Global foundations for reducing nutrient enrichment and oxygen depletion from land based pollution, in support of the

Global Nutrient Cycle

Second Regional Planning Meeting of the GPNM Caribbean Platform for Nutrient Management

February 24-25, 2016

Prepared by the GPNM Secretariat

Component A: Doc: A1-3

Partners:

April 2016

About the GEF-Global Nutrient Cycle Project

Project objective: to provide the foundations (including partnerships, information, tools and policy mechanisms) for governments and other stakeholders to initiate comprehensive, effective and sustained programmes addressing nutrient over-enrichment and oxygen depletion from land based pollution of coastal waters in Large Marine Ecosystems.

Core project outcomes and outputs:

- the development and application of quantitative modeling approaches: to estimate and map present day contributions of different watershed based nutrient sources to coastal nutrient loading and their effects; to indicate when nutrient over-enrichment problem areas are likely to occur; and to estimate the magnitude of expected effects of further nutrient loading on coastal systems under a range of scenarios
- the systematic analysis of available scientific, technological and policy options for managing nutrient over-enrichment impacts in the coastal zone from key nutrient source sectors such as agriculture, wastewater and aquaculture, and their bringing together an overall Policy Tool Box
- the application of the modeling analysis to assess the likely impact and overall cost effectiveness of the various policy options etc brought together in the Tool Box, so that resource managers have a means to determine which investments and decisions they can better make in addressing root causes of coastal over-enrichment through nutrient reduction strategies
- the application of this approach in the Manila Bay watershed with a view to helping deliver the key tangible outcome of the project – the development of stakeholder owned, cost-effective and policy relevant nutrient reduction strategies (containing relevant stress reduction and environmental quality indicators), which can be mainstreamed into broader planning
- a fully established global partnership on nutrient management to provide a necessary stimulus and framework for the effective development, replication, up-scaling and sharing of these key outcomes.

Project partners:

- Chilika Development Authority
- Energy Centre of the Netherlands
- Global Environment Technology Foundation
- Government of India - Lake Chilika Development Authority
- Government of the Netherlands
- Government of the Philippines
- Government of the United States
- Intergovernmental Oceanographic Commission of UNESCO
- International Nitrogen Initiative
- Laguna Lake Development Authority
- Partnerships in Environmental Management for the Seas of East Asia
- Scientific Committee on Problems of the Environment
- University of Maryland
- University of the Philippines
- University of Utrecht
- Washington State University
- World Resources Institute

Implementing Agency: United Nations Environment Programme
Executing Agency: UNEP- Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities (GPA)

Global Partnership on Nutrient Management (GPNM)

Second Regional Planning Meeting of the Caribbean Platform for Nutrient Management

Workshop Proceedings

February 24-25, 2016
Hilton Hotel, Port of Spain, Trinidad & Tobago

Supported under the
GEF-funded Global Foundations for Reducing Nutrient Enrichment and Oxygen Depletion from Land-Based Pollution, in Support of Global Nutrient Cycle (GEF-GNC) Project

April 2016

Collaborators and organizing partners:

Background

The Global Partnership on Nutrient Management (GPNM) was launched in 2009 to address the global challenges faced by the mismanagement of nutrients and nutrient over-enrichment. It is a global partnership of governments, scientists, policy makers, private sector, NGOs and international organizations. It responds to the 'nutrient challenge' – how to reduce the amount of excess nutrients in the global environment consistent with global development. The GPNM reflects a need for strategic, global advocacy to trigger governments and stakeholders in moving towards more efficient and effective nitrogen and phosphorous use and lower losses associated with human activities. It provides a platform for governments, UN agencies, scientists and the private sector to forge a common agenda, mainstreaming best practices and integrated assessments, so that policy and investment responses/options are effectively 'nutrient proofed'. The GPNM also provides a space where countries and other stakeholders can forge more co-operative work across the variety of international and regional fora and agencies dealing with nutrients, including the importance of impact assessment work. The work of the GPNM is advanced by a Steering Committee, a sub-set of the Partnership members and is supported by the GPA Unit of the Marine and Coastal Ecosystems Branch of the Division of Environmental Policy Implementation of UNEP, which serves as the Secretariat to the Steering Committee.

