NF-POGO Alumni Network for Oceans (NANO) Report

December 2013

1. Background

The Nippon Foundation, through its partnership with POGO, has provided professional training in observational oceanography to over 250 young scientists from around the world, the majority from developing countries, between 2005 and 2013. Networking was always a priority for the joint NF-POGO initiatives and both the NF and POGO wanted the benefits of the training to extend beyond the formal training period.

The idea of forming a network of former scholars, or “alumni” thus emerged and matured into a meeting to formulate plans for the network. This meeting was held in London in October 2010, involving selected scholars and instructors, and representatives of the Nippon Foundation and of POGO. The vision for the Network established during this meeting was "Integrated Observations of a Changing Ocean” and the unifying thread that would hold the network together was a common interest in, and commitment to, ocean science, and the common will to communicate scientific results to the general public. The network was named NF-POGO Alumni Network for Oceans, or NANO.

2. Objectives

The main objectives of NANO are:
- to establish regular communication between the Nippon Foundation, POGO and their former scholars,
- to provide them with further support, and
- to organize new activities that will involve professional collaboration between the Alumni.

It was decided that:
- Regional Coalitions would be established (initially Asia, Latin America and North Africa/Europe and sub-Saharan Africa) whose activities will include regional coordination, workshops, information exchange and assistance with placement for prospective graduate students.
- There would be a free and vigorous exchange of information between and within Coalitions.
- There would be research projects carried out by NF-POGO Alumni and coordinated by NANO. Regional proposals for these projects should be written with due regard for local culture and customs, engaging senior managers in the Region from the outset.
- Research projects would focus on global and regional monitoring of biological, chemical and physical changes in the ocean, aiming at better understanding of interactions and feedbacks in the ocean. The concept is to observe locally at selected time-series stations around the global ocean, and network the time-series stations to obtain a global vision.
- These projects would be run in collaboration with existing projects and aim to contribute to, rather than compete with, existing research programmes in developing countries.

3. Progress to date

Since the London meeting significant progress has been made in bringing the alumni into the network, establishing communication channels, and engaging the alumni in joint activities. To undertake this work, it was essential to engage former scholars to assist the Secretariat. Thus, NF-POGO fellowships were awarded to former scholars from the second year of the Centre of Excellence: Lilian Krug (Brazil) and Olga Shatova (Ukraine), who were identified during the London Meeting as enthusiastic and excellent contributors, and at the time were seeking opportunities to further their research careers. Lilian’s fellowship was for 8 months (Jan-Sept 2011), and Olga’s for 3 months (April-June 2011). In both cases, the full-time fellowships ended once the fellows had found a research or postgraduate (PhD) position that would further their career development. Both have been continuing their support of NANO through part-time (20% FTE) fellowships. These fellowships were supported initially by residual funds carried over from previous years of the NF-POGO programme, and in 2012 and 2013 funds were allocated from the NANO administration budget.

3.1. Database of alumni

Questionnaires were sent out to the alumni of the six NF-POGO Visiting Professorships (India, Fiji, Sri Lanka, Brazil, Tunisia and Viet Nam), the four years of the CofE, and the three regional CofE programmes (Brazil, Viet Nam and India). As of Dec. 2013, two thirds of the questionnaires have been returned, which is a very positive result considering that many of these alumni were trained over 5 years ago and a significant proportion will have moved on and changed e-mail addresses. The Network thus comprises 160 official members from 37 countries. Among those who returned the questionnaire, around one third were female and two thirds were male. The majority are from India, Brazil and Vietnam (two training courses were conducted in each of these countries). In terms of education, as of Dec. 2013, 83% had an MSc and 28% had a PhD. The most prominent research areas are Biological Oceanography and Remote Sensing.

3.2. Website

A website was created and launched in June 2011 (http://www.nf-pogo-alumni.org). Wikispaces was chosen as it is user-friendly, adopts a social networking approach (i.e. membership of the website and discussion forums) and can easily include different types of media (e.g. maps and videos). There are a number of pages open to the public, however all the pages containing personal information on the alumni are open to members only. Thus, the website is a virtual platform for communication within the network, as well as providing information on NANO to the general public. In total, 173 alumni and “NANO Friends” have joined the website to date. The number of website visitors has been increasing steadily since it was launched, reaching an average of 250
unique visitors per day in October 2013 (see Figure 1). Visitors are from all over the world (see Figure 2). The alumni are very keen to be active members of the network and can see the benefits that will accrue from being part of NANO.

