, research programmes and support departments and its role on national development.

From science to action & policy: experience of the WIO region

Uku Jacqueline; juku988@gmail.com; Kenya Marine and Fisheries Research Institute (KMFRI), President, WIOMSA, Kenya

It is widely accepted that policies, regulations and programmes are stronger and more relevant if informed by scientific knowledge, but development of an effective science policy

interface remains challenging in view of the complexity of the policy process. While provision of timely scientific information and assessments has a role in shaping policy, it is increasingly recognized that a sustained dialogue between scientists and policy makers is more effective than the traditional pipeline model, where scientists set the research agenda, do the research, and transfer the results to potential users.
The Western Indian Ocean region has several regional environmental and resource management organizations, with different objectives and focuses, and mechanisms for cooperation, coordination, collaborative actions and science to policy dialogues. The Nairobi Convention is used as a case study, to describe the process it went through to plan and operationalize its Science to Policy Forum and lessons learnt.
Further in some countries, the development of ocean policies and the Blue Economy has provided opportunities for Science to Policy dialogues. Blue Economy implementation requires a number of tools/strategies including Ecosystem-based management, marine spatial planning (MSP), integrated coastal management (ICM) and the establishment of marine protected areas (MPAs), all of the have benefited from different levels and extent of Science to Policy dialogues. These dialogues have been instrumental in providing the latest evidence on the effectiveness of these tools/strategies. Effective science to policy dialogues are dependent on a number of factors including adequate capacity for trans-disciplinary research; mechanisms for coordinating the inputs of the scientific community and boundary organizations to support cross linking and communications between the scientific research and the policy communities.
This talk was first presented at the IOC-UNESCO High Level Scientific Conference "From COP21 towards the United Nations Decade of Ocean Science for Sustainable Development (2021 – 2030)" on 10th September 2018, UNESCO HQ, Paris, France

Change the world by changing yourself

Vanblaere Shanna;
shanna.vanblaere@ugent.be; Gent Universiteit, Belgium

In order to change the world, you must first change yourself (quote by C. Joybell) Everyone has probably heard of this quote and it is more relevant now than ever. To create change, you must understand the world, its processes but also yourself, your colleagues and your network. It is easy to see everything unilaterally and one-disciplinary but in order to change something you must know all sides of a story, all aspects of a problem and all motivations of individuals concerned.
Keywords: stakeholder analysis, win-win situation, innovation through co-creation

Being a marine scientist at WWF

Vanden Eede Sarah;
vanden.eede.sarah@gmail.com; WWF-Belgium, Belgium

Being a marine scientist at WWF can help the ocean as the knowledge you gathered during your studies provides the basis to build positions and case studies upon. As in policy and governance, lobbying is essential, knowing how to present information to a very diverse public is key. You will have to be able to talk to the wider public, policy makers, the corporate sector, scientists… Some will share your opinion, but there will be critics too. Your scientific expertise, your career experience before, during and after your studies, the network of people you've build… They all help you find your footing in the lobbying arena. Making a difference starts with a good education.

Offshore development in the North Sea: interactions between fish, scientists and the industry

van der Knaap Inge; fsembapr@gmail.com ; Universiteit Gent, Belgium

Europe is directed toward sustainable energy development and the offshore industry plays an important role in this change. Industries relay on knowledge of their impact on the ecosystem to get permission from their governments for exploration, construction and exploitation. In order for them to get information on their sustainability and the precautionary measures they need to take, researcher are hired to monitor and investigate the effects. In light of this, the Joint Industry Program (JIP), has funded research into the effects of seismic bottom exploration on fish. However, what happens when the results are in? How does it reach the industries and what is done with this information?