The GPNM launched a Caribbean Platform for nutrient management in May 2013 in Trinidad and Tobago. The purpose of the regional nutrient platform is to extend the reach of UNEP and the GPNM down to the country level so as to drive policy and encourage implementation of best practices in nutrient management to minimize adverse impacts on the marine environment. The GPNM convened the second meeting of the platform between February 24 and 25, 2016 and was again co-hosted by the Institute of Marine Affairs (IMA) of Trinidad and Tobago, and UNEP's Caribbean Regional Coordinating Unit. The aim of this meeting was to continue to build awareness of nutrient management issues in the Caribbean, consider recommendations made from the first meeting of the platform, present a draft action plan, and seek out an appropriate institutional mechanism to support the work of the Platform within the region.

The workshop was attended by technical and policy country policy makers and regional technical support agencies. The participant list is contained in Annex 1.

The meeting was supported through financial contributions from the GEF-funded Global Foundations for Reducing Nutrient Enrichment and Oxygen Depletion from Land-Based Pollution, in Support of Global Nutrient Cycle (GEF-GNC) Project.

Workshop objectives

The following were the primary workshop objectives:

- To understand the current priorities in respect to nutrient management in the region
- To agree on a plan of action for the operationalization of the Caribbean Platform for Nutrient Management
- To agree on mechanisms for mainstreaming and building sustainability for the Platform into existing frameworks
- To identify immediate opportunities from ongoing or planned projects to support nutrient related activities in the region.

The workshop agenda is contained in Annex 2.

DAY 1

Opening remarks, Workshop objectives and expectations

Session Chair: Ms. Toylan Arneaud, Director (Ag.) IMA, Trinidad & Tobago

Ms. Toylan Arneaud, Director (Ag.), Institute of Marine Affairs (IMA), Trinidad & Tobago welcomed participants to the meeting on behalf of the Institute and the Government of Trinidad and Tobago. She gave an overview of the nutrient challenge in Trinidad and Tobago, and provided examples of progress in addressing the challenge across the globe with recognition of the need to implement best practices in managing phosphorus and nitrogen flows to the environment. She highlighted issues with respect to nutrient load pollution that was of greatest concern along the west coast of Trinidad, mainly associated with the many urban centers and industrial areas. In Trinidad there are concerns over industrial discharges associated with ammonia production in the Point Lisas industrial area, which has been the focus of implementation of better waste control practices. In Tobago the concern with land-based pollution is along the southwest coast, which is mainly associated with urbanization. The Buccoo Reef, a significant ecological area has been subject to the negative impacts of land-based pollution. Some 30% of the country is centrally sewered, while 70% of discharges are treated using onsite means. Some 99% of industrial effluent is discharged untreated to the environment. Slash and burn agriculture is a problem and associated land degradation contributes to land-based pollution. She emphasized that there must be collective action to address the pollution problems in the country and that there must be strong stakeholder cooperation. She expressed the continuing commitment of the IMA to the work of the GPNM Caribbean Platform and to the issue of sustainable nutrient management.

Dr. Lorna Inniss, Coordinator, UNEP Caribbean Regional Coordinating Unit (Car/RCU) conveyed greetings on behalf of UNEP, thanking the IMA for its support. She noted that from the formation of the GPA in 1995, UNEP Car/RCU has been actively involved in extending the work of the GPA within the Wider Caribbean area. She noted that the Land-Based Sources of marine pollution (LBS) Protocol of the Cartagena Convention was the first relevant regional protocol to follow after the formation of the GPA. There are 12 Contracting Parties to the LBS Protocol where Trinidad and Tobago was the first English-speaking Caribbean country to ratify the Protocol. Trinidad and Tobago hosts one of two Regional Activity Centres (RACs) for the LBS Protocol, that being the Institute of Marine Affairs, where its cooperation is governed by an agreement between UNEP and the Institute. The LBS Protocol identifies domestic sewerage and agricultural runoff as major sources for nutrient loading in the Caribbean. She expressed that UNEP Car/RCU welcomes this technical meeting noting that some of the related emerging issues includes the Sargassum seaweed invasion that is linked to nutrient loading, compounded by climate change drivers, along with the occurrence of harmful algal blooms and dead zones.

