

## From the Editor

Issue Four of Ballast Water News marks the first anniversary of the GloBallast programme. Much has been achieved and the programme is now in full swing. During the last three months a number of technical activities have been completed or commenced, as highlighted within. The slightly delayed production of this issue also allows us to report on some activities from April.

In January Captain Dandu Pughiuc of the GloBallast Programme Coordination Unit (PCU) lectured on ballast water management at the IMO World Maritime University (WMU) in Malmö, Sweden. This provided an important opportunity to raise awareness amongst future maritime administrators from around the world.

In March the review of ballast water legislation in each of our six pilot countries commenced, with the signing of a contract with WMU to coordinate this review and develop model legislation for use in developing countries.

Also in March the 1st International Ballast Water Treatment *R&D Symposium* was held at IMO in London, followed immediately by the 1st International Ballast Water Treatment *Standards Workshop*. These two events may be considered 'watersheds' in catalysing research and development of new and alternative ballast water treatment technologies.

Keeping with the symposium theme, in this issue we announce no less than four different forthcoming international conferences on ballast water and related matters.

In April the first port baseline survey to be carried out under the programme was conducted at the Saldanha Bay demonstration site in South Africa. This included training of personnel from the other pilot countries.

One of the 'founders' of the GloBallast programme, Mr Philip Reynolds of the United Nations Development Programme, retired in April. Mr Reynolds was instrumental in initiating the programme, securing US\$7.6 million in funding from the Global Environment Facility and guiding the PCU through our first twelve months. We would like to pay tribute to his pivotal role, express our deepest gratitude and wish him all the best in his retirement.



**Steve Raaymakers**  
Contributing Editor

## From the Programme

In March 2001 the GloBallast programme celebrated its first full year of activity. Both IMO and UNDP expressed satisfaction at the significant progress achieved by the PCU and the participating countries, where the necessary management structures are now operational. With approval of the National Workplans, the momentum is being transferred to the countries.

GloBallast's next objectives are ballast water risk assessments and the development of compliance monitoring and enforcement systems. We will work closely with countries advanced in ballast water management to develop flexible models.

Significant progress has been made in building "win-win" relationships with other UN programmes and GEF sister projects. Exploratory discussions have been held with the UNEP Mediterranean Action Plan and the Caspian Environment Programme, and the prospects for collaboration appear encouraging.

Although unable to attend the 6th meeting of the Subsidiary Body for Scientific, Technical and Technological Advice to the Convention on Biological Diversity, GloBallast submitted a statement regarding the programme's objectives.

The GloBallast programme has been attentively observing the development of the new international ballast water convention by MEPC. GloBallast makes every effort to support the work of MEPC and its Member States whose directives form the programme's evolving guiding principles. Perhaps our most substantial contribution to date has been the organization of the 1st International Ballast Water Treatment R&D Symposium and Standards Workshop, which were acclaimed a great success.

The appreciation shown in response to our first year of operation is an added incentive for our continued contribution towards the global efforts to minimize transfers of alien species in ships' ballast water, which is one of the greatest threats to our oceans.



**Dandu Pughiuc**  
Chief Technical Adviser

Ballast Water News is the quarterly newsletter of the Global Ballast Water Management Programme (GloBallast). GloBallast is a cooperative initiative of GEF, UNDP and IMO to assist developing countries to reduce the transfer of harmful organisms in ships' ballast water, through the implementation of IMO ballast water management guidelines.

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The views expressed in Ballast Water News are not necessarily those of GEF, UNDP or IMO.