Figure 1. Increase in the daily number of unique visitors to the NANO website since its launch.

The website includes a private database of the alumni, whereby everyone who returned the questionnaire has a profile page (short CV) including education, professional achievements, research interests and publications. With the aim to facilitate collaboration, research theme pages were created as well as regional pages listing the alumni by research interest and by region, respectively. A page has also been created for “NANO friends”, which include faculty of training programmes and other professionals keen to assist the development of the network. The Opportunities page, where alumni can post jobs, scholarships, meetings and other announcements, is one of the most visited. In 2012, pages were created for the four regional research projects (see below).
Figure 2. Map showing locations of NANO website visitors in (a) 2011 and (b) 2013, showing how the geographical extent of the visitors has grown in the last year, particularly in Africa and Latin America. Size of red dots is relative to number of visitors.

3.3. Newsletter

The creation of the NANO newsletter was another initiative led by an alumnus, Kanthi Yapa from the Visiting Professorship in Sri Lanka. The idea for a newsletter was initiated at the London Meeting to open dialogue, develop and exchange research ideas and disseminate information to society at large. The first issue was released in September 2011. Kanthi Yapa was the Chief Editor for the first two issues, then it was decided that this role should rotate among the alumni to relieve the burden on a single person, and give more alumni the responsibility and sense of ownership of the newsletter. Chief Editors have been Yosra Khammeri (Tunisia), Olga Shatova (Ukraine), Kathleen Silvano (Philippines) and Arvind Singh (India). The issues generally include articles by alumni outlining their research interests, one or two articles by NANO Friends, and updates on NF-POGO training and NANO activities. The latest issue included a feature on Phase 1 of the Centre of Excellence, and a new section “When NANO Ponders”, where alumni can reflect on issues relating to science and society. See http://www.nf-pogo-alumni.org/NANO+Newsletter.
3.4 NANO research projects

Four regional project proposals were prepared during a NANO Meeting that took place in Abingdon in September 2011, and funded in 2012. Themes included societal benefit angles such as coastal pollution, hazards, climate change, and management of coastal resources.

The four projects all focus on global/regional monitoring rather than local problems, and on ocean observations for societal benefit, with an emphasis on different aspects of coastal water quality (i.e. harmful algal blooms and coastal pollution). There is also an emphasis on time-series measurements, and the achievement of a global vision through a combination of in situ data, satellite remote sensing and modelling.

3.4.1. Indian Sub-Continent

See [http://www.nf-pogo-alumni.org/Indian+Sub-Continent+Regional+Project](http://www.nf-pogo-alumni.org/Indian+Sub-Continent+Regional+Project)
The objectives of this project are:

1. Study of the dinoflagellates community structure with reference to HAB species and dissolved phycotoxins in the coastal waters of Indian and Sri Lankan subcontinent;
2. Use of remote sensing and bio-optical properties to understand HABS in this region.

Dr. Ravidas Naik (NF-POGO Visiting Professorship Kochi alumnus) and Dr. Kanthi Yapa (NF-POGO Visiting Professorship Sri Lanka alumnus) were appointed as Regional Coordinators for the project. First, it was important to obtain the cooperation of senior administrators and scientists in India for the project to go ahead. Ravidas set up a meeting with the director of CMLRE, Kochi, India, which is very involved in Harmful Algal Bloom monitoring and research. The director was very helpful, and offered help in terms of sample collection for the project during their cruises along the west coast of India. Ravidas also met with Dr. V.V.S.S. Sarma, scientist at NIO, Vishakhapatnam, who was also helpful, and with his approval one of the NF-POGO alumni from the Regional Centre of Excellence in Hyderabad (Mr. Aziz) is collecting samples from Visakhapatnam for the project.

During Year 2, meetings were held at NARA, Sri Lanka, to discuss procedures with the experimentalist, Ms. Priyadarshani, and the team advisor Dr. Arul, for the continuation of sampling. Sampling commenced in February 2013 in Putlam Lagoon, on the west coast of Sri Lanka. Samples were collected during the following periods:
- 28 March – 14 April
- April: 04/14 – 04/23
- 23 April 28 May
- 28 May – 27 June
- 27 June – 30 July
- 27 Aug – 14 Sep
SPATT bags deployed during February (12-14, 23-24) and March (26-28) were lost as marker buoys had been cutoff. Frozen SPATT samples were sent to Rajdeep Roy, NIO, Goa, India (in November) for analysis.