Vincent Sweeney, Head, UNEP Caribbean Sub-Regional Office extended a welcome on behalf of the Executive Director of UNEP. He noted that UNEP's Caribbean sub-regional office was recently established which for the time being is being hosted by the Cartagena Secretariat. The sub-regional office was established so as to extend UNEP's reach, with a renewed SIDS focus. The establishment of the Caribbean office follows the establishment of a regional office in the Pacific to serve SIDS in that region. He provided an overview of the various work areas of UNEP citing relevance to Caribbean SIDS. The work of the GPNM Caribbean Platform fits very well within UNEP's work and the work of the GPA, noting the three partnerships under the GPA, the Global Partnership on Nutrient Management (GPNM), the Global Partnership on Marine Litter (GPML) and the Global Wastewater Initiative (GW^2I). The scope of the GPNM platform's work straddles the nexus between nutrient and wastewater management. The Caribbean will be the first region to have focal points for each of the GPA partnerships, which is a notable achievement. The work by the Platform will be expected to support decisions out of the United Nations Environment Assembly (UNEA) that will be held in May 2016, and should further contribute to the Sustainable Development Goals, also with alignment to the outcomes of the UNFCCC COP21 and the Paris Declaration on climate change.

Overview of the GPNM and relationship within UNEP's GPA Programme

Dr. Greg Crosby, United States Department of Agriculture and GPNM Chair
Dr. Christopher Cox, United Nations Environment Programme

Dr. Greg Crosby welcomed the concern of Caribbean stakeholders over the issue of nutrient management and willingness to contribute to the nutrient management agenda, suggesting that the work of the platform is consistent with the resolutions that are emerging out of the United Nations Environment Assembly (UNEA). The GPNM is a global partnership and the regional platform is a way to bring the global level to the regions and down to the national level; without these platforms the GPNM cannot do much. The GPA Coordination Office in Nairobi has continued to provide strong support to the GPNM through the management and programme support levels of UNEP. The strengthening of the Caribbean Platform presents an opportunity to consolidate joint work in the areas of wastewater and nutrient management, where in the Caribbean these are closely related in terms of land-based pollution of coastal waters. In the Caribbean and elsewhere, we need to adopt an integrative approach in trying to figure out how we integrate the nutrient-related management areas of relevant projects and other initiatives within the work of the GPNM. In this context we need to ask how the GPNM Caribbean Platform will assist this process. A challenge with nutrient management is that there is a perception that it is not a priority or emergency issue; in this light, we need to recognize that the work toward sustainable nutrient management will be a gradual process. This, notwithstanding the fact that it is estimated that globally some 80% of fertilizer applied does not meet intended crop uptake and that the nutrients end up as losses to the environment and the oceans threatening ecosystem services and in turn livelihoods. He affirmed the commitment of the GPNM to advance the nutrient management agenda in the Caribbean.

Dr. Christopher Cox gave an overview of the GPNM and relationship within UNEP's GPA Programme. He highlighted the scale and magnitude of problems associated with land-based sources of marine pollution and that with the population to exceed possibly 9 billion by 2050, addressing degradation of the planet's oceans must be addressed with urgency. He noted that globally some 80% of wastewater is discharged untreated to the marine environment. He gave an overview of the nutrient cycle and the fate of nutrients in the environment termed the 'nutrient cascade'. According to Johan Rockström et al., 2009 the volume of reactive nitrogen that is created by mankind through fertilizer production and application, and from other sources have greatly exceeded the acceptable planetary boundaries (the 'safe limits' without incurring irreparable ecological damage). The boundary for phosphorous is quickly being approached. He outlined the negative impacts that excess nutrients have on the environment in terms of water quality, air quality, greenhouse balance, ecosystems integrity and soil quality. Climate change drivers are now thought to be accelerating the impacts associated with nutrient loading to the environment. Harmful algal blooms (HABs) could become more severe and persistent due to warmer oceans and fresh waterbodies. The current Sargassum proliferation in the Caribbean (and West Africa) is likely linked to such phenomenon. Nutrient deficits in parts of the world such as

sub-Saharan Africa where crop harvest without replenishment leads to soil fatigue and land degradation.