## Guest Speaker

**Mr William A. O'Neil**  
**Secretary General, IMO**



*Mr William A. O'Neil of Canada became Secretary-General of the International Maritime Organization, the United Nations agency concerned with maritime safety and the prevention of marine pollution from ships, on 1 January 1990.*

*Mr O'Neil has been associated with IMO since 1972, when he attended the IMO Council as Canada's representative. In 1979 Mr O'Neil was elected Chairman of the Council and held the post until his appointment by the Council to serve his first four-year term as Secretary-General.*

*Mr O'Neil was unanimously re-elected to serve a second four-year term as Secretary-General beginning in 1994 and was again re-elected for a third four-year term beginning in 1998.*

*During his term of office Mr O'Neil has encouraged IMO to take a more pro-active role in promoting maritime safety and combating marine pollution.*

*Mr O'Neil has been at the helm of IMO since ballast water was first raised as an issue of concern by member countries. He has guided the Organization's response to the issue, including the development of the IMO voluntary ballast water management guidelines, negotiation of the new international convention on ballast water management and the initiation of the GloBallast programme to assist developing countries.*

The introduction of harmful aquatic organisms and pathogens to new environments, including via ships' ballast water, has been identified as one of the four greatest threats to the world's oceans. It is estimated that a foreign marine species is introduced to a new environment somewhere in the world every nine weeks. Human health, ecological and economic impacts can be severe.

The International Maritime Organization has been working on this issue for over ten years. The Marine Environment Protection Committee formed a Ballast Water Working Group in 1990 and in 1997, the first set of guidelines elaborated in 1993 were improved and adopted as assembly resolution A.868(20).

While the 1997 guidelines have provided a sound basis for the management and control of ballast water, the MEPC has also been actively working on the creation of

an international convention for the regulation of ballast water. The development of this convention is now reaching the point where it appears that a diplomatic conference to adopt it could be held within three years, which would be a major breakthrough in dealing with this problem.

In anticipation of the new convention, IMO, with funding provided by the Global Environment Facility (GEF), has initiated the Global Ballast Water Management Programme (GloBallast).

The overall objective of the programme is to reduce the transfer of harmful aquatic organisms in ships' ballast water, by assisting developing countries to implement the existing IMO guidelines and to prepare for the new ballast water convention.

Under both the existing IMO guidelines and the new convention, ballast water exchange at sea remains the main management measure for reducing the risk of transfer of harmful aquatic organisms. It is widely recognized that ballast water exchange has many limitations, including serious safety concerns that limit its applicability, and the fact that translocation of species can still occur even when a vessel has undertaken full ballast exchange. It is therefore extremely important that alternative, more effective ballast water treatment methods are developed as soon as possible. To facilitate the development of alternative methods, it is vital that internationally agreed and approved standards for the evaluation and approval of new ballast water treatment systems are developed and agreed as soon as possible.

To help address this situation, IMO, through the GloBallast PCU, took the initiative to organize the 1st international symposium on ballast water treatment R&D, followed by an expert workshop on ballast water treatment standards, in the last week of March 2001. This was the first time that the world's leading experts in the specialised field of ballast water treatment have come together at an international conference. I am pleased that the outcomes are providing important catalysts for progressing the new convention and for moving us closer to a practical solution to the 'ballast water problem'.

Ballast water transfers and invasive marine species are one of the most serious environmental challenges facing the global shipping industry. The IMO Secretariat remains committed to providing all the assistance necessary to assure the development and effective implementation of a uniform, standardized, global ballast water management regime.

*William A. O'Neil*

~ ~ ~ NEWSFLASH ~ ~ ~

**New mandatory ballast water  
regulations to enter into force  
in Australia**

1 July 2001

[www.aqis.gov.au/shipping](http://www.aqis.gov.au/shipping)

## Port Surveys Underway

*From 15 to 30 April 2001, teams of marine scientists and divers gathered at the GloBallast demonstration site of Saldanha Bay in South Africa to conduct the first port survey to be carried out by the programme.*



*Saldanha Bay: Sensitive mariculture rafts adjacent to the main port facilities where ballast water is discharged*

**Why Port Surveys?** It is not possible to manage and control introduced marine species unless you know *what they are and where they are*. Under the current IMO ballast water management guidelines (Resolution A.868(20)), Port States are encouraged to undertake biological surveys and monitoring in their ports. The purpose is to assess native biodiversity and determine the presence, absence, distribution, abundance and seasonality of introduced marine species.