In India, water samples were collected from the west coast as well as the east coast of India during monsoon and post-monsoon seasons. A total of 23 potential HAB species were recorded from the west coast of India. The greatest contribution (78%) was from dinoflagellates (18 species). Among these, *Prorocentrum* was the most dominant genus followed by *Dinophysis* and *Ceratium* in the coastal waters of Goa. The number of HAB species in coastal waters along the east coast was lower (8) and was dominated by diatoms (5 genera) followed by dinoflagellates (3 genera). *Skeletonema, Chaetoceros, Pseudo-nitzschia, Coscinodiscus and Thalassiosira* were the abundant HAB-forming diatoms.

A single cell pure culture of *Heterosigma akashiwo* was established through micropipetting technique from Dona Paula Bay area. This is a brevitoxin producer and known for its massive blooms and fish kills. These cultures were grown in 80 μmol photons m\(^{-2}\) s\(^{-1}\) and reached as density of 20,000 cells ml\(^{-1}\). The pigment profile showed the presence of various marker pigments such as chls c1 and c2; fucoxanthin, violaxanthin, antheraxanthin and minor quantities of zeaxanthin (which is found in
cyanobacteria). The presence of zeaxanthin has also been noted earlier from one temperate water species. This is first report of *Heterosigma akashiwo* from Indian waters.

![Sampling stations and transects around the coasts of India and Sri Lanka.](image)

**Figure 4.** Sampling stations and transects around the coasts of India and Sri Lanka.

### 3.4.2. South-East Asia

See [http://www.nf-pogo-alumni.org/South-East+Asia+Regional+Project](http://www.nf-pogo-alumni.org/South-East+Asia+Regional+Project).

For Year 1, the objectives of this project were:

1. Validate, refine and apply the Remote Sensing-Harmful Algal Bloom (RS-HAB) model developed by the Philippines;
2. Continue the Mekong Delta time-series in Vietnam and use the data to validate the model.

The first step for this project was a kick-off meeting bringing together the participants from Vietnam and the Philippines. The two-day meeting was hosted by the National Institute of Oceanography Nha Trang, Vietnam, from 6 to 7 July 2012, and attended by fourteen NANO alumni and mentors. The NANO-SEA regional proposal, “*Harmful algal bloom remote sensing model for Southeast Asian region*”, was presented to the participants, followed by presentations from both countries to guide and facilitate discussions in the subsequent working group sessions. These presentations provided information on the research capabilities of each country in terms of facilities, resources and the level of data support that are currently available during the initial phase of the NANO project.

Ideas on various topics were exchanged such as sampling plan and ability for ocean colour algorithm development in Mekong Delta, Vietnam. Details such as locations, sampling methods, algorithm development, and tasking were given attention. Thus, a sampling plan and data utilities as input data for biochemical-oceanography of HAB
modeling in Philippine and Vietnam waters was made. A list of action items and corresponding people responsible for each research component was also drawn up. The first field trip in Vietnam, targeting the rainy season, was planned for Sept 2012, but had to be delayed to October due to the weather conditions. The field trip took place from 10 to 13 October 2012, and 8 scientists from the Institute of Oceanography took part. A total of 15 samples were collected from 8 stations for analysis of chlorophyll, total suspended matter, total organic matter, dissolved and particulate organic carbon, total suspended solids and phytoplankton identification. Profiles of Photosynthetic Available Radiation (PAR), temperature, salinity, pH, turbidity, DO, and fluorescence were taken. The phytoplankton community structure and chemical parameters have already been analysed. The second field trip is planned for December 2012 (dry season).

The first field trip in the Philippines took place in August 2012. *Pyrodinium bahamense* var. *compressum* was found in the areas of the bay where it is typically found. However, they did not seem to be in high enough concentrations to be considered “blooms”. Hydrographic conditions also showed the typical stratified water column driven by freshwater influx characteristic of the southwest monsoon. Laboratory analyses of nutrients and other physical parameters are currently on-going. The next field trip is planned for January 2013.