He provided a background on the GPA and its mandate in oceans protection from land-based pollution, where the focus of the Programme is on three pollution source categories; nutrients, marine litter and wastewater. The GPA serves as the Secretariat for three associated global partnerships respectively, the Global Partnership on Nutrient Management (GPNM), the Global Partnership on Marine Litter (GPML), and the Global Wastewater Initiative (GW^2I). The GPNM was established in 2009 with the key roles being to catalyze strategic advocacy and co-operation at the global and regional levels, support science-policy interaction and translating science for policy makers, provide information and enhance capacities to address the growing problem of nutrient over-enrichment and eutrophication, and position nutrient issues within the international sustainable development agenda. The nutrient management agenda is most closely aligned to Sustainable Development Goal 14 on conservation of the oceans and Goal 2 on sustainable agriculture. The GPA Coordination Office/GPNM Secretariat is executing the GEF-Global Nutrient Cycling (GNC) Project which is helping to build the foundations of knowledge for nutrient management at the global level. Main areas of support under the GEF-GNC Project include the strengthening of global partnership, analysis of relationships between nutrient sources and impacts, the promotion of best practice technological and policy options based on science and lessons learned, and demonstration of source-impact nutrient flux modeling at the watershed-scale (in the Philippines). The project has also supported the development of ecosystem health scorecard methodologies around nutrient and pollution and assessments for specific ecosystems in India and the Philippines.

He concluded by saying that the work of the GPNM under initiatives such as the GNC Project will contribute to decision maker needs. He made a call to the audience to contribute best practices to the Global Nutrient Management Toolbox that has been developed under the GEF-GNC Project. He noted that the Caribbean Platform will need to figure out how best to incorporate the work of the GPNM from the global level and identify lead local and regional partners to carry the work forward.

An important consideration in the case of the support from GPA is the ability to link to and draw on GPNM's sister global partnership for wastewater, the Global Wastewater Initiative (GW^2I). The GW^2I is seeking to establish a Caribbean node similar to the nutrient platform and has engaged discussions with the CWWA. The linkages between the nutrient and wastewater partnerships will be close in the case of the Caribbean, given that wastewater is a significant contributor to nutrient loading in coastal waters.

Refer to presentation in Annex 3.1.

Discussion

The Netherlands is a good example of how the nutrient management agenda was raised to the level of national crisis as a result of widespread adverse environmental impacts from nutrient excess. The main source was from the intensive agricultural development policy that the country promoted under heavy government subsidization (including access to fertilizers). The critical factor was the disposal of livestock manure, where it was spread liberally over agricultural fields with little diversion from polluting waterways. This lead to widespread eutrophication and hypoxia of waterbodies. In

response, the government put significant restrictions on the production of livestock to reduce the pollution problem, which then led to economic and social fall-out among many livestock producers. Many farmers left the country under economic hardship conditions. There are many lessons to be learnt here in principle.

In such circumstances, livestock production policies may need to tend towards reduction of the consumption of red meat. This may be more important in some of the countries of the wider Caribbean such as in northern South America that may be larger livestock producers. This points to the important concept of nutrient recycling to reduce nutrient leakage to the environment. It should be noted that the Netherlands, given their experiences, played an instrumental role in the establishment, support and leadership to the GPNM. Embracing the concept of nutrient use efficiency (NUE) is essential to drive policy response across all relevant sectors. This work must not only be confined to governments but must also engage the private sector, with recognition of not only the environmental, but the economic benefits.

Relationship of GPNM to the Caribbean Regional Seas Programme

Chris Corbin, United Nations Environment Programme

The main sources of pollution in the Wider Caribbean region are from poor agricultural practices in the form of non-point run off, untreated domestic wastewater and fertilizer run-off from coastal tourism investments (notably golf courses in the islands). Under UNEP Car/RCU's Assessment and Management of Environmental Pollution (AMEP) Sub-programme there are several work areas of relevance to nutrient management; the GEF-Caribbean Regional Fund for Wastewater Management (CReW) Project, the new GEF-Implementing Water, Land & Ecosystem Management in Caribbean SIDS (IWEco) Project, the collaboration with the US Dept. of State on ocean acidification, collaborations under various MEAs, and with international financial institutions and other UN agencies aimed at addressing land-based pollution to the Caribbean. There are interventions looking at the economic dimension of pollution such as the economic valuation pilot projects under the CReW Project, and the Secretariat is providing inputs to the Green Economy Project in Jamaica and St. Lucia. UNEP Car/RCU is active in assisting to build capacity to support the State of the Convention Area Reporting (SOCAR) and the UN Regular Process. Under the Specially Protected Areas and Wildlife (SPAW) Sub-programme there are relevant initiatives in assessment of the status of sensitive ecosystems and management along with capacity building through a myriad of associated projects such as the Caribbean Challenge Initiative and the Caribbean Large Marine Ecosystem Project. There is also collaborative network with IOC-UNESCO, the Convention on Biological Diversity and the Ramsar Convention that will have related dimensions within the nutrient and pollution management agenda.