Better-informed policy-making - Mangrove conservation in Malaysia, Southeast Asia

Vande Velde Katherine; kathvdev@ulb.ac.be ; Université libre de Bruxelles, Belgium

Throughout my doctoral research, we have considered mangrove forests within their Social-Ecological System. Thus, we consider humans as an integral part of the system to be understood, considered and managed alongside the natural system. Biologists, including ecologists are increasingly aware of the crucial importance to take the complete set of human-linked variables into account, when deciding what conservation or management plan to apply to an area. This is often limited to the mapping of direct cause and its effect of mangrove forest degradation or deforestation. While also important, a more profound understanding of the Social-Ecological System is crucially important to researchers (including biologists and ecologists), amongst others for them to understand the possibilities for real impact with their research. Researchers often do not have the chance to invest a lot of time or funding into this. However, my sole focus during this doctoral research is on the detailed understanding of the mangrove social-ecological system in Johor (Malaysia, Southeast Asia), including: (i) direct and indirect drivers of mangrove deforestation and conservation; (ii) identifying socio-economic and socio-ecologic objectives of the people living adjacent to these mangrove forests; (iii) identifying ecological objectives essential to mangrove conservation within given political/social/economic settings; and (iv) gathering all of the above in an easy to use framework that allows decision-makers to make an informed decision, when choosing between different management options. This is a time-consuming endeavour. With my doctoral research I hope to find recurring patterns in recurring contexts of Southeast Asia, to help speed up the process and allow for easy re-assessment of ecologic, socio-economic and socio-ecologic objectives. As well as use several qualitative and quantitative social-science methods to be able to recommend a combination that will get you the information that you need as quick and detailed as possible.

Keyworks: Mangrove forest; Social-Ecological System; Decision-making process; Values; Management

LIST OF PARTICIPANTS

Last name	First name	Email	Institution	Institution acronym
Addo	Emmanuel Yaw	emmanuel.yaw.addo@vub.be	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Agnihotri	Ananya	ananyaagnihotri@gmail.com	Erasmus Mundus Masters Course in Tropical Biodiversity and Ecosystems, Belgium	TROPIMUNDO
Aguilar	Luis	luis.e.aguilar1@gmail.com	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Ahmed	Abduselam	abselame0@gmail.com	Haramaya University, Ethiopia	Haramaya University
Alfaro-Cordova	Eliana	elianaalfarocordova@gmail.com	PRODELPHINUS, Peru	PRODELPHINUS
Alnour	Tasneem	tasnima881@gmail.com	Ministry of Animal Resourses, Sudan	Ministry of Animal Resourses
Andrade Vera	Solange	solange.andrade@fcdarwin.org.ec	Charles Darwin Foundation Galapagos, Ecuador	Charles Darwin Foundation
Ashepet	Mercy Gloria	ashepetmercy@gmail.com	Africa Museum, Belgium	Africa Museum
Baetens	Katrijn	kbaetens@naturalsciences.be	Royal Belgian Institute of Natural Sciences, Belgium	RBINS
Barba Herrera	Sonia	Sonia5bh@hotmail.com	Erasmus Mundus Masters Course in Tropical Biodiversity and Ecosystems, Belgium	TROPIMUNDO
Bashnin	Tayebeh	tayebeh.bashnin@uantwerpen.be	Universiteit Antwerpen, Belgium	UAntwerpen
Basooma	Rose	basoomsrose6@gmail.com	National fisheries resources research institute, Uganda	NAFIRI
Behara	Satyanarayana	satyam2149@gmail.com	Institut français de recherche pour l'exploitation de la mer, France	IFREMER
Benham	Peter	peter.benham@imbrsea.eu	International Master in Marine Biological Resources, Belgium	IMBRSea
Bervoets	Lieven	lieven.bervoets@uantwerpen.be	Universiteit Antwerpen, Belgium	UAntwerpen