For the second year, it was decided that the group would expand to include other NANO countries. Since the year 1 project was able to continue without support from NANO, it was deemed more worthwhile to change the research topic to one that would be relevant for a greater number of countries. A workshop was held in the Philippines in November 2013, with participants (alumni) from Vietnam, Philippines and Thailand. An alumnus from Indonesia was also invited, but was not available to attend.

The objectives of the workshop were as follows:
1. Introduce the participants to encourage networking and collaboration.
2. Provide background on the previous regional project conducted by the NANO-SE Asia Region.
3. Discuss the next steps for NANO-SE Asia research project for the current and coming year.
4. Prepare a project proposal and budgets for a collaborative NANO-SE Asia project, including defining the participants and their roles; draft a work plan; agree upon the methodology and variables to be measured, and on the milestones to be achieved.

The workshop enabled all of the lead participants to meet one another and to have the opportunity to communicate how they can contribute towards a NANO regional research project. Following the 2-day workshop, a major conclusion of the meeting was that NF-POGO alumni (NANO members) from three countries (Vietnam, Philippines and Thailand) were able to collectively draft a project proposal and agree upon the methodology and variables that would be measured. The project proposed is entitled “Eutrophication in the coastal waters of SE Asia: An assessment”. Additionally, some NANO members that are currently undertaking research at other locations, yet are still affiliated to the lead institutes will be able to contribute to the project, by participating in the field sampling trips, processing the samples, or analysing the data collated from the
research. The aims of the research project are to provide useful insights that can form the basis for informing stakeholders and to provide guidelines on how to manage water quality on local and regional levels. This will be done through submission of a policy paper and a scientific paper, as well as a report to the Nippon Foundation and POGO.

3.4.3. Latin America

See [http://www.nf-pogo-alumni.org/Latin+American+Regional+Project](http://www.nf-pogo-alumni.org/Latin+American+Regional+Project). The Latin American Regional Project (LA-NANO Project) aims to implement pigment analyses using HPLC in the ANTARES network time series stations. In Year 1, Guillermina Ruiz (Argentina) was awarded with a 1-year fellowship to help in the coordination and development of the LA-NANO Project, working under the supervision of NANO alumnus Dr. Ana Dogliotti and NANO Friend Dr. Vivian Lutz. Between the participating stations, an agreement was reached on the method for storing HPLC samples until analyses by the Ocean Ecology Branch of NASA-Goddard Space Flight Centre. Subsequently, a standard operating protocol for collecting the pigment samples was defined and distributed to the participating stations to ensure consistent methods were followed and, in so-doing, the limitations of equipment availability could be identified and resolved. A result of this was that particular provision was made to the Cartagena station which required suitable storage facilities for the samples. An allocation of project budget was made for the purchase of a new liquid nitrogen dewar and liquid nitrogen for this station.

A total of 19 cruises were conducted by the 6 different institutions between July and October 2012, and a total of 60 samples were collected for pigment analysis by HPLC. The samples from 6 time-series stations were shipped to the Ocean Ecology Laboratory, NASA-Goddard Space Flight Center (Greenbelt, Maryland, USA). Shipping was logistically challenging, but it was successfully coordinated by Guillermina and all samples arrived at the laboratory intact.

Figure 5. Purchasing a liquid nitrogen dewar for the Columbian station allowed this laboratory to store pigment samples at the required temperature and thus participate in the project.
In Year 2, a fellowship was awarded to an alumnus, Jaimie Rojas Marquez, to coordinate the project. The workshop “Ecological use of marine phytoplankton pigments at the Antares-ChloroGIN time-series-stations” (hereafter Margarita Workshop) was carried out in the framework of the second phase of the Latin American Regional Project for the NANO Network. The workshop took place from 21 to 24 October of 2013 and it was held at the Station of Marine Research of the La Salle Foundation for Natural Sciences in Margarita Island, Venezuela.

