

## MEETING REPORTS

### **International Conference on the Long-Term Environmental Effects of the Gulf War**

*Held in Kuwait, during 18–20 November 1996*

The hostilities of the Gulf War (August 1990–July 1994) included six phases of military activities, which were: transport of troops, ground entrenchment and implantation of mines, air campaign and ground battle, oil-well fires, rehabilitation and reconstruction, and disposal of ordinance. The damages resulting from these activities were diverse. The War resulted in one of the worst environmental catastrophes in recent history. About 6–8 million barrels of crude oil were released into the marine environment, and c. 800 oil wells in Kuwait remained burning for several months, emitting huge quantities of pollutants to the atmosphere. Sixty million barrels of crude oil gushed from the burning wells, creating about 250 oil lakes over an estimated area of 50 km<sup>2</sup>. The damage done to the desert environment of the region as a result of the various hostilities has been significant.

Gulf countries with additional international cooperation have initiated several long-term projects for the continuous monitoring of the Gulf environment after the War. This conference provided an opportunity to present current information on the regional implications of the Gulf War and environmental status of the region five years after the War. The research findings were presented in consideration with the earlier data available, an important asset to address the basic issue of long-term environmental catastrophes and the assessment of their risk.

The four technical themes of the conference focused on: (1) the status of marine pollution; (2) marine ecosystem health; (3) terrestrial and atmospheric pollution and health; and (4) environmental management, bioremediation and productivity.

The papers presented on the status of marine pollution that dealt with studies on coastal and marine ecosystems were undertaken to determine the extent and degree of contamination by petroleum hydrocarbons and trace metals originating from oil sources. Kuwait oil field fires ignited some 500 million barrels which released oil aerosols, soot and combustion products into the Gulf environment. Contamination from the largest oil spill in history was restricted to approximately 400 km from the sources. Petroleum hydrocarbons were the principal anthropogenic contaminants impacting the marine and coastal ecosystems following the War. The highest level of oil contamination was noted in the heavily-impacted coasts of Kuwait and Saudi Arabia, where concentrations expressed as Kuwait crude oil equivalents ranged from 62 to 1400  $\mu\text{g g}^{-1}$  of dry surface sediment, 570 to 2600  $\mu\text{g g}^{-1}$  in clams and 9.6 to 31  $\mu\text{g g}^{-1}$  in fish muscle. High concentrations of selected oil-released heavy metals were associated with oil contamination. In the years subsequent to the War, oil contaminants either dropped slightly or remained about the same in both biotic and abiotic components of the ecosystems.

The sessions on marine ecosystem health were devoted to the state of marine environment five years after the War. Interpretation of the war-related impacts on the overall ecosystem health was inadequate due to the lack of baseline and the likelihood of synergism and antagonism between war-related effects, the background impacts and natural stress. The five-year, post-war period is generally

characterized by a recovery in the intertidal biota, and over-wintering and domestic sea-bird populations. The intertidal habitats were more seriously affected than the subtidal habitats, which largely escaped oil contamination. Although fish assemblages in the subtidal areas declined in 1992, the first year after war, they had recovered by 1994. The upper intertidal zone was covered by oil and tar, and lost most of its biota. The macrofauna of the intertidal zone had a 60 to 100% recovery by 1995. The damage done to the mangroves and salt marsh vegetation is serious and may take several years to recover. The reef-fish assemblages showed considerable variability between years and were possibly not affected by oil. The results on bottom-dwelling invertebrates showed that intertidal areas demonstrated a reduction in the density and changes in species composition in the post-war years as compared to data from the pre-war years. The ecological risks associated with the water-soluble fraction of the partially combusted crude oil (PCCO) from Kuwait oil fires to fish populations were estimated relative to those associated with the water-soluble fraction of crude oil. Risks generally increased at a higher rate in fish populations exposed to PCCO than those exposed to crude oil.

The papers presented in the sessions of terrestrial and atmospheric pollution and health discussed the environmental status before and after the Gulf War. The most obvious problem during and after the war was the atmospheric pollution caused by burning oil wells in Kuwait. It was estimated that approximately 22 000 tonnes of sulphur dioxide (SO<sub>2</sub>), 18 000 tonnes of soot, and thousands of tonnes of carbon monoxide (CO) and dioxides of nitrogen (NO<sub>x</sub>) were introduced into the atmosphere from the burning wells on a daily basis in the early stages of the fires. The amount of soot deposition in the coastal area was significant enough to cause adverse and irreversible impact on the regional ecosystems.