The LBS Protocol is the primary instrument through which nutrient management and pollution will be addressed. The Protocol's annexes list the pollutants of concern including nutrients, establishes effluent limits and provides specifications related to non-point sources of pollution. Of note under Annex IV, Parties to the Protocol are to develop pollution reduction plans and control agricultural

non-point sources of pollution. This is where nutrient management is most closely linked. The Annex calls for estimates of pollution loading, assessment of health risks, assessment of management frameworks, best practices and establishment of monitoring programmes. There have been some key publications on assessment of LBS pollution to the Caribbean Sea that have been supported by collaborating partners such as the Regional Activity Centres (IMA in Trinidad & Tobago and CIMBA in Cuba), INVEMAR in Colombia and the Caribbean Public Health Agency (CARPHA).

The findings of the Pollutant Loads into Caribbean Sea studies (Technical Reports 33 & 52) pointed to the Mississippi, the Orinoco and the Magdalena watershed basins, being the largest basins, as the main contributors of pollutant loads to the marine environment of the Wider Caribbean (Caribbean Sea and the Gulf of Mexico). The Orinoco basin contributes more nitrogen to the Caribbean Sea that the other watersheds.

Refer to presentation in Annex 3.2.

Discussion:

Q: Are true economic costs of pollution being quantified including emission of greenhouse gases and are there any experiences in terms of effecting change at the country level using such information? **R:** In the Caribbean this is not the case for the most part. In the Netherlands such studies were undertaken; these could be explored.

At the 7th GEF International Waters Conference (IWC) that was held in Barbados there was attention paid to the cost of pollution in presentations delivered by projects in the GEF International Waters portfolio. The World Resources Institute (WRI) has also done work in this area in certain parts of the world. There is an emerging resolution at UNEA around the nutrient management issue and quantifying the benefits of good nutrient management practices.

The private sector dimension related to wastewater treatment and reduction of nutrient loads must be considered. It is a good idea to design treatment solutions that are more stringent than the regulatory standards so as to give a better chance at meeting compliance and environmental requirements. In general there has to be a policy shift to drive more focus on addressing nutrient diversion from wastewater streams across treatment facilities.

Training of farmers to use fertilizers correctly is an important element of addressing the nutrient challenge. **Q:** Have fertilizer supply companies been involved in UNEP's work in the region? **R:** Private sector partnerships were established under the GEF-Reducing the Pesticides Runoff to the Caribbean Sea (RepCAR) Project; CropLife was involved under this initiative. Private sector investors in the agricultural sector provided co-financing to work in field with farmers under the RepCAR Project. Similar collaborations can be sought and developed based on the lessons learned from this project.

The health effects of nutrient effects in the environment must be emphasized so that it could drive public sector policy and making the needed investments. This seems to be a gap in the Caribbean that can be used to promote and develop the programme.

Overview of status of the Caribbean Platform – review of 2013 launch event

Dr. Clement Lewsey, NOS-NOAA

The Caribbean Nutrient Platform was launched in Trinidad and Tobago in May 2013 and was attended by several countries of the Caribbean along with technical regional agencies. A key aim of the launch meeting was to provide recommendations on the process to advance sustainable nutrient management in the region. Attending countries provided brief accounts of national perspectives in terms of issues and challenges. The technical agencies in attendance provided inputs on their inputs of relevance to the nutrient challenge; these included work by NOAA and special initiatives such as the GEF-REPCar Project, work on best management practices to reduce livestock pollution and policy processes through demonstration such as the Northwest Coastal Water Quality Demonstration Project in Saint Lucia.