The workshop consisted of lectures, working sessions and group discussions on the topics of phytoplankton pigment uses in oceanographic research and the possibilities for carrying out HPLC analyses in Latin America. The main goals set for the workshop were:

- Offer a brief introduction to the High Performance Liquid Chromatography (HPLC) technique for the analysis of phytoplankton pigments; principles and comparison of methods; applications in oceanography; pigment indices, CHEMTAX, remote sensing of Phytoplankton Functional Types, etc.
- Discuss and interpret the results of the 2012 NANO Regional Project for Latin America; including, whenever possible, a comparison of pigment results obtained at each centre and those provided by NASA.
- Discuss a first outline of a manuscript/report using this pigment information in conjunction with satellite data. This manuscript will be a concrete output of the Latin American NANO Project, where the NANO Alumni and young ANTARES participants will be co-authors; and the senior scientists NANO-Friends will generously guide them.
- Evaluate the technical and budgetary challenges of each ANTARES station to conduct HPLC pigment analysis locally that meet NASA quality standards.
- Design a strategic plan to ensure that pigment HPLC analyses are systematically carried out at all ANTARES stations.
- Gather the pigment samples collected at each of the participating stations during 2013 at EDIMAR in order to be shipped to NASA for HPLC analysis in a single shipment.

Two special guests were invited to the workshop. Dr Suzanne Roy, from the Institut des sciences de la mer de Rimouski, Université du Québec à Rimouski (Canada), offered lectures on general topics regarding the diversity of phytoplankton pigments, CHEMTAX and the ecological use of the pigment data in oceanographic research. Crystal Thomas, from the Ocean Ecology Laboratory, NASA-Goddard Space Flight Center (USA), gave a few classes on HPLC analysis, quality control and HPLC methods. Both guests provided a valuable input as lecturers and also by getting involved during the discussions regarding practical issues concerning how to implement or improve HPLC analysis in the Latin-American centers.

Sample collection, filtration (volume, duration, pressure) and storage (temperature, labelling) recommendations were discussed. Then the group compared their current situations regarding carrying out HPLC analyses at each station. They found that all stations either already had, were able to arrange access to, or were in the process of acquiring HPLC equipment. Ways to achieve the best quality data were discussed.

It was also deemed important in the near future to carry out an inter-comparison of pigments results by HPLC obtained at the different Antares stations, and also to follow up on the fluorometric Chla inter-comparison (from the one performed in 2006). It was
suggested that a first step would be comparing the pigments data obtained at each station with those provided by the NASA laboratory. In addition, Crystal Thomas offered to analyze all the samples received from this second-phase LA-NANO project by the classic fluorometric technique as well as by HPLC. The groups from the Peruvian and Colombian stations, who will be starting soon to analyze their own samples, should check for training opportunities for the HPLC analysis. Throughout the whole workshop, the necessity to compliment pigment data with the identification of phytoplankton species using microscopy was stated.

A preliminary outline of the manuscript was agreed among the participants which is the following:

1. Index of phytoplankton biomass [TChla]
   a. HPLC
   b. Fluorometer or spectrophotometer
   c. Satellite (different sensors, different scales)

2. Main phytoplankton groups present
   a. Description of the main possible groups found according to pigment composition in the samples.
   b. Pigments indices (Uitz)
   c. Microscopy information
   d. Compare both, and readjust indices

3. Photoacclimation status of phytoplankton
   a. Indices PPC/Tpig, PSC/ Tpig; PPC/PSC
   b. Microscopy information

A description of phytoplankton richness (biomass and diversity) at the different NANO stations will be made. This information will be interpreted in relationship with the biogeochemical provinces (physical, chemical environment), and seasons to which they belong. An analysis of the phytoplankton groups and photoacclimation according to the physical conditions with season and depth (MLD, Zeu) will be made. A match-up TChla in situ vs satellite will be made. Other satellite applications will be explored.

**Future Directions:**

A new advisor and coordinator for the project should be selected. This issue was discussed within the participants from the stations and was agreed that ‘Ensenada’ (Mexico) could lead the next stage of the LA-NANO; they have three NANO alumni/instructors (Roberto Millan-Nuñez, Eduardo Santamaria del Angel, Adriana Gonzalez-Silvera).

It will also be good to try to include other stations (e.g. from Chile, Ecuador and south of Argentina) in the next stage of the LA-NANO.