The oil lakes were seen as the most visible legacy in terrestrial ecosystems. Satellite remote-sensing has confirmed that many oil lakes are now covered with sand, and still pose a real threat to terrestrial ecosystems. Surveys of atmospheric pollution clearly suggest that the concentrations of various pollutants emitted from the burning oil wells decreased significantly to background levels between 1991 and 1995.

Some papers discussed the human health implications of atmospheric pollution as a result of the oil fires. The findings indicated a significant increase in oil-related heavy metal (such as selenium, cobalt, nickel and vanadium) concentrations in brain tumours. The air-borne dust collected from Kuwait during oil fires decreased the function of alveolar macrophages which may have compromised the ability of these cells to perform their role in host defence against microorganisms. The air-borne dust collected soon after the War was contaminated with certain elements which were effective in enhancing lipid peroxidation and causing DNA damage.

The comparative analysis of mutagenic activities of air samples before and after the war suggested that there was an increase in air particulate mutagenicity during the burning of oil wells. The increased mutagenicity activity in air may have impacted the upper aerodigestive tracts of exposed populations. The mutagenicity activity, however, reached pre-war levels a few months after the oil wells were fully capped. The comparison of pre-war and post-war

asthma onset cases showed a non-significant increase during the post-war period.

Studies on polyaromatic hydrocarbon (PAH) exposure in blood cell DNA of United States soldiers stationed in Germany and Kuwait during the Gulf War concluded that soldiers in Kuwait worked in an environment that had lower ambient PAH levels and fewer dietary sources of PAH exposure than were available to soldiers in Germany in October 1991, which was reflected in the changes in their blood cell DNA adduct levels.

The papers presented in the session on environmental management and bioremediation assessed the feasibility of using biological methods for the clean up of oil-contaminated desert soil in Kuwait and some other Gulf countries. These studies involved field-scale trials using different bioremediation approaches, namely; arable farming, wind-row composting soils and static bioventing piles. In general, the results showed that bioremediation is effective in the restoration of oil contamination. Different strains of white rot fungi proved to have the ability to degrade oil-contaminated soils. Some other soil microorganisms were found to degrade different compounds synergistically with the white rot fungi. Flowering plant bioremediation proved to be effective, economically inexpensive and an environmentally-desirable method for restoration of tar-polluted land. Some flowering plant species can be used conveniently as tools for phytomonitoring of tar pollution. The tolerant species can be used in bioremediation programmes, while the sensitive species may serve as bioindicators. Management considerations and flowering plant bioremediation framework were suggested to optimize the natural recovery of tar-polluted lands.

Papers in the poster session had relevance to the impact of the Gulf War and contained environmental issues of general interest to the protection and management of different ecosystems in the Gulf region. The major visual impacts were the disturbance of the coastal and inland sediment balance which enhanced erosion problems. These impacts were attributed to physical disturbances such as trenching sand and beach rock removal, dredging, fencing and barbed-wiring of the coast and camp sites by the army. Although ecological implications of these changes have not been determined, they appear to be significant locally. Some posters dealt with environmental issues which were unrelated to the Gulf War impacts, but were relevant to the management of the Gulf environment.

AHMAD K. HEGAZY  
*Department of Botany*  
*University of Cairo*  
 12613 Giza  
 Egypt  
 Fax: + 20 25727556  
 email: ahkhegazy@frcu.eun.eg

### **Buffer Zones. Their Processes and Potential in Water Protection**

*A conference held at Heythrop Park, Oxfordshire, UK, during 30 August–2 September 1996*

The conference was organized by Quest Environmental in association with Oxford University, IACR-Rothamsted and CNRS (Centre National de la Recherche Scientifique) Rennes. It was supported by the UK Environment Agency, English Nature, the Royal Society for the Protection of Birds, The National Trust, the Farming and Wildlife Advisory Group, The Foundation for Water

Research, IUCN (The World Conservation Union), the Soil Science Society of America, LEAF (Linking the Environment and Farming), The River Restoration Project, The British Geomorphological Research Group and The British Hydrological Society. The principal aim of the conference was to examine the processes occurring within buffer zones in relation to their potential to conserve, enhance and protect the water environment, and to further our understanding of the value of buffer zone landscapes. There were approximately 140 participants from over 20 countries, with 60% coming from Europe, 14% from North America and 6% from Australia and New Zealand. Heythrop Park, The National Westminster Bank's training centre in the Cotswolds, was chosen as the venue because of its state-of-the-art facilities, superb organizational support and nearness to several buffer zone projects.