This information can be used by management agencies to devise strategies to control introduced species and to advise shipping of areas or times to be avoided in taking on ballast, so as to minimise the potential uptake and transfer of these species. Such information is also required for undertaking risk assessments and supporting Decision Support Systems to assist ballast water management.

Port surveys for introduced marine species are a fundamental and vital part of the port-based aspects of ballast water management. Without such surveys Port States are essentially 'blind' in their efforts to control the transfer of marine organisms in ballast water.

As part of its objective of assisting developing countries to implement the IMO ballast water guidelines, the GloBallast programme is assisting each of its six pilot countries to conduct port baseline surveys. This support includes direct funding of survey activities and the provision of expert advice, assistance, training and coordination in each country. The six pilot countries are Brasil, China, India, Iran, South Africa and Ukraine. Each pilot country has a demonstration site. These are the ports of Sepetiba, Dalian, Mumbai, Kharg Island, Saldanha and Odessa respectively.

**Standardisation is Vital** It is highly desirable that port surveys for introduced marine species are conducted according to standardised, uniform methods. This helps to ensure quality control and a basic minimum standard, and allow inter-comparability of data. Such standardisation is extremely important when dealing with a global industry such as shipping and the transboundary movement of species, which requires a high level of international cooperation and coordination.

Fortunately for GloBallast, the Australian Centre for Research on Introduced Marine Pests (CRIMP) developed standard port survey protocols in 1996. They have been tried and tested in Australia since then, during which 25 ports have been surveyed for introduced marine species. The protocols were revised and republished this year (Hewitt & Martin 2001).

GloBallast has selected the CRIMP Protocols for application at its six demonstration sites, on a trial basis. They will be considered for possible adaptation as international port survey protocols. We are also following the approaches being taken by the University of Wales for UK ports, the Smithsonian Environmental Research Centre at various locations in the United States and the New Zealand Ministry of Fisheries.

**Training & Capacity Building** In order to provide expert advice, assistance, training and coordination in each of the pilot countries, GloBallast has contracted Dr Marnie Campbell, previously of CRIMP and now a freelance consultant, as Port Survey Coordinator.

The first GloBallast pilot country to plan and conduct its port baseline survey was South Africa, coordinated by Mr Adnan Awad, the GloBallast representative there.

The team comprises marine scientists from the University of Western Cape, the University of Cape Town and specialist consultants, plus three MSc students who are being funded by the programme. PortNet, the national port administration for South Africa, is also an important contributor, organizing port access and providing vessels and onshore facilities.

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### ~ CONFERENCE ANNOUNCEMENTS ~

2<sup>ND</sup> ICHCA  
Ballast Water Conference  
London 10 September 2001  
[www.ichca.org.uk](http://www.ichca.org.uk)

1<sup>ST</sup> International Ballast Technology  
Investment Fair

Chicago 20-21 September 2001  
[www.nemw.org/fair\\_about.htm](http://www.nemw.org/fair_about.htm)

As the CRIMP Protocols place a significant emphasis on SCUBA diving, a team of divers was also contracted, many of who are PhD students at the University of Western Cape.



*South African dive team from University of Western Cape*

As port surveys are a new concept for most of the GloBallast pilot countries, it was decided to utilise the first South African survey as a training opportunity for the other five pilot countries. Two marine scientists from each of these countries were funded by the programme to travel to South Africa for this purpose.

A two-day workshop was conducted at Saldanha by Dr Campbell on 17 and 18 April, to train these delegates in the theoretical aspects of the CRIMP Protocols. From 19 to 22 April the delegates joined the South African team to observe and assist the field sampling and gain practical experience.