A major outcome of this collaboration has been that a proposal was recently approved for the Antares network by the Inter-American Institute for Global Change Research CNR-3094 “Assessment of Marine Ecosystem Services at the Latin-American Antares Time-Series Network”. It will be interesting to make a link with the next LA-NANO project.
Further Outcomes from the Workshop:
A total of 63 samples from the different participants were gathered at EDIMAR. Fortunately all the samples arrived to Venezuela at the appropriate temperature but once again we confirmed that transporting samples refrigerated in dry ice overseas is a difficult task. Customs regulations are quite strict; some of us were required to drop the dry ice or even to make holes in the polystyrene boxes, which put at risk the integrity of the samples. It was recommended during the workshop to acquire cryo-gel packs that can be chilled at -23°C to avoid future problems.

3.4.4. North and West Africa

See [http://www.nf-pogo-alumni.org/North-West+Africa+Regional+Project](http://www.nf-pogo-alumni.org/North-West+Africa+Regional+Project)
The objective of this project is the characterization of coastal chemical pollution and erosion of Northern and Western Africa. In the first two year, the main thrust was the organisation of a workshop bringing together alumni from 5 different African countries to discuss and compare methods for measuring chemical pollution and erosion, and to set up and apply a standard methodology for such measurements.

In Year 1, Yosra Khammeri was awarded a 5-month fellowship to coordinate the regional project. Initially, she spent time making enquiries at the Institut National des Sciences et Technologies de la Mer (INSTM) and preparing a budget to hold the workshop there. Because the negotiations with that institute did not lead to a satisfactory conclusion, it was decided that the workshop location would be changed. Ousmane Diankha (NF-POGO CofE Year 4 alumnus) was asked if he would host the workshop, and he was very willing. However, after he returned to Bermuda he was accepted on another fellowship scheme for a 3-months period. Due to delays in obtaining a visa, the fellowship was delayed until September, therefore the workshop could only be held in December at the earliest. The dates were fixed as 10-14 December and the participants were invited. Yosra organised the workshop programme and invited senior participants from each country, to give lectures and lead the practical sessions, and to ensure that the workshop was steered in the right direction. The workshop addressed two themes: (1) chemical pollution and the use of biomarkers for monitoring biological and ecosystem effects; and (2) physical transport mechanisms. Two Tunisian professors were invited to lead the first component, and Prof. Vladimir Koutitonsky (NF-POGO visiting professor to Tunisia) was invited to lead the second component. Dr Gerry Plumley (Bermuda CofE Coordinator) was also invited to help run the workshop and ensure a successful outcome. The workshop consisted of introductory presentations by the alumni on their current research, divided into the two topics described above; lectures and practical sessions on those topics; a field trip to a polluted site to collect water samples and analyse them; discussion sessions on the applications of the methods learnt to the monitoring of chemical pollution in the alumni countries; planning for the next steps of the project and writing proposals for 2013.

Ousmane took care of the logistics of the workshop, with help from Yosra in the final week before the workshop took place. The meeting was attended by 7 alumni and 5 senior scientists from 5 countries (Ghana, Ivory Coast, Nigeria, Senegal, Tunisia).
The next steps will be for the alumni to apply the knowledge gained during the workshop and develop and apply common guidelines for monitoring chemical pollution in the five participating countries; to set up a database to deposit and share new data; and to analyse and compare chemical pollution data between the five countries.

The NANO Africa Nearshore Hydrodynamics-Erosion working group (or NH-E) is a subgroup of the larger NANO Africa Regional Pollution and Erosion Group. In Year 2, the NHE group held its Kickoff Workshop at the École Nationale des Ingénieurs de Tunis, University of Tunis-El Manar, from 3 - 5 June 2013. The workshop focused on coastal erosion as influenced by ocean hydrodynamics, with an emphasis on the impacts of wind-driven waves. Prior to the workshop, NANO members from Angola, the Ivory Coast, Nigeria, and Tunisia selected study sites in their home countries and collected and analyzed met-ocean data from these sites for input into the Mike21-SW wind-driven wave model.

NANO members from Angola, the Ivory Coast and Tunisia attended the workshop along with Vladimir Koutitonski and Gerry Plumley.

The meeting objectives included: 1) an opportunity for the NANO Scholars to meet each other, as many had not met previously; 2) present the rationale for selection of study sites; 3) discuss the met-ocean data from each selected study site; 4) review and analyze the Mike21-SW wave simulation results from each site; and 5) make plans and initial drafts for the proposal that would provide funds to support NH-E research in Africa in 2013 – 2014 and beyond.