The conference was opened by the Earl of Cranbrook (Chairman, English Nature). It drew together 28 invited speakers, all of whom were acknowledged experts in their field, and who were charged with reviewing specific aspects related to the conference objectives. The first day considered the processes that occur within buffer zone habitats, such as hydrology, the trapping of sediment, diffuse pollution and pesticides, and examined the impact of such buffering on the ecology of the local environment. The second day considered the potential of systems such as riparian forests, ponds and wet meadows to act as buffers, and to what extent these systems can be modelled. The final day looked at the problems of establishing or restoring riparian zones, and the impact of buffer zones on the wider environment, with a special focus on farming. In addition there were over 60 posters presenting the latest research and providing a focus for discussion, two workshops, and field visits to a Ministry of Agriculture, Fisheries & Food (MAFF) English Nature Demonstration Project, the River Restoration Project, and Rothamsted.

The main points of the conference and its conclusions were brought out through the workshops. The first workshop considered a series of questions. What are the functions of buffer zones? How certain are we that each buffer zone habitat can perform these functions? If there is uncertainty, why? Are the functions maintained over a prolonged period and can they cope with extreme events? Is any one buffer zone habitat more competent for a particular function? There is still much uncertainty about the ability of buffer zones to function, because of the variation both within and between buffer zones in both space and time, and because of their complexity and multifunctionality. However, delegates agreed that buffer zones have many interrelated functions, such as maintaining or improving water quality, wildlife habitat, landscape, and biodiversity, and may be of economic or structural benefit and store energy and water. No single buffer zone performs all functions, but all buffer zones perform at least one function. Buffer zones are site specific, so they must be selected for function and location, planned for multifunctionality, where a balance can be struck among competing interests, and a catchment perspective taken in choice and design. More long-term research is required before the question of maintenance of function can be fully answered. However, buffer zones need to be managed and maintained by such practices as harvesting and sediment removal.

In the second workshop, another series of questions was addressed. What are the future directions of research, whether pure and applied; are there key processes that need to be explored further? Do we know enough to design an effective buffer zone habitat? Are there policies that could be developed to protect and aid the creation of buffer zone habitats? There was a very long wish-list for

further research covering almost every aspect. Priority areas were identified as nutrient cycling, especially of phosphorus and dissolved organic nutrients, modelling, especially of hydrology and nutrient/sediment flow, catchment and ecosystem interactions, the role of plants, the effectiveness of buffer zones, hydrology and the effects of drainage, economics, especially cost-benefit analysis, and the social aspects of buffer zones, i.e. their acceptability.

There was a widely-held view that there should be a move away from national policy to local policy, that whatever policies are developed should be long-term, flexible, integrated and practicable, that the 'bottom line' for all policy is likely to be taxes/rewards and legislation to ensure compliance, and finally that education is the key to maximizing compliance with acceptance.

The main conclusions of the conference were that buffer zones are complex, variable in space and time and multifunctional. They should be maintained or designed with these aspects in mind. Much more research is needed, especially into hydrology, denitrification and phosphorus cycling in buffer zones before we can be *certain* of their function and effectiveness. Their value is certain, however, and there is a need for education and policy to maintain what we have and re-create what we have lost, to the social, economic and scientific benefit of the environment.

The conference proceedings will be published in early 1997. The address for details is Quest Environmental, PO Box 45, Harpenden, Herts AL5 5JL, UK. However, details of the conference, the proceedings, and many buffer zone projects can be found at the Conference Home Page on the internet at <http://www.res.bbsrc.ac.uk/buffzone/bzchp.htm>.

K. W. T. GOULDING  
Soil Science Department  
IACR-Rothamsted  
Harpenden, Herts AL5 2JQ,  
UK  
Tel: +44 1582 763133, ext. 2514  
Fax: +44 1582 760981  
e-mail: [keith.goulding@bbsrc.ac.uk](mailto:keith.goulding@bbsrc.ac.uk)

### Coastal Zone Canada (CZC) 96

*A conference held at the University of Quebec, Rimouski (UQAR), Quebec, Canada, during 9–17 August 1996*

Only slightly over 300 of the expected 500 participants attended, owing to 'defections' of registrants from the Far East; as a result, some 6–8% of the 49 scheduled sessions had to be cancelled. However, there were plenty interesting papers to hear. Public participation was enhanced by a presentation from P. Leblanc (UQAR) concerning the 'romantic' conquest of the sea, which stressed the need to love both the ocean and the land. This lecture attracted more than 100 attendees, with standing room only in the large amphitheatre. It was followed up five days later by a public 'roundtable' discussion that focused on the conciliation of two aspects of coastal management, namely development of riverine and coastal commerce, and coastal protection.