*Port survey trainees from the GloBallast pilot countries in South Africa with Dr Marnie Campbell (front row centre)*

**Saldanha Sampling Design** In accordance with the CRIMP Protocols, a sampling design was developed for Saldanha based on the likely inoculation and settling points for introduced marine species, considering ballast water discharge points, prevailing water movements and suitable settling habitats. Field teams undertook sampling as follows:

- SCUBA Diving:
  - Scraping and still photography within 0.10m<sup>2</sup> quadrants placed along vertical transects to sample hard-substrates.
  - 50m bottom transects with visual searches, collection and photography at 1m intervals to sample soft-substrates.
  - Tubular hand cores to sample benthic infauna and dinoflagellate cysts.
  - Rotenone to sample for fishes.
  - Opportunistic visual searches.
- Plankton Tows: Vertical and horizontal tows of 20um and 100um nets from a small boat.
- Trapping: Setting of crustacean traps to sample for crabs, shrimps etc.
- Nets: Beach seines to sample nearshore fishes over sandy and muddy substrates.

Other techniques can be used depending on site conditions. For example vessel-operated grabs can substitute some diver-based sampling at sites where conditions may be unsuitable for diving.

**Sorting, Preserving and Identifying Samples** Perhaps one of the most important parts of the port survey is to ensure well organized and documented sorting, preservation and identification of the biological samples.

Initial rough sorting into the most obvious taxonomic groups is done on-site at the end of each day of field work. These are preserved and taken to the laboratory for finer sorting and identification. Local taxonomists are used wherever possible. However, invariably it will be necessary to send hard-to-identify specimens to specialist taxonomists internationally.

It is also extremely important to establish national voucher and reference collections for the samples collected. These are vital for reference purposes and as a baseline for future surveys.



*Initial 'rough' sorting of biological samples*

**Results and Reporting** Port surveys are of limited value if the results are not communicated to management agencies for action. There are usually two types of reporting; immediately after the survey on any serious pest species requiring an urgent response, and a more comprehensive report covering all species found. The final report can only be made after all of the taxonomic identification has been completed.

**Where to from Here?** Port surveys should consist of a comprehensive baseline survey followed by ongoing, long-term monitoring. To conduct an initial, one-off survey without follow-up surveys is of limited value. As shipping movements and ballast water transfers will continue in the port, introductions may subsequently occur. Long term monitoring does not need to be as comprehensive as the baseline survey. Passive and less expensive techniques such as settling plates may be used.

The port baseline surveys for Brasil, China, India, Iran and Ukraine are now being planned.

It is intended that the baseline surveys initiated by GloBallast will be the catalyst for long-term ongoing surveys at each demonstration site, as well as replication at both the national and regional levels. We are extremely pleased that most of the pilot countries are now planning for this, including seeking in-country sources of resourcing and financing.

**Global System is Needed** Ideally, a global system of ongoing port surveys should be implemented with all major ports in the world using a standardised approach. Results should be fed into a global database of introductions. This should be linked to a communication system which allows the international shipping industry to be alerted to outbreaks of harmful species, and to manage their ballast operations accordingly. It would also be used by port and government authorities.

The port surveys being implemented at the GloBallast demonstration sites are the foundation of this global system.

## A New Vehicle for Raising Awareness

*The GloBallast PCU is working closely with the World Maritime University to raise awareness about ballast water and invasive marine species amongst the world's future maritime administrators.*

A lack of information about the transfer of organisms in ships' ballast water is currently the most significant barrier to solving this problem. While the ballast water issue is of concern to specialists and experts, it is not currently recognised by the more general community and especially not in developing countries.

In January 2001 the PCU's Chief Technical Adviser, Captain Dandu Pughiuc, continued the GloBallast awareness raising campaign, by lecturing to Maritime Administration students at the World Maritime University (WMU) in Malmö, Sweden.

Founded in 1983 under the auspices of IMO, WMU is the global centre for advanced education and training in maritime affairs. Almost 1,600 graduates can now be found in 138 countries. WMU represents an extremely valuable centre through which the world's future maritime managers can be reached.

The pivotal question of the WMU 2001 module on Maritime Environmental Principles, organised by Professor Moira McConnell, was "are international environmental issues managed?" In this context Captain Pughiuc gave an overview of the ballast water problem, the international response and potential solutions. The lecture stimulated lively discussion and the students, from 16 countries, demonstrated genuine interest in ballast water matters.