NANO members presented details of their selected study sites and their preliminary data analyses of variables such as wind speed and direction, bathymetry, and beach profiles. The presentations were interspersed with numerous short discussions and/or "mini-lectures" that emphasized either theoretical or applied aspects of the research. During one of these group discussions, a detailed list of protocols was mutually agreed upon that each country would use to analyze their respective time series met-ocean data sets. The practical session of the workshop included a demonstration of Mike21-SW, a spectral wind-wave model that is used to access wave climates in coastal and nearshore areas. More details on the wave simulations for all sites are provided in the project report. The strength of Mike21 was readily visible, but equally important was the realization that modeled results were limited in scope and reliability due to the very small size and temporal range of preliminary met-ocean data collected to date.

Most of the last day of the workshop was spent organizing the workshop report and creating a rough draft of the proposal for submission to NANO to request funding to support future research on nearshore erosion. Remarkably, it was obvious to all that the proposal for future research had ‘self-assembled’ by the last day of the workshop, the result of dedicated work of the participants both before and during the workshop, and the clear need for continued study of nearshore erosion in the face of increased global climate uncertainty. The workshop adjourned with assignments made and accepted for completing the workshop report and proposal for future funding.
3.4.5. Proposals for 2014

Indian Sub-Continent

In continuation of the previous proposal we would like to propose the work plan for 2014 under the same title “Monitoring of HAB Species in the coastal waters of India and Sri Lanka”.

Objectives:
- Analysis of the data collected during the period of 2013 from Indian and Sri Lankan coast.
- Use of multipurpose spectrophotometer and underwater radiometer* to study the spectral characteristics of phytoplankton, detritus and CDOM
- Screening of isolated cultures for their toxin potential
- HAB workshop/ training for Sri Lankan Participant for common research methodology establishment

South-East Asia

In this research study, NANO members from three countries (Vietnam, Philippines and Thailand) will investigate eutrophication, possibly enhanced by nutrient load and modulated by residence time. The study will include fieldwork, lab measurements and application of the LOICZ approach and the eutrophication index.

General objective: Identify environmental monitoring systems in coastal waters of SEAsia countries to provide helpful information for economic development and coastal management.

Specific objectives:
- To estimate water exchange in coastal waters by using in-situ data and models
- To develop and/or apply a eutrophication index which can be used in coastal waters of SEAsia countries.
- To define the status of environmental quality of coastal waters in SEAsia countries by combining eutrophication index and water exchanges.

Latin America

The next phase of the LA-NANO project will continue and complete the present project. Additionally, it will involve identifying which ANTARES centres have the facility to analyse HPLC samples and would be willing to analyse surface samples for the rest of the participating stations. Also to reinforce one or two HPLC centres in Latin America and complement the existing equipment (by purchasing standards, columns, solvents, and other consumables). There is also an objective to organise a workshop in which NANO Alumni from Latin America and researchers could interact with invited social scientists in order to discuss a future proposal on the topic of “Oceans & Society”. Through a scholarship, a student would work on the project and continue updating and maintaining
the NANO Wiki as well as the ANTARES website; and identify the possible HPLC centres in Latin America and their requirements.

North and West Africa

The main objective of N-NHG first stage project is to set up sustainable nearshore erosion monitoring observatories in Angola, Ivory Coast and Tunisia (one in each country). The data will provide us invaluable information to set up a Swell/Storm Early Warning System (SEWS), will improve our understanding of the role of local and remote forcing wave generation and its impacts along West and North African coasts. In addition, the observations will be the pillar of the modelling effort (stage 2).

Specific Objectives:
1) Set up one observatory in each country (Angola, Ivory Coast and Tunisia), observations include: wave/tide, wind and atmospheric pressure, bathymetry/beach profiling surveys and sediment analysis.
2) Using historical, remote sensing data and WW3 model output, set up Swell/Storm Early Warning System (SEWS) for western and northern Africa (apply Elisee paper methods). Improve SEWS using observatories new data.
3) Ivory Coast workshop: networking, capacity building (“hands on” observatory and data analysis) and societal benefits (SEWS).
4) Identify N-NHG countries needs in terms of numerical modelling and select best option that fits all members.

4. Budget for 2014 (submitted to NF on 30th Dec 2013)

All amounts are in US Dollars

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</table>