The meeting split into breakout sessions to consider the areas of focus for the Caribbean Platform and the main elements of a mid-term workplan. The main recommendations included:

- Seek endorsement of the Regional Platform, supported by regional technical experts on nutrients management as a voluntary mechanism to assist government action
- Define the mandate and operation of the Platform, outlining goals, structure, plans of action and partners of the Platform. The work of the Platform should be organized around thematic groups (e.g. agriculture; ports and shipping; tourism; mining; solid waste management, etc.) comprising representation from countries.
- Adopt a formalized approach through each respective government - build on existing linkages via the LBS Protocol (Cartagena Convention)
- Identify resources (financial and human) to carry out work programme
- Set up an administrative body / Secretariat for purposes of communicating and coordinating, whereas it was recommended that UNEP/CAR serve as the Secretariat.

Refer to presentation in Annex 3.3.

Discussion:

Following the 2013 launch meeting a number of governments received the meeting report. At that time UNEP Car/RCU requested that countries nominate focal points for the Caribbean Platform. However there remained some uncertainty over the points of contact and the process was never fully completed. This has led to some slip in securing commitment from governments. This process needs to be revisited.

An action plan is required to treat with industrial sources of nutrients which are major contributors, apart from domestic and agricultural sources. This has not been a prominent issue and should be addressed by inclusion of fertilizer manufacturing industries, supply sectors and other relevant industries in the GPNM.

The effectiveness of regional monitoring systems to support any interventions in nutrient management and wider pollution assessment should be considered. The State of Convention Area

Report (SOCAR) is the mechanism for undertaking this type of evaluation. The CLME Project is seeking to develop similar capabilities to contribute to and strengthen assessment efforts. Sustainability in assessments will rely on the partnership networks.

It must be recognized that monitoring still remains a challenge. Many countries do not publicly release environmental data particularly on the status of coastal waters due to perceived potential back-lash from the hospitality sector. There have been many attempts to make the policy shift primarily through environmental health departments in the interest of making investments in pollution control, however the success of such efforts have been marginal. There needs to be greater emphasis placed on the use of strategic economic entry points to drive policy; again this calls for the need to engage the private sector and seek out constructive ways to maintain engagement.

National overviews on relevant emerging issues, impacts, response measures, governance frameworks and challenges

Country delegates

Antigua & Barbuda

Laël Bretide-Josiah, Antigua & Barbuda Fisheries Division Laboratory

The main issues for the country is discharge of untreated domestic wastes into waterways and eventual entry to the coastal environment. Agricultural runoff is also an issue. Many of the hotels use wastewater treatment plants but in many cases they do not work effectively and there is inconsistent treatment. There are also problems with unregulated disposals from yachts and cruise ships in nearshore waters.

The 2015 Environmental Protection and Management Act is a key legal instrument that concerns land-based pollution. It adopts a sustainable island development approach and incorporates the LBS Protocol. The implementation of the law is overseen by a technical advisory group drawn from the key regulatory agencies in the country. There are challenges related to monitoring methods particularly related to nutrient loading in sea water. Other issues include limited public awareness, the need for continual lab capacity strengthening and consistency of surveillance efforts. These areas are where the country needs support from regional agencies and within the framework of the Caribbean Platform.

Refer to presentation in Annex 3.4.

Colombia

Luisa Fernanda Espinosa - INVEMAR

There is a National Network for Inter-Institutional Cooperation (REDCAM) that is based on a group of regional environmental authorities throughout the country. These authorities are supported by research centres and institutes. INVEMAR serves to consolidate information for environmental status assessment of the marine environment. The main objective of REDCAM is

water quality assessment of the coastal and marine environments of the country. Under REDCAM some 236 stations on the Caribbean coast, including estuaries, marshes, beaches, lower basin rivers generate monitoring data. Parameters assessed include ammonium, nitrates, nitrites and phosphates.

In general the highest concentrations of nutrients are recorded during the rainy season. Higher concentrations are recorded in the stations located in the principal coastal cities (Santa Marta, Barranquilla and Cartagena), due to domestic waste water discharges. Nutrient concentrations have remained within similar ranges between the period 2001 to 2016, explained by the fact that the country has a low coverage of sewerage. There have been improvements in the coastal areas of Cartagena, Santa Marta and San Andres where marine outfalls where installed.

Refer to presentation in Annex 3.5.

Costa Rica

Leonardo Cascante, Departamento de Desarrollo Hídrico

The issues of concern for the country is climate change, the pressures to increase food production in relation to managing crops diseases and realizing effective coordination among institutions. A monitoring system for surface water bodies and aquifers and digital database has been put in place. There has been investment in the creation of a legal framework to address pollution, along with initiatives to raise awareness on climate change and wastewater management.