Bhagta	Poonam	poonambhagta55@gmail.com	Panjab University, India	Panjab University
Birhane	Haileyesus Girma	hailejesus22@gmail.com	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Boileau-Locas	Camille	camille.boileau.locas@gmail.com	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Boulenger	Arnaud	arnaud.boulenger.97@gmail.com	Université libre de Bruxelles, Belgium	ULB
Bouwens	Jan	bouwensjan@hotmail.com	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Buschbeck	Leonie	leonie.buschbeck@gmail.com	European Parliament- Intern, Belgium	European Parliament
Buschke	Falko	falko.buschke@gmail.com	University of the Free State, South Africa	University of the Free State
Buydens	Marius	marius.buydens@gmail.com	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Byns	Cara	carabyns@hotmail.com	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Calewaert	Jan-Bart	janbart.calewaert@emodnet.eu	European Marine Observation and Data Network, Belgium	EMODNET
Campinas Bezerra	Tânia	Tania.CampinasBezerra@UGent.be	Universiteit Gent, Belgium	UGent
Candido	Soraya	soraya.candido@ams.ac.be	Antwerp Management School, Belgium	AMS
Carrasco	Pedro	peter120_1@hotmail.com	Universidad Nacional Pedro Ruiz Gallo, Peru	UNPRG
Charachimwe	Reason	reaschara@gmail.com	research and specialist services, Zimbabwe	research and specialist services
Chtouris	Nikolas	nikchtouris_23@outlook.com	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Claes	Jolien	jolien.claes95@gmail.com	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Da Costa Monteiro	Luana	Luana.DaCostaMonteiro@UGent.be	Universiteit Gent, Belgium	UGent

Dahdouh-Guebas	Farid	fdahdouh@vub.ac.be	Vrije Univeristeit Brussel-Univeristé Libre de Bruxelles, Belgium	VUB-ULB
De Boeck	Gudrun	gudrun.deboeck@uantwerpen.be	Universiteit Antwerpen, Belgium	UAntwerpen
De Clerck	Olivier	olivier.declerck@ugent.be	Universiteit Gent, Belgium	UGent
De Jonge	Cindy	cindy.dejonge@uantwerpen.be	Universiteit Antwerpen, Belgium	UAntwerpen
De Meyer	Marc	marc.de.meyer@africamuseum.be	Africa Museum, Belgium	Africa Museum
De Weerdt	Joëlle	Eliscientific@gmail.com	ELI-Scientific, Belgium	ELI-Scientific
Dejene	Haileyesus	hailedejene64@yahoo.com	Woldia university, Ethiopia	Woldia university
Delhaye	Louise	louisedelhaye@yahoo.fr	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Demissie	Belaynesh	dbelaynesh87@gmail.com	Ethiopian Public Health Institute, Ethiopia	EPHI
Dereje	Telile	telyder@gmail.com	Jimma University, Ethioppia	Jimma University
Desmidt	Joanna	joanna.desmidt@student.uantwerpen.be	Universiteit Antwerpen, Belgium	UAntwerpen
Dewenter	Jana	janadewenter@gmx.de	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Di Nitto	Diana	diana.dinitto@gmail.com	Vrije Universiteit Brussel, Belgium	VUB
Dierkens	Morgane	morganedierkens@hotmail.com	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Dominguez Martinez	Rosa Mar	rdomingu@ulb.ac.be	Erasmus Mundus Masters Course in Tropical Biodiversity and Ecosystems	TROPIMUNDO
Eijkelhof	Yoeri Marinus	yoeri.eykelhof@gmail.com	Universiteit Gent, Belgium	UGent
El Adak	Yousri	yousriel@hotmail.com	Vrije Universiteit Brussel, Belgium	VUB

Engelbrecht	Jacobus AA	quintoneng555@gmail.com	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Evangelio	Julissah	julissahevangelio@gmail.com	Phd student, Philippines	Phd student
Fajardo	Silvana	silvanadfajardo@gmail.com	Sustainable Oceans, Water and Cities, Peru	SOWAC
Fauziyah	Arida	fauziyaharida@gmail.com	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Fernandez	Georgina	ginazambo9@gmail.com	Provincial Environment and Natural Resources Office, Zamboanga Sibugay, Philippines	Provincial Environment and Natural Resources Office, Zamboanga Sibugay, Philippines
Ferré	Melissa	melissa.ferre.mf@gmail.com	Vrije Universiteit Brussel, Belgium	VUB
Ganoza Gallardo	Maria Jose	mjganoza@outlook.com	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Gebremichael	yitbarek	yitu2014@gmail.com	Ethiopian Civil Service University, Ethiopia	ECSU
Geladi	Ilke	ilkegeladi95@hotmail.com	Erasmus Mundus Masters Course in Tropical Biodiversity and Ecosystems, Belgium	TROPIMUNDO
Genson	Fermina	fgenson@gmail.com	Visayas State University-Tolosa Campus, Philippines	Visayas State University-Tolosa Campus
Geslin	Valentin	valentin.geslin@imbrsea.eu	Universiteit Gent, Belgium	UGent
Goad	Devonne	dv980169@dal.ca	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans&Lakes
Gök	Duygu	duygu.gok.dg@hotmail.com	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Guden	Rodgee Mae	rodgeemae.guden@ugent.be	Universiteit Gent, Belgium	UGent
Hamza	Amina Juma	amina_j2002@yahoo.com	Kenya Marine and Fisheries Research Institute, Kenya	KMFRI
Hardie	Kim	Kim.Hardie@vub.be	International Relations & Mobility Office , Vrije Universiteit Brussel, Belgium	IRMO