The conference was preceded by two workshop-training sessions dealing respectively with 'Satellite Canada' and its uses and applications in forestry, fisheries, agriculture, sites, geology and cartography, and included an introduction to geographical information

systems (GIS). The programme included five plenary sessions, 44 technical sessions, and two poster sessions. More than 100 posters were displayed in the UQAR gymnasium, which also housed an exhibition of nearly 40 stands from bioremediation companies, protection designers, government agencies, international organizations, educational institutions, professional societies, and equipment providers. Visitors were attracted by scheduling 'socials' at poster times. Fifty-one countries were represented.

Papers addressed ten major themes grouped in such categories as management of the coastal zone, coastal erosion, anthropology, sustainable development modelling, including the use of 'traditional' (meaning mostly indigenous) knowledge, and education and training. The latter was not limited to formal 'school' approaches, but included 'sensitization' at large (an important factor for management) and 'awareness' of contemporary geological and geophysical problems. The management theme attempted to link the conclusions and recommendations of the 1994 Halifax CZC conference and to address the integrated approach spanning the 1970–93 period. An analysis was made of the management models with 'labels' bestowed: Brazilian or highly centralized, Filipino or somewhat decentralized, and Canadian or strongly decentralized. It is regrettable that European models were not examined more critically. Considerable attention was given to biodegradation, and the remarkable success achieved in the Alaska accident was the subject of sustained interest.

The problems of developing countries were brought to the fore and proposals mooted for restoration of ecosystems. For instance, for Malaysia, an ambitious programme was proposed involving environmental conservation, habitat restoration, community development, environmental education, marine protected area measures, and coastal vegetation buffer zone delimitation. It encompassed co-management or community-based management options, buttressed by regular scientific evaluation. Unfortunately, no sources of financial backing had thus far been identified.

Attendance was also 'standing room only' for the sessions dealing with coastal protection. Although 'hard' structures are by no means obsolete, the emphasis lies on 'soft' methods, such as artificial nourishment, geo-textile sheet revetments, or sheets for more temporary use. Attention was also focused on wetlands and salt-marsh restoration, and polder creation, in front of crumbling sea walls where repair is financially impossible. This latter attempt to act with nature was illustrated by examples from England (Essex), France (north), and Belgium (west).

On the closing day, separate statements were made by both the conference delegates and the CZC Association, and resulted in the 'Rimouski Declaration', a call for international action on sustainable use of coastal and ocean resources. Though it had been said that no proceedings volume would be printed and that the *Abstracts* book would be the only *Actae* of the conference, it appears now (December 1996) that some papers will be published in a special issue of the journal *Ocean and Shoreline Management*.

CZC 98 is scheduled for Victoria, Vancouver, British Columbia (30 August to 3 September 1998) and will highlight attention on the 1998 International Year of the Oceans.

ROGER H. CHARLIER  
Haecon, Inc.  
110 Deinsteeweg  
B-9031 Drongen  
Belgium

### First SPARC (Stratospheric Processes And their Role in Climate) General Assembly

*Held at the University of Melbourne, Australia, during 2–6 December 1996*

The SPARC project was established by the World Climate Research Program in 1992. The purpose of the Assembly was to focus on understanding how processes operating in the stratosphere can affect climate. Over 200 people from more than 20 countries attended the Assembly. While a majority of delegates came from the USA and Europe (60%), there was a substantial number of participants from Australia, New Zealand and Asia.

Dr Marie-Lise Chanin (SPARC, Cedex, France), Dr John Zillman (President, World Meteorological Organization, Geneva, Switzerland) and Professor David Karoly (Director of the Meteorology, CRC, Clayton, Australia) opened the Assembly. Following the first morning session, a media conference with keynote speakers was held. Much attention was directed toward Professor Mario Molina (Massachusetts Institute of Technology), who was a guest of the Meteorology CRC and Silicon Graphics during his visit to Australia. Professor Molina was joint winner of the 1995 Nobel Chemistry prize for his research into the depletion of the ozone layer. His research has been crucial in raising world concern about ozone in recent years. Professor Molina also gave a public lecture on 'Stratospheric ozone depletion: a global problem'.

Eight-one oral and 189 poster presentations were made over the five days covering eight topics, with at least one invited speaker making a half-hour presentation for each of the topics. Oral presentations were given throughout each day, followed by poster presentations in the late afternoon on four of the days. There were no concurrent series of presentations.

