Report about the RGNO for the period 2020-2021 submitted to SCOR and the Sponsors compiled by Kurt Hanselmann

Hit hard – but optimistic outlook

The RGNO pages on OLAT and the internet pages contain information about the last in-person course in 2019 and the online activity in 2021.


(when prompted by OLAT, please enter via “Guest access”)

http://www.microeco.ethz.ch/rgno_namibia_18-21/RGNO_Namibia.html

RGNO stands for “Regional Graduate Network in Oceanography”. As originally proposed by SCOR’s Bellagio Meeting Report of 1998, RGNOs are means of including students from developing countries and engaging local scientists in capacity development and cooperation in international ocean research activities. The scientific training of the Namibian RGNO is based on topics that can be carried out in and are relevant for the Benguela Upwelling System (BUS). The program has developed in a bottom-up process with instructors and local researchers from UNAM (University of Namibia), NUST (Namibian University of Science and Technology), and NatMIRC (the National Marine Information and Research Center of the Ministry for Fisheries and Marine Resources), BCC (the Benguela Current Commission), and with visiting investigators from abroad. The RGNO aims

• to support local scientific capacity to acquire practical skills,
• students to envision becoming oceanic researchers,
• to promote confidence to collaborate in international research projects,
• to actively contribute to SCOR working groups,
• to identify needs and propose research projects that are of local or global importance, and
• to engage interested researchers to contribute to executing research, always linked to teach and train students.
The Namibian RGNO Course Model.

After two Visiting Scholarships in 2010 and 2011, and with the financial support of the Agouron Institute and since 2017 also of the Simons Foundation, SCOR had initiated the Namibian RGNO on "Biogeochemical Oceanography in Upwelling Ecosystems" in 2013.

Six courses had been offered since 2014. The overarching theme of the second phase of funding (2018 to 2023) is "Resilience and Responses of the Benguela Upwelling Ecosystem towards Changes in the global and regional Environment". The research contents have been chosen for their relevance towards a holistic view of the BUS as an integrated marine ecosystem.

RGNO courses last normally 4 to 5 weeks. They include preparation and execution of a cruise for a few days in the BUS, proper collection and preservation of samples for later analyses at the NatMIRC or SANUMARC campus or at the participant's home institution, attending daily lectures, and organising and contributing to seminars and short symposia. We like to accept students who are involved in ocean research as part of their thesis work and have invited instructors who are willing to support the RGNO mandate and who have the capacity to contribute personally.

The program encourages students and instructors to execute their funded research projects in the Benguela upwelling system. The individual projects are assembled into an interdisciplinary course. Variability makes each course unique and allows one to adapt to shifting interests that include innovative new methodologies and approaches.

RGNO itself does not fund research; its objectives are education through international research collaborations. The initiatives were started with the intention to connect local research and tertiary training to international research programs as an activity to prevent further "parachute science". RGNOs make it possible for local students and instructors to become partners in ongoing international projects but also to initiate programs and invite partners from abroad to participate in projects of national importance and needs. The programs are offered to local universities with the intention that all research executed in their marine zones must leave broad educational footprints in the host countries. This has been done six times between 2014 and 2019, before …

The Corona pandemic disrupted the program.

RGNO had to cancel the 2020 course, did not announce a course for 2021, and is hoping to be able to offer a course again in Namibia in 2022. Also, the outreach activity, the training for Highschool Teachers on marine literacy, that RGNO helps to execute could not take place during the Corona years. We hope to be able to return to Namibia as soon as the world health situation will safely allow to continue the hands-on training.

The interruption of the RGNO program by Covid has allowed us to reflect on the state of achievement and whether we are still on track with reaching the goals that had been formulated in the original proposal.
Although the SARS-CoV-2 has put an abrupt halt to our usual activities, it has also taught us how to adapt to changes. The virus has given us opportunities to rethink what we have been doing, assemble many former course students and instructors in regular seminar meetings online and evaluate our priorities.

We were in the last week of the seminar series of the 2021fall semester when we received the news that made us all deeply sad and very concerned. Dr. Chibo Chikwililwa, RGNO’s Co-director and the local organiser had lost her fight against SARS-CoV-2. She had died on June 23 at the age of 41. We had worked with Chibo for the development of this promising educational project since 2016. Her thoughts shall be properly acknowledged and her intentions realized as many had expressed and wished during the memorial student showcase symposium on June 28.

https://lms.uzh.ch/url/RepositoryEntry/16371188134/CourseNode/104040658544200

Response to the Corona challenges

During the height of the pandemic in 2020, the RGNO executive group had decided to organise a series of online seminars devoted to the course research topics. The event took place during the period February to June 2021. It had offered 18 seminars with 40+ presentations and 2 showcase student symposia with a total of 10 presentations. Seminar speakers and convenors were former RGNO instructors and alumni, but also guest speakers from all over the world. The seminar themes had focused on the 5 topics of the RGNO-II program which are covered by 10 projects, all supervised by RGNO instructors.

• Trophic ecology (1, 2, 8)
• Biogeochemical cycling (3, 6)
• Sediment-water interactions (5, 4b, 7)
• Ecosystem resilience (4a, 9)
• Ecosystem resources and services (10)

The numbers in ( ) refer to the 10 research projects that are described below the conceptual program summary figure on the website https://lms.uzh.ch/url/RepositoryEntry/16371188134/CourseNode/83591083552889 (guest access)

The showcase presentations of June 21 and 28 had offered opportunities for alumni and potential course participants whom we had invited to discuss the progress of their research. It was satisfying to realise how much the course was able to initiate. A number of published papers that had originated or were further supported by samples collected during the course are available in the folders that supplement the seminar presentations.