Hauquier	Freija	freija.hauquier@ugent.be	Universiteit Gent, Belgium	UGent
Henkens	Symine	symine.henkens@gmail.com	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Hernandez Lucas	Simon	simonhernandezlucas@gmail.com	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Hidayani	A. Aliah	Lhia_achsan@yahoo.com	Hasanuddin University, Indonesia	Hasanuddin University
Hugé	Jean	Jean.Huge@ulb.ac.be	Vrije Universiteit Brussel, Belgium	VUB
Ignoul	Ann	anni@rtbf.be	RTBF	RTBF
Iqram	Muhammad	muhammad.iqram@vub.be	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Islam	Md Jakiul	jakiulmi@sau.ac.bd	Leibniz Centre for Tropical Marine Research (ZMT), University of Bremen	ZMT, University of Bremen
Izava	Mike	izavamike@gmail.com	Conservation International	Conservation International
Janssen	Tom	info@tomsodyssey.com	Tom's Oddysey, Belgium	Tom's Oddysey
Janssens de Bisthoven	Luc	ljanssens@naturalsciences.be	Royal Belgian Institute of Natural Sciences, Belgium	RBINS
Jiménez Alcántara	Juana Susana	jjimenezalcantara@gmail.com	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Jose Tebid	Kehbuma	sigtenyon1er@gmail.com	government, Cameroon	government
Joseph Mtonga	Cretusi	josephcretus@gmail.com	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Jossart	Quentin	qjossart@gmail.com	Vrije Universiteit Brussel, Belgium	VUB
Jung	Julia	JJEduOcean@Gmail.com	International Master in Marine Biological Resources, Belgium	IMBRSea
Kannekanti	Sriram	progrespect@gmail.com	PROGRESPECT, India	PROGRESPECT

Kassanda	Jarline	Jarlinekassanda@gmail.com	Organisation congolaise des écologiste et amis de la nature, D.C. Congo	Organisation congolaise des écologiste et amis de la nature
Kerkhove	Thomas	thomas.kerkhove@ugent.be	Universiteit Gent, Belgium	UGent
Kimeli	Amon	kimeli.k.amon@gmail.com	Kenya Marine and Fisheries Research Institute, Kenya	KMFRI
Knops	Laura	Laura.anastasia.knops@vub.be	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Kochzius	Marc	marc.kochzius@vub.ac.be	Vrije Universiteit Brussel, Belgium	VUB
Koedam	Nico	nikoedam@vub.be	Vrije Univeristeit Brussel, Belgium	VUB
Kugonza	Priscilla	Pkugonzaliz@gmail.com	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Kungula Makoso	Djedje	djekung@yahoo.fr	Université Pédagogique Nationale, D.R. Congo	Université Pédagogique Nationale
Kwilasa	Emmanuel Yaw	kwilasac@gmail.com		
Lagaisse	Rune	rune.lagaisse@gmail.com	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Lambert	Elke	elkelambrt@gmail.com	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Lear	Daniel	Daniel.Lear@vub.be	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Liben	Abreham	abliben3@gmail.com	michael abraha BC., Ehiopia	michael abraha BC.
Loaiza Alamo	Ivan	ivan.loaizaalamo@ugent.be	Universiteit Gent and Universiteit Antwerpen	UGent/UAntwerpen
Loquere	Rose Antoneth	loquere.roseantoneth@gmail.com	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Lorent	Sophie	Solorent@ulb.ac.be	Université libre de Bruxelles, Belgium	ULB