In the session on troposphere-stratosphere general circulation models, Dr Steve Pawson (Institut für Meteorologie, Berlin) gave an invited talk 'Intercomparison of stratospheric models: The GRIPS (Gcm-Reality Intercomparison Project for Sparc) Project' and Dr Kunihiro Kodera (Meteorological Research Institute, Tsukuba Ibaraki, Japan) gave a talk titled 'General circulation model study of the impact of the stratosphere on the troposphere'.

Under the topic of stratospheric climatology studies, Dr William Randel (National Centre for Atmospheric Research, Boulder, Colorado) addressed 'Stratospheric climatology studies for SPARC', and Professor Alan O'Neill (Centre for Global Atmospheric Modelling, Reading, UK) discussed the comparison between the stratosphere of the northern and southern hemispheres.

In the session discussing trends in temperature, ozone, and water vapour, Dr V. Ramaswamy (Geophysical Fluid Dynamics Laboratory [GFDL]/National Oceanic and Atmospheric Administration [NOAA], Princeton University, New Jersey) spoke on 'Stratospheric temperature trends: observations and model simulations', while Dr Neil Harris (European Ozone Research Coordinating Unit, Cambridge, UK) discussed 'Ozone trends', and Dr John Gille (National Center for Atmospheric Research, Boulder, Colorado) gave a talk titled 'Monitoring and understanding the distribution of upper troposphere water vapour'.

On gravity wave processes, Dr Bob Vincent (University of Adelaide, Australia) delivered a paper on 'Gravity wave parameters in the stratosphere and their relationship to parameterization schemes', Professor Jim Holton (University of Washington, Seattle) spoke on 'A model study of zonal forcing in the equatorial stratosphere

by convectively-induced gravity waves: implications for the QBO', and Dr Kevin Hamilton (GFDL/NOAA, Princeton University, New Jersey) presented a paper on 'Progress towards gravity wave parameterization for global climate models'.

Stratosphere-troposphere transport and mixing was discussed in an invited paper by Dr Ted Shepherd (University of Toronto, Canada), 'Transport and mixing in the lowermost stratosphere'. The session on chemistry-climate interaction had papers by Dr Ravishankara (NOAA, Boulder, Colorado) on the 'Chemistry of the lower stratosphere and the upper troposphere' and Dr Guy Brasseur (National Centre for Atmospheric Research, Boulder, Colorado) on 'The impact of stratospheric changes on the chemical composition of the troposphere'. UV radiation and its impacts on human health were discussed by Dr Bruce Armstrong (New South Wales Anti-Cancer Council, Australia). Other aspects of stratospheric processes were addressed by Dr Darin Toohey (University of California, Irvine) who gave a paper on the role of *in situ* measurements in the satellite era.

A comprehensive programme for associate delegates included a tour of Melbourne, the famous Queen Victoria Market and a day at the Healesville Sanctuary. The Assembly dinner was held on Wednesday and was attended by almost all of the participants and associate delegates. Buses departed Melbourne University and took passengers to Ferguson's Winery at Dixon's Creek for a short wine tasting. Passengers were then taken to the Yarra Glen Racecourse for dinner and entertainment from the Australian bush band, the 'Bushwahbees'.

The Abstracts Volume is available from the Meteorology CRC at the address below and all papers presented can be browsed on the World Wide Web at: <http://www.shm.monash.edu.au/96/papers/abstrac.htm>. A Proceedings Volume is being printed by the SPARC Office in France and is expected to be available soon. The next SPARC General Assembly is likely to be in about three years, somewhere in the northern hemisphere.

ANNITA ALLMAN  
 Communications Officer  
 CRC for Southern Hemisphere Meteorology  
 Monash University  
 Wellington Road  
 Clayton Victoria 3168  
 Australia

### GIS in Wildlife Science: Current and Future Directions

*A conference held at The Wildlife Society Annual Meeting in Cincinnati, Ohio, USA, during 1–6 October 1996*

A one-day symposium was attended by members of The Wildlife Society on 2 October 1996. Main topics included the integration of GIS and Remote Sensing with traditional wildlife management investigations to enhance and improve the set of tools available to biologists and managers. Empirical and theoretical presentations examined the use of GIS in population and habitat modelling, risk assessment, and change detection. Additionally, the GIS/Remote Sensing Working Group held its annual meeting on Thursday 4 October and a further one-day GIS workshop, which was sponsored by Pacific Meridian Resources, was attended by over 40 participants on Saturday 6 October.