*1st WMU students to receive lectures in ballast water management under the GloBallast programme, 2001*

One of the main benefits of this exercise is that once the students return to their countries, usually to senior government positions, they may become focal points for the implementation of the new international ballast water convention.

Given the enthusiastic response received, the PCU may continue this cooperative activity with WMU.

## 1st R&D Symposium a Success

*From 26 to 30 March 2001 the GloBallast PCU convened the 1st International Ballast Water Treatment R&D Symposium and Standards Workshop at IMO headquarters in London.*



*Some of the delegates at the symposium - nearly 200 attended*

While ballast water exchange at sea is currently the only generally accepted method for reducing the risk of transferring organisms in ships' ballast water, it is widely recognised that this method has several limitations and constitutes an interim measure only. The limitations include:

- It may be unsafe for some ships in certain weather conditions, threatening the stability and/or the structural integrity of the ship.
- Some ships do not have plumbing, ballast tank arrangement and/or pumping capacity suitable for ballast exchange.
- Some voyages are too short to allow complete ballast exchange.
- While it is theoretically possible to achieve up to 99% volumetric exchange of ballast water, the biological effectiveness may vary widely. Several studies indicate that species diversity and abundance can actually increase in ballast tanks after exchange. Even when carried out in full, harmful species may still be transferred.
- Some oceanic species taken on during ballast exchange may survive and establish in coastal waters, and vice versa.

The race is therefore on to find alternative, more effective ballast water treatment methods. We have identified 40 different projects around the world, either completed or underway, aimed at developing potential new systems.

R&D groups are spurred on by the prospect of a potential US\$2 billion market for an effective ballast water treatment system that receives international approval.

Technologies being researched include filtration and physical separation, treatment with chemicals, ultra-violet light, ozone, heat, de-oxygenation, electro-ionisation, gas super-saturation and various combinations of the above. The R&D projects are based in countries as far-flung as Australia, Brasil, Canada, China, Germany, Japan, New Zealand, Norway, Poland, Singapore, the UK and the USA. They comprise government programmes, private initiatives, private-public consortiums, local efforts, national programmes and international alliances.

One of the difficulties faced by this diverse global R&D effort, was the lack of effective lines of communication between these groups and with governments and the shipping industry. It has been difficult for any party to gain an up-to-date picture of the latest 'state-of-the-art' in ballast water treatment R&D. The shipping industry, the ultimate end-user of this effort, is being bombarded with offers from vendors of so-called 'solve-all' ballast water treatment systems, without any formal international system for their independent evaluation and approval.

To help address this situation, we have produced the Ballast Water Treatment R&D Directory, and convened the 1st International Ballast Water Treatment R&D Symposium.

Twenty six papers were presented at the symposium by the world's leading ballast water treatment experts, covering all of the technologies referred to above and updating the latest results from the major R&D projects. The symposium attracted nearly 200 participants.

The general picture that emerged from the symposium was as follows:

- All of the various technologies are currently at a very early stage of development and significant further research is required.
- It is likely to be some years before a new ballast water treatment system is developed, proven effective, approved and accepted for operational use. Ballast water exchange will therefore remain a primary method for some time yet, despite its limitations.
- It appears that any new ballast water treatment system will involve a combination of technologies, for example primary filtration or physical separation followed by a secondary biocidal treatment.

- The current global budget for ballast water treatment R&D (about US\$10 million) is insignificant compared to the global costs of marine introductions (likely to be at least in the tens of billions of US\$).
- There is a desperate need to develop and implement international standards and procedures for the evaluation and approval of new ballast water treatment systems.

Abstracts of papers presented are currently available on the GloBallast web site <http://globallast.imo.org>, on the page titled 'Ballast Water Treatment'. The full proceedings are currently being prepared and will be available in the near future.

The symposium was hailed as a major success and participants requested that it become a regular event held every one to two years. We are currently exploring options for this.

## Standards Workshop Worked Too

In response to the need to develop and implement international standards and procedures for the evaluation and approval of new ballast water treatment systems, the R&D symposium was immediately followed by the 1st International Ballast Water Treatment *Standards Workshop* from 28 to 30 March.