The Water Act (1942) is the main instrument that has support regulations on the operation of wastewater treatment plants, effluent disposal and reuse, along with economic instruments governing wastewater discharge to water bodies. A key challenge is that the New Water Act and LBS Protocol has to be approved by legislators. There needs to be the creation of national regulations on non-point sources of pollution and emerging pollutants. Assistance is required mainly in the areas of capacity building on best practices for nutrient management, raising awareness on the problems and in the implementation of technical regulations.

Refer to presentation in Annex 3.6.

Dominican Republic

Antony De Oleo - Analista de Gestión Ambiental

The national circumstances in the country remain similar to what which was reported in the 2013 meeting. There still remain problems with lab capacity for monitoring and there is not enough coverage to provide adequate assessment of nutrient loading into the marine environment. A key challenge is the fact that there is no national reference laboratory. This presents an issue in terms of certifying private labs; there are between 12 and 15 labs and they should be certified by a single authority so as to be able to gain confidence in data being produced by these labs. Another issue is that wastewater operators typically have no certification

and this has implications for the quality of wastewater discharges. There is recognized need for a training centre or centres. In 2004 the environmental agency created a training programme for wastewater operators and work is ongoing to strengthen the programme. There is a national wastewater policy, however it does not include considerations for reuse. This limitation is recognized and recent work has commenced mainly in terms of use for irrigation; there are no specific standards at this time however.

Haiti

Exil Lucienna - Droit de l'Environnement et Dèveloppement

There are not enough labs working on pollution monitoring and assessment in the country. There are university and some private labs but without needed capacity in this area. It is desirous to connect with other countries to help build Haiti's national capacities. Work needs to continue on building the information baseline for the country. There also has to be effort invested in raising awareness so as to gain support and effect change.

Trinidad & Tobago

Daryl Banjoo - Institute of Marine Affairs

Industrial pollution is a major concern for the country; ammonia production and its discharge to the marine environment is an issue particularly in the Gulf of Paria which is an environmentally sensitive area. Trinidad and Tobago has in place key legislative and regulatory frameworks for pollution control and the management of wastewater/nutrients. These include the Environmental Management Act (2000) and associated Certificate of Environmental Clearance Rules (2001). Trinidad and Tobago has in place a National Environmental Policy (2006) which guides environmental sustainable development. There is a draft ICZM Policy Framework (2015) that outlines strategies and an action plan. Other important instruments include the Water Pollution Rules (2001, 2006) that deals with the specification for the effluent from industrial processes discharged into the Environment. There is also a standard for the specification of liquid effluent discharges from Domestic Wastewater Treatment Plants into the Environment. A voluntary Trade Effluent Standard was introduced in 2015 for the discharge into Public Sewers.

There is need to step-up enforcement of existing laws and regulations (Water Pollution Rules) and the increased implementation of appropriate technologies to deal with untreated toxic waste. Adoption of treatment technologies should be mandatory for industries. The waste discharge permitting system and the polluter-pays framework needs to be improved along with updating the fee structure. Addressing the issue is compounded by a fragmented approach to industrial wastewater management.

The main challenges faced by the country are due to the relatively low percentage of proper sewerage treatment coverage, the typical malfunctioning of a majority of sewerage treatment

plants, combined with poor maintenance, discharge of untreated industrial effluents into public sewers, along with poor agricultural practices that result in nutrient runoff and land degradation. Although Trinidad and Tobago has in place laws and regulations in environmental management, limited enforcement and low levels of information and awareness results in weak and ineffective policies. The government of Trinidad and Tobago in 2013 secured an IDB loan (US$246 million) for the upgrade of wastewater management.

Refer to presentation in Annex 3.7.

Discussion:

It seems that the recommendations for minimizing industrial discharges have been generally ignored by operators within the Point Lisas Industrial complex. However many companies have obtained ISO 14001 certification and are making necessary changes. These companies need to incorporate best available treatment technologies to lower pollution levels entering the marine environment.

In the Dominican Republic although there are significant problems with agriculture and pollution, progress is being made. The agriculture department has been offering assistance in addressing wastewater discharges whereby producers are being encouraged to use treatment lagoons and recycling manure to augment nutrient return to crops.