Nineteen contributing authors presented eighteen of twenty scheduled technical papers. A panel discussion focused questions and suggestions from attendees on how GIS and Remote Sensing technologies could be better applied and made more user-friendly in meeting agency and educational needs and objectives. The panel consisted of Kass Green (Pacific Meridian), Gerry Kinn (TASC, Inc, Boston, MA), Anthony Curtis (Environmental Systems Research Institute Inc., Redlands, CA), and Jeanette Jones (Tennessee Technological University). The workshop attracted over 40 participants, consisting mainly of individuals seeking their first interaction with a Geographic Information System. Basic GIS terminology, concepts and design were discussed and applied to wildlife management problems. A WorldWide Web document, containing both email links to authors and web-links to either an extended abstract, a manuscript, or a web-poster, is available at <http://web.syr.edu/~rilawren/twsgis.html>.

The Working Group also planned next year's proposed sessions, to be held in Snowmass, Colorado, during 23–27 September 1997. The theme of that session will be integrating the tools of radiotelemetry, GPS and GIS in wildlife and natural resources management. The poster session/social format will complement the Biotelemetry Forum to be held just prior (21–23 September) to the TWS Annual Meeting in Snowmass. Additional information on the proposed poster session/social can be obtained by contacting Richard K. Lawrence ([rilawren@syr.edu](mailto:rilawren@syr.edu)), Karl Didier ([kadidier@syr.edu](mailto:kadidier@syr.edu)), Darren Divine ([divined@nevada.edu](mailto:divined@nevada.edu)), or Tony Curtis ([tcurtis@esri.com](mailto:tcurtis@esri.com)). Additional information on the Biotelemetry Forum is available from Jane Austin ([jane\\_austin@nbs.gov](mailto:jane_austin@nbs.gov)) or Pam Pietz ([pam\\_pietz@nbs.gov](mailto:pam_pietz@nbs.gov)), National Biological Service, Northern Prairie Science Center, 8711 37th Street SE, Jamestown, ND 58401 USA, tel: 11 701 252 5363, fax: 11 701 252 4217.

RICHARD K. LAWRENCE  
253 Illick Hall  
State University of New York  
College of Environmental Science and Forestry  
1 Forestry Drive  
Syracuse, New York 13210, USA  
Tel: +1 315 470 6985  
Fax: +1 315 470 6934

### Global Diversity Forum

*Held in Buenos Aires, Argentina, during 1–3 November 1996*

The fifth session of the Global Biodiversity Forum was held immediately prior to the third meeting of the Conference of the Parties (COP) to the Convention on Biological Diversity (CBD). Like the previous sessions of the Forum, the purpose was to foster analysis and unencumbered dialogue amongst interested parties from all sectors and to address key ecological, economic, social and institutional issues relating to biodiversity, many of which were debated by the COP over the subsequent two weeks. The Forum series is organized by IUCN (World Conservation Union) in cooperation with the World Resources Institute (WRI, Washington DC), the United Nations Environment Programme (UNEP), and the African Centre for Technology Studies (Nairobi, Kenya). The Indigenous Peoples Biodiversity Network (IPBN) joined as a partner for GBF5

and the Fundacion Ambiental y Recursos Naturales (FARN) ably acted as the local host.

More than 145 individuals from over 40 countries organized their discussions in four workshops to address: Investing in Biodiversity; Agriculture and Biodiversity; Integrating Biodiversity Into Land-Use Planning and Management; and Biodiversity and Indigenous Peoples.

The Investing in Biodiversity workshop, organized by IUCN in cooperation with Worldwide Fund for Nature (WWF) and the Global Environment Facility (GEF), reviewed compelling evidence that the developed countries, with the sole exception of Norway, are failing to meet their financial obligations under Article 20 of the Convention. ODA (Overseas Development Administration) investments remain a keystone for biodiversity, and it was thus recommended that the COP call on all donors to meet their obligations. The workshop concluded that, while the record of the GEF in its operation of the financial mechanism is mixed, no credible alternatives are in view. Improved performance, however, is not only the responsibility of the GEF, but also of recipient countries who should strive to ensure that proposed projects are driven by a broad constituency within both government and civil society. In addition, the COP must clarify its policy guidance to the GEF, while avoiding the pitfalls of micro-management.

GEF, however, will never meet the Convention's financial needs on its own. Fortunately, a wide range of complementary and innovative financing mechanisms is available, including debt swaps, national environment funds, revenue generation through innovative user fees, commercialization of genetic resources through bio-prospecting and biotechnology transfers, venture capital funding of biodiversity-sensitive small and medium size enterprises, and the potential market for biotic carbon offsets. The COP should call on the Secretariat and the GEF to mobilize this potential.