The shipping industry has made repeated calls for international standards to be developed and adopted. This will provide the industry with a clear target to aim for and encourage innovation.

The standards workshop was by invitation only, in order to ensure a manageable process and that a meaningful result would be achieved. The invitation list ensured a broad representation from the shipping industry, water treatment industry, marine science community, governments and environmental organisations. The total number of participants was around 70.

A number of scene setting papers were presented on the first day. The workshop then broke into smaller working groups which were asked to brainstorm the development of possible ballast water treatment standards, and in particular a *biological effectiveness* standard (*biological effectiveness* meaning removing, killing or rendering inactive organisms in ballast water).



*One of the working groups in deep discussion*

The working groups convened in plenary to consolidate their recommendations into a workshop report. The workshop unanimously agreed five Primary Criteria that any new treatment systems should meet and 10 Fundamental Principles that should be applied in developing biological effectiveness standards. The workshop also proposed two possible options for such a standard, one representing a majority view and the other a dissenting view.

The workshop report was submitted to the Ballast Water Working Group of the 46th meeting of MEPC held from 23 to 27 April. MEPC welcomed the report and agreed to use it as the basis from which to develop standards for use in the new international convention on ballast water. A correspondence group has been tasked to do this, coordinated by the USA.

The workshop report is available on the GloBallast web site, on the page titled 'Ballast Water Treatment'. It should be noted that the treatment standards described in it are for discussion purposes only. The formal, official process of MEPC is where a final standard will be developed and agreed by member countries.

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### ~ ~ ~ CONFERENCE ANNOUNCEMENTS ~ ~ ~

#### 11<sup>TH</sup> International Conference on Aquatic Invasive Species

Alexandria, Virginia, USA  
1-4 October 2001

[www.aquatic-invasive-species-conference.org](http://www.aquatic-invasive-species-conference.org)

#### 1<sup>ST</sup> International Conference on Ballast Water Management

Singapore  
1-2 November 2001

[www.eti.org.sg](http://www.eti.org.sg)



## Progress Report

### Activities Undertaken January – March 2001:

- ✓ National workplans refined and implementation of in-country activities accelerated.
- ✓ Additional Administrative Assistant employed at PCU.
- ✓ Port survey coordinator consultancy awarded.
- ✓ Planning completed for 1st port survey – South Africa.
- ✓ Official launch function held in South Africa.
- ✓ Contract concluded with WMU for legislation review.
- ✓ Preparations completed for Train-X modules project.
- ✓ ROPME meeting attended in Bahrain.
- ✓ Lectures commenced at WMU, Malmö.
- ✓ Mission undertaken to Iran.
- ✓ Lecture given to Nautical Institute (Belgian Branch).
- ✓ ICES/IOC/IMO meeting attended (Barcelona).
- ✓ 1st case studies prepared for publication.
- ✓ Additional awareness materials produced.
- ✓ Submission made to the 6th meeting of the Subsidiary Body for Scientific, Technical and Technological Advice of the Convention on Biological Diversity.
- ✓ Ballast water treatment R&D symposium and standards workshop held (London 26-30 March).
- ✓ 4th issue of Ballast Water News prepared.



### Activities Planned April – June 2001:

- Attend 2nd International Marine Bioinvasions Conference (New Orleans).
- Conduct 1st port survey – S Africa (including training).
- Attend/support MEPC 46.
- Undertaken mission to Azerbaijan – link with Caspian Environment Programme.
- Attend Baltic/Nordic Invasive Species Workshop (Copenhagen).
- Award risk assessment consultancy.
- Plan/commence further port surveys.
- Commence legislation review project.
- Commence Train-X modules project.
- Prepare compliance monitoring & enforcement project.
- Commence second case studies (China, India, Iran).
- Review/consolidate information clearing house function.
- Lecture to Plymouth University MSc course.
- Initiate development of Regional Ballast Water Management Strategy for the Black Sea.
- Produce 5th issue of Ballast Water News.



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