Louis	Victoria	victoria.louis@vub.be	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Macheriotou	Lara	lara.macheriotou@ugent.be	Universiteit Gent, Belgium	UGent
Maes	Frank	Frank.Maes@ugent.be	Universiteit Gent, Belgium	UGent
Mascart	Thibaud	mascart.thibaud@deme-group.com	Dredging, Environment and Marine Engineering, Belgium	DEME
Mavuti	Kenneth Muema	kmavuti@uonbi.ac.ke	University of Nairobi, Kenya	UoN
Mcintosh	Ophélie	opheliemcintosh@gmail.com	Erasmus Mundus Masters Course in Tropical Biodiversity and Ecosystems, Belgium	TROPIMUNDO
Mees	Jan	jan.mees@vliz.be	Flanders Marine Institute, Belgium	VLIZ
Meeusen	Romain	romain.meeusen@vub.ac.be	Vrije Universiteit Brussel, Belgium	VUB
Melake	Bealemlay	bealemlayabebe@gmail.com	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Mevenkamp	Lisa	lisa.mevenkamp@ugent.be	Universiteit Gent, Belgium	UGent
Minani	Georges	georgesminani2018@gmail.com	Université du Burundi, Burundi	Université du Burundi
Mohamed	Mohamed	msaid26474@me.com	Kenya Wildlife Service, Kenya	KWS
Moodley	Kylene	kylene.moodley@gmail.com	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Mordi	Collins	Mordinonso@gmail.com	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Moreaux	Benoit	benoit@moreaux.de	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Motmans	Jannes	jannes.motmans@vub.be	International Relations & Mobility Office , Vrije Universiteit Brussel, Belgium	IRMO
Mouyabi	Flaviancia	fl.mouyabi@gmail.com	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes

Moya Serrano	Ana Victoria	anvier7@gmail.com	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Mufariji	Bizimana Hervé	hervebizimana@gmail.com	Université Officiel de Bukavu, D.R. Congo	Université Officiel de Bukavu
Mujuru	Tinashe	mujurutinashe02@gmail.com	University of Zimbabwe, Zwimbabwe	University of Zimbabwe graduate
Munga	Cosmas	cosmasnke2001@yahoo.com	Technical University of Mombasa, Kenya	TUM
Mutamba Irungu	Shivon	sheevonmalcom1@gmail.com	Uganda Christian university, Uganda	Uganda Christian university
Muteti	Jane	jane.mwikali.muteti@vub.be	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Nankabirwa	Angela	angelenankabirwa@gmail.com	National fisheries resources research institute, Uganda	NAFIRI
Nansumbi	Florence	fnansumbi@gmail.com	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Narie	Tiruneh	girmanarie@gmail.com	Hawassa City Adminstration Agriculture Department, Ethiopia	Hawassa City Adminstration Agriculture Department
Nathalie	Beenaerts	natalie.beenaerts@uhasselt.be	Universiteit Hasselt, Belgium	UHasselt
Ndione	Maguette	ndionemaxim@gmail.com	Université Cheikh Anta DIOP de Dakar, Sénégal	Université Cheikh Anta DIOP de Dakar, Sénégal
Nelson	Marcus	nelsonm9191@outlook.com	Marine Stewardship Council, UK	MSC
Nguu	josphat	Josphat.Nguu@vub.ac.be	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Nguyen	Thanh-Hien	nguyen-thanh.hien@usth.edu.vn	University of Science and Technology of Hanoi, Vietnam	USTH
Nguyen	Thanh	ndthanh0109@gmail.com	Vietnam Center on Karst and Geoheritage, Vietnam	VCKG
Nguyen	Dung	dzung.nguyen.195@gmail.com	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes

Nguyen Minh	Nhut	nhutnm20704@gmail.com	Universiteit Gent, Belgium	UGent
Njiru	James	jamnji@gmail.com	Kenya Marine and Fisheries Research Institute, Kenya	KMFRI
Nmor	Stanley	nmorstanlee@gmail.com	International Master in Marine Biological Resources, Belgium	IMBRSea
nurbandika	navisa	navisadika@gmail.com	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Okello	Judith	judith_okello2003@yahoo.com	Kenya Marine and Fisheries Research Institute, Kenya	KMFRI
Okoth	Ronald Reagan	reaganokoth@hotmail.com	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Olkeba	Takele Tafese	takele.tafese1@gmail.com	Jimma University, Ethioppia	Jimma University
Ong	Ee Zin	ong.eezin@ugent.be	Universiteit Gent, Belgium	UGent
Oude Luttikhuis	Dorien	dorien.oude.luttikhuis@vub.be	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Panto	Gabriella	gabriella_pan@hotmail.it	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Paoletti	Silvia	silviapaoletti95@gmail.com	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Pape	Ellen	Ellen.Pape@Ugent.be	Universiteit Gent, Belgium	UGent
Pappis	Thatiane	thatigestao@gmail.com	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Paredes Coral	Evelyn	evelynbio22@gmail.com	Universiteit Gent, Belgium	UGent
Paul	Musinguzi	musinguzipaul@gmail.com	Mariestopes Uganda, Uganda	Mariestopes Uganda
Phan	Nhat-Truong	nhattruong.wbf@gmail.com	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Pieraccini	Riccardo	riccardo.pieraccini@vub.be	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes

Pinti	Liesbeth	liesbeth.pinti@vub.be	Vrije Universiteit Brussel, Belgium	VUB
Pinzone	Marianna	mpinzone@uliege.be	University of Liège, Belgium	ULiège
Plevoets	Tim	Timplevoets@hotmail.com	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Potter	Kevin	kevin.potter@vub.be	Vrije Universiteit Brussel, Belgium	VUB
Rakib	Md. Refat Jahan	rifatjahanrakib@gmail.com	Noakhali science and technology university, Bangladesh	Noakhali science and technology university
Ralison	Harifidy Olivier	horalison@wwf.mg	WWF-Madagascar, Madagascar	WWF-Magascar
Ratsimbazafy	Hajaniaina	Hajaniaina.Ratsimbazafy@vub.be	Vrije Universiteit Brussel, Belgium	VUB
Reubens	Jan	jan.reubens@vliz.be	Flanders Marine Institute, Belgium	VLIZ
Roelofs	Marleen	marleen.roelofs@ugent.be	Universiteit Gent, Belgium	UGent
Rojas de Aldana	Alejandro	arojasal@ucalgary.ca	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Rundt	Christine	christine.rundt@vub.be	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Runya	Robert	runya-r@ulster.ac.uk	Ulster University, Kenya	Ulster University
Said	Hashim	hashim48@hotmail.com	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Sammy	Kibor	sammykibor@gmail.com	Kenya Marine and Fisheries Research Institute	KMFRI
Satish	Sidanth	sidanthks95@gmail.com	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Sauvaire	Maxime	sauvairemaxime@gmail.com	Erasmus Mundus Masters Course in Tropical Biodiversity and Ecosystems	TROPIMUNDO
Seid	Mohammed Adefa	antemoha2008@yahoo.com	EBI, Ethiopia	EBI

Semba Prasetiya	Fiddy	fsembapr@gmail.com	Institut français de recherche pour l'exploitation de la mer, France	IFREMER
Senne	Aertbeliën	senneaertbelien@hotmail.com	Begium	
Shankar Poti	Meenakshi	meenakshipoti@gmail.com	Université libre de Bruxelles, Belgium	ULB
Shanna	Vanblaere	shanna.vanblaere@ugent.be	Universiteit Gent, Belgium	UGent
Shymbaliova	Nadzeya	nadi.shymbaliova@gmail.com	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans&Lakes
Sindikubwabo	Vincent	sindikubwabovincent@gmail.com	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Slootmaekers	Bart	Bart.Slootmaekers@uantwerpen.be	Universiteit Antwerpen, Belgium	UAntwerpen
Stamoulis	Antonios	astamoulis@gmail.com	European Commission - Executive Agency for Small- and Medium-sized Enterprises	European Commission - Executive Agency for Small- and Medium-sized Enterprises
Stiers	Iris	Iris.Stiers@vub.be	Vrije Universiteit Brussel, Belgium	VUB
Strauss	Sylvia	sstrauss@skynet.be	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Suello	Rey Harvey	rharveysuello@gmail.com	Mindanao State University, Philippines	Mindanao State University
Suleiman	Suleiman	suleimansuleiman888@gmail.com	institution, Tanzania	institution
Thi Thuy Huong	Ngo	ngothithuyhuong@gmail.com	Vietnam Center on Karst and Geoheritage, Vietnam	VCKG
Thiam	IBRAHIMA	ithiam@wetlands-africa.org	Wetlands International Afrique, Senegal	Wetlands International Afrique
Thuy Dung	Nguyen	junegal195@gmail.com	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Tonné	Nathalie	nathalie.tonne@emodnet.eu	European Marine Observation and Data Network, Belgium	EMODNET