Over 99% of all investments in developing countries are not directed to biodiversity conservation, but have an immense impact on biodiversity. Pursuant to Article 11 of the CBD, parties should restructure incentives for both public and private investment, in both the north and the south, to better attain the objectives of the Convention.

The Agriculture and Biodiversity workshop, organized by IUCN and WRI, began with the understanding that agricultural biodiversity is a basis of people's food and livelihood security worldwide. This 'agrobiodiversity' encompasses an enormous array of biological resources, not only at the genetic level, but also at those of species and agroecosystems, including fisheries and pastoral systems. It is also distinctive because it has been, and continues to be, developed by food producers. Yet agrobiodiversity is being rapidly eroded, largely from the expansion of homogeneous industrial food production; this is a serious threat to productivity and sustainability of food supplies. The conservation, sustainable use, and enhancement of all forms of agrobiodiversity is essential to alleviate hunger, which affects some 800 million people today. Ensuring the rights, full participation, equity, and empowerment of local peoples is urgently needed in decision-making and actions for agrobiodiversity conservation and enhancement.

Chances are needed in policies, especially for dismantling incentives for the so-called 'Green Revolution' and industrial food production technologies, developing policy incentives for agrobiodiversity conservation, reforms of resource tenure systems, and mitigating macroeconomic trade and market policies that lead to agrobiodiversity loss. Research paradigms also must be transformed

to support this new agenda, particularly in areas of soil biodiversity, integrated pest management, reduction of pesticide use, and sustainable use of non-domesticated ('wild') resources.

The workshop on Integrating Biodiversity and Land-Use, organized by the Netherlands Committee for IUCN, the Environmental Liaison Center International (ELCI) and IPBN, noted that sustainable land use is essential for the conservation of ecosystem diversity. Biodiversity forms an indicator of sustainable land use, and must be integrated into land-use management practices. Among the threats to land are unsustainable agricultural practices (erosion and desertification), rapid urbanization and unsustainable consumption and production patterns. To achieve sustainable land use will depend in part on parties' implementation of CBD Articles 8 (In-situ Conservation), 10 (Sustainable Use) and 11 (Incentive Measures), with particular emphasis on articles 8[j] (to respect, preserve and maintain the knowledge innovations and practices of indigenous and local communities) and 10[c] (to protect and encourage customary use of the components of biological diversity). For example, the land rights of indigenous and local communities need to be secured and the value of indigenous and traditional technologies recognized and protected. Public participation in land-use decisions needs to be ensured, and perverse incentives which encourage unsustainable land-use practices must be eliminated. Land-use practices have to be premised on the realization that land is a finite resource which must be managed sustainably. They must reflect 'biocultural' scales and allow active and broad local participation. Ecological and social priorities, including food security, need to be emphasized.

The point of departure for the workshop on Biodiversity and Indigenous Peoples, organized by the IPBN, was the Convention's recognition that indigenous peoples' knowledge systems and practices are central to the conservation and sustainable use of biodiversity. However, the parties need to be reminded that biodiversity cannot be preserved or promoted by removing indigenous knowledge from its context. The creation and dissemination of knowledge is intimately tied to values and practices in the daily lives of indigenous peoples. It would be improper for the COP to discuss access to indigenous peoples' knowledge without first addressing the basis for protecting and promoting this knowledge: namely the livelihoods, well-being and survival of indigenous peoples. Land rights are central to the implementation of article 8[j] and the Convention as a whole.

The workshop participants therefore make the following specific recommendations to the COP: (1) Before implementing any measures for access to indigenous peoples' knowledge, the rights of indigenous peoples over their territories, resources and knowledge systems must be recognized and enforced; (2) the Secretariat should immediately implement the Indigenous Peoples' Focal Point position; (3) an ad hoc, open-ended working group should be established to integrate protection and promotion of indigenous peoples' knowledge within the overall work of the CBD; (4) a process of dialogue should be established with indigenous peoples to protect indigenous peoples' knowledge systems; (5) non-indigenous claims to the processes and products associated with indigenous peoples' knowledge and genetic resources should be prohibited; and (6) a moratorium should be established on bioprospecting and ethnobotanical collections until adequate protection mechanisms for indigenous peoples' knowledge and innovations are established.