The titles of all seminars and showcase talks are listed here https://lms.uzh.ch/url/RepositoryEntry/16371188134/CourseNode/103233498265063 and recordings of most seminars and all showcase presentations can be viewed via the YouTube links given on the program page. The reasons for offering RGNO seminars, the concept, and an evaluation of the outcome can be found in the addendum under “Why we make Discovery Seminars”. https://lms.uzh.ch/url/RepositoryEntry/16371188134/CourseNode/103233498265063

The seminars attracted up to 45 attendees for an hour every Monday afternoon and a total of more than 6500 visits to the seminar website.
Potential values, and pitfalls of digitalised learning and teaching

Although the 2021 RGNO seminar series was not the first attempt to include e-learning, it was the first to do it online with live streaming. We had designed protocols for successful online teaching https://lms.uzh.ch/url/RepositoryEntry/16371188134/CourseNode/103279806799355 and for using the Zoom Meeting platform https://lms.uzh.ch/url/RepositoryEntry/16371188134/CourseNode/103233498242522 effectively. Many presenters made an effort to adhere to the recommendations.

Using a well-established LMS, like OLAT, allows one to structure contents, link recordings, work in groups, make papers available, exchange ideas in blogs and chats, offer a steadily growing Q&A user forum, establish “office hours”, and pre- and post-seminar discussion periods.

Learning online requires a high degree of concentration by the learners as well as the teachers. Presenters must recognise this and adapt to the associated shorter attention span of the learners. Besides following a clear structure and emphasising key points, presentations must be kept short (≤20 minutes) and be followed by discussion periods immediately. Recordings should be done and technically controlled by a moderator who relieves the speaker from having to keep an eye on the recording functionalities.

Learning online and possibly from home is comfortable but it entices one to do several things besides following the ongoing presentation (multi-tasking). This diminishes the attention and the learning efficiency. Recordings are helpful for reviewing the material but they do not allow asking direct questions that could clarify things on the spot.

With the seminar activity, we were able to reach RGNO alumni, potential students, instructors, speakers, and guests from as far apart as Denver and Shanghai. Although
connecting via Zoom, sharing screens, and discussing in breakout groups has become quite common and easy to handle, it was sometimes a technical challenge to reach African students for the sessions via the internet. Minor technical glitches could be overcome quite well. Problems that had occurred from time to time were mostly due to the low quality of the internet connection and the stability of the providers’ networks.

In general, everything had worked out pretty well for the relatively small number of attendees (<50). In future years we will need more server and cloud space for the recorded videos. At the beginning of a seminar series, we need to offer more advice about presentation formats that work well and those that should be avoided, and we need to offer tutorials with instructions, and technical support.

**Lessons learned**
The pandemic has removed the widespread reluctance of using digital platforms in education. It is to be expected that digitalised learning and teaching will become a more and more accepted and heavily used approach for knowledge transfer and acquisition, and for the creation of new knowledge. The development of simple and reliable electronic communication tools will continue. Digital and didactically learner-oriented teaching approaches for in-class, as well as online, will offer many new possibilities. Students who are accustomed to self-motivated learning will profit most.

For an international project like RGNO, digital support offers new dimensions for strengthening the interactions between course alumni, active and potential course participants and thus for capacity development and support in developing countries. For the practical part of a course, we still need expert instructors to conduct and supervise the research at the site. Acquiring practical expertise must remain the main goal of the RGNO. But we can engage the best lecturers from far away without them having to travel far. The prerequisites for participation at a training course and the quality of the training can be increased through online activities and collaborative working, and task sharing can be facilitated.

What I have missed most is not being able to learn from one another spontaneously, not being able to profit from the knowledge of experienced people at sea, and the lack of opportunities to exchange ideas and practice and pass on skills in the laboratory.

**Outlook**
Presently we are in the planning process of two courses:
1. A short skills training course (sampling and sample preservation techniques) is being prepared for a few local and foreign students in connection with the environmental survey cruise in December 2021. This course shall also study the practicability of creating a sample exchange repository.
2. A hopefully regular RGNO course in Namibia is scheduled for April 2022. Its goals are to support the development of an international research network for the benefit of students and instructors of the region, of Africa, and worldwide and to continue strengthening the Namibian Ocean training hub as pictured at the bottom of this page.
An online seminar series about the five defined topics is foreseen to take place in the Namibia fall semester of 2022 (February to May). It shall serve as a preparation for the course participants. The series will include the instructors of the course as speakers, a few RGNO alumni, and specialists from SCOR working groups. Besides learning about the Benguela ecosystem and sampling approaches that can be used during the cruise in April, it will emphasise the use of online ocean resources, other databases, and processing software (e.g. Ocean Data, GeoTraces, KBase, KEGG, etc.)

A number of new study topics have been proposed by seminar participants. They can be included if investigators with funded research projects express interest to execute them as part of an RGNO course.

- How gas formation in sedimenting aggregates (N\textsubscript{2}O, CH\textsubscript{4}) makes them float and increases the gas transport to the atmosphere.
- Metabolomics to elucidate the microbial metabolisms in aggregates from different pelagic settings.
- The sedimentary CH\textsubscript{4} metabolism that makes sediments erupt and transport sulfide into the photic zone.
- Searching for actively sulfide oxidising populations of anaerobic, phototrophic bacteria in sulfide eruption zones. Many of these organisms contain specific cellular biomarkers that have been found as chemical fossils in the shelf sediments. The presence of biomarkers in sediments might allow one to reconstruct past sulfide eruptions.
- Bioturbation by sediment-dwelling microzoobenthos and its role in the benthic food chain.
- Risks posed by microplastic particles (< 5 mm) and Nanoplastics (< ? µm) that are ingested by microzoobenthos.

Where RGNO students and instructors came from