Tran	Thi Lan Anh	anhttl@hus.edu.vn	Universiteit Gent, Belgium	UGent
Tran	Khuong	tranchinhkhuong@gmail.com	United States Agency for International Development, Vietnam	USAID
Triest	Ludwig	ltriest@vub.be	Vrije Universiteit Brussel, Belgium	VUB
Trinh	Hai Son	haison.trinh@gmail.com	Vietnam Institute of Geosciences and Mineral Resources, Vietnam	VIGMR
Uku	Jacqueline	juku988@gmail.com	Kenya Marine and Fisheries Research Institute, Kenya	KMFRI
Umar Ali	Widyastuti	widyastuti160@gmail.com		
Vaes	Tom	tomvaes@gmail.com	Ace of Brussels, Belgium	Ace of Brussels
Vafeia	Anna Maria	annamaria.vafeiadou@ugent.be	Universiteit Gent, Belgium	UGent
van Caster	Nathalie	nathalie.laurence.van.caster@vub.be	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Van Craenenbroeck	Lore	lore.vc@hotmail.com	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Van der Aa	Pierrot	prionace96@gmail.com	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans&Lakes
van der Knaap	Inge	inge.vanderknaap@ugent.be	Universiteit Gent, Belgium	UGent
Van Huylenbroeck	Guido	Guido.VanHuylenbroeck@UGent.be	Universiteit Gent, Belgium	UGent
Van Loock	Stephanie	stephanievanloock@hotmail.com	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Van Nieuwenhove	Annelore	Annelore.Van.Nieuwenhove@vub.be	Vrije Universiteit Brussel, Belgium	VUB
Van Puyvelde	Karolien	karolien.van.puyvelde@vub.be	Vrije Universiteit Brussel, Belgium	VUB
Van Roozendael	Benjamin	benjamin.van.roozendael@gmail.com	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes

van Werven	Bernike	Bernike.van.Werven@vub.be	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Vande Velde	Katherine	kathvdev@ulb.ac.be	Université libre de Bruxelles, Belgium	ULB
Vanden Eede	Sarah	vanden.eede.sarah@gmail.com	WWF-Belgium, Belgium	WWF-Belgium
Vanreusel	Ann	ann.vanreusel@ugent.be	Universiteit Gent, Belgium	UGent
Verbrugghen	Kristien	kristien.verbrugghen@vliruos.be	VLIR-UOS, Belgium	VLIR-UOS
Verhaegen	Coralie	coralie.cecile.verhaegen@vub.be	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans&Lakes
Verlé	Katrien	katrien.verle@ilvo.vlaanderen.be	Instituut voor Landbouw- en Visserijonderzoek, Belgium	ILVO
Verstraeten	Tim	tim.verstraeten@ugent.be	Universiteit Gent, Belgium	UGent
Vincx	Magda	magda.vincx@ugent.be	Universiteit Gent, Belgium	UGent
Vyverman	Wim	wim.vyverman@ugent.be	Universiteit Gent, Belgium	UGent
Wellens	Siel	siel.wellens@ugent.be	Universiteit Gent, Belgium	UGent
Wouters	Bram	wouters.bram@hotmail.com	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes
Wyns	Paulien	paulien.wyns@student.uantwerpen.be	Master of Science in Marine and Lacustrine Science and Management, Belgium	Oceans & Lakes