The collective conclusions of the workshops and the strains which appear to exist between both promoting commercialization of

resources and calling for a moratorium on collection is not in fact a conflict, it is rather a manifestation of the failure by parties to adopt the legislative and policy decisions necessary to ensure the equitable and sustainable use of biological diversity. The GBF called upon the COP to work towards establishing the legal and institutional frameworks necessary to ensure the equitable recognition of rights by both the providers and recipients of biological resources so that the Convention's objectives may be realized sooner rather than later.

JEFFERY A. MCNEELY  
IUCN  
Rue Mauverney 28  
1196 Gland  
Switzerland  
Tel: +41 22 9990001  
Fax: +41 22 9990002

### **11th International Harbour Congress and the 8th International Harbour Exhibition**

*Held at the Antwerp Harbour Convention Halls, Hangars No 26/27, Rijnjkaai, Antwerp, Belgium, during 17–21 June 1996*

King Albert II came to inaugurate the activities, thereby bestowing a Belgian character to an affair which otherwise was lacking in excitement. The Port of Brussels, which attractively celebrated its centenary, was not represented, although Ghent and Zeebrugge had stands at the Exhibition and offered technical visits.

About 200 people from 32 countries attended, but participation was largely Flemish-Belgian and Dutch. The event was billed as 'a conference of engineers for engineers'. The name perhaps ought to have been modified to a Harbour Engineering or Technology Congress.

Papers of high quality were grouped by major themes: breakwaters and the like; port construction and quay walls; scouring and fender dredging aspects, including maintenance dredging; port access, which also included social and economic aspects; and maintenance and environmental matters. Two concurrent sessions accommodated 81 papers from 20 countries.

In the Port Planning sessions, G. Allaert (University of Ghent) in his communication 'Sustainable maritime (industrial) development in perspective' pleaded for, and proposed steps to maintain spacious qualifications in terms of land-use, mobility and landscape qualities. The adverse effects of development are that too much is attempted in too little space within too short a time. The development of a port in social-economic terms must be reconciled with the sustainable management of space. Clearly, the author holds, political structure influences both urban and port development. To him, new management tools are needed to guarantee the future value of urban maritime areas.

In 'Environmental conservation for planning of ports and harbours in developing countries', B.K. Mazurkiewicz (Technical University of Gdansk, Poland) provided a literature review dealing with the negative impact of development and assessed the need for mitigating and remediation measures.

A practical experience was described by M. Meine and P.G. Tamminga (Strom und Hafenubau, Hamburg, Germany). To compensate for the ecological impact of the port extension on landscape

and nature, a former branch of the Elbe River was reopened and the tidal regime restored, so that the ecological situation could be improved.

Coastal protection was the subject of a few papers. K.W. Pilarczyk (Netherlands' Rijkswaterstaat Road and Hydraulic Engineering Department, Delft) gave a comprehensive literature review on geotextiles, and mentioned some new approaches on rebuilding beaches.

In the maintenance session, R.J. Snowden and C.R. Hoggart (Environmental Science Department, Halcrow, Swindon, UK) presented a paper 'An environmental audit and impact assessment of a former Soviet Baltic Port'. The Lithuanian port Klaipeda (formerly Memel) was revealed to contain highly-contaminated sediments, too polluted to be dumped at sea. Chronic problems with pollutants are due to sewerage and industrial effluents. The audit recommended removal of the sediments, the routing of effluents to the sewers, and improvements in the water-treatment plant. Only after a spillway for oil emergencies is built and removal of the contaminated sediments takes place can thought be given to undertaking the construction of the waterway.

'The environmental management on large industrial sites. A case for the Europoort-Bottlek area' by E. Schrink and P. Stienstra (Environmental Department, Delft Geotechnics, Netherlands)

dealt with pollution in soils and groundwater in the Flemish part of Belgium and The Netherlands. Regional rather than local management is recommended. The authors described the Rotterdam 'cluster concept', which is a management control unit that benefits from sharing costs and considering the interrelation of pollution on different sites. In this way, relative health hazards could be established. In their case, pollutants are not dispersed, but concentrated in 'centres' with no significant threats to health as long as the pollution is contained within the cluster's limits. The same authors, in a companion paper, found that many classical methods of assessing pollution are inappropriate for large industrial sites because they are cost-inefficient. They suggest some alternative methods.

A 752-page volume of Proceedings includes a companion 65-page book of 'General Reports', which reproduces my remarks. All in all the conference may be considered as a success and I look forward to the 12th congress, wherever it may find a home.

ROGER H. CHARLIER  
*HAECON Inc.*  
*110 Deinsteeweg*  
*B-90314 Drongen*  
*Belgium*