At the regional level UNEP Car/RCU has been active in promoting initiatives such as SOCAR so as to mobilize resources for lab capacity strengthening to enable reporting. On UNEP Car/RCU's website there is a searchable database on lab capacities for countries in the region. Additional countries have been expressing interest in participating in the CReW2 Project with the opportunity to help build laboratory capacity.

Not much mention was made of the recreational yachting sector; this should be taken into account. The IMO has done work on pollution from vessels but in the main has to be translated to local implementation. In the British Virgin Islands some relevant practices have been adopted. In the case of yachts there is a loophole in respect to provisions under MARPOL as these types of vessels generally fall outside these provisions. This can also be a sensitive issue in the tourism and hospitality sector in terms of enforcing compliance. It was noted that the Caribbean is rather fragmented in approaches to deal with the issue; there needs to be unity in policy.

Relevant Regional Level Initiatives
Overview of work of regional partners

Caribbean Water And Wastewater Association (CWWA)
Patricia Aquing, CWWA Secretariat, Trinidad & Tobago

The CWWA is the largest professional association for water, wastewater and waste management in the Caribbean comprising of individual members and those

representing water and waste management utility companies, private sector and other professional associations. The organization has been engaged in research, capacity building, technical cooperation, supporting governance arrangements for regional initiatives in water and wastewater management and exchange of expertise and information. The CWWA collaborated jointly with CAWASA in hosting the Caribbean Water Operators Partnership (CariWOP) and is currently in discussions with UNEP GPA Global Wastewater Initiative (GW^2I) in terms of hosting its Caribbean Platform. The organization has co-organized the High Level Forum of Caribbean Ministers Responsible for Wastewater and makes representation at CARICOM COTED for water, wastewater and waste management. CWWA's flagship event is the Annual Conference that attracts over 400 persons including approximately 60 exhibitors from within and outside the region.

CWWA could offer collaborative opportunities for the work of the GPNM Caribbean Platform in supporting research and studies in wastewater around nutrient management within an established professional forum (such as the Annual Conference), securing political and policy entry points through the High-Level Forum to advance for advocacy on the subject through governments and development partners. The CWWA offers a network of support for work of the Platform through its membership amongst water utilities, individuals and the private sector.

Refer to presentation in Annex 3.8.

Global Water Partnership-Caribbean (GWP-C)

Patricia Shako, Natalie Boodram, GWP-C Secretariat, Trinidad & Tobago

GWP-C is a non-governmental organization representing one of thirteen regions of the Global Water Partnership Organization (GWP-O) with the mandate for building capacity and knowledge exchange to support Integrated Water Resources Management (IWRM) in the region. GWP-C's partners include water utilities, government agencies, private sector, NGOs, consultants, youth groups and universities. There are active programmes in regional and national cooperation for IWRM under which include initiatives such as the Water, Climate and Development (WACDEP) Programme, the Rainwater Harvesting (RWH) Programme and the Integrated Urban Wastewater Management (IUWM) Programme. There is a Water Policy, Legislation and Governance Programme that supports countries to develop and implement water policies, roadmaps, and master plans. GWP-C provide a platform for Ministerial level discussions on IWRM in conjunction with the Caribbean Water and Wastewater Association (CWWA).

Refer to presentation in Annex 3.9.

Caribbean Large Marine Ecosystem (CLME)

Laverne Walker, CLME+ Project Secretariat

The CLME Project supports improved management of the living marine resources within the Wider Caribbean Region through an Ecosystem-Based Management (EBM) approach. CLME+ titled "*Catalyzing Implementation of the Strategic Action Programme for the Sustainable Management of shared Living Marine Resources in the Caribbean and North Brazil Shelf Large Marine Ecosystems*" is the implementation of the 10-year Strategic Action Plan (SAP), an agreed program of interventions which will include policy, legal and institutional reforms, conservation measures and pollution control. The SAP was based on a Transboundary Diagnostic Analysis (TDA) that identified priority transboundary problems that affect the Caribbean Large Marine Ecosystem (CLME) and Adjacent Regions including the Brazilian Shelf. One of these priority areas is pollution, of which nutrient loading is of significance. The SAP is to target investments to reduce the nutrient loading to the marine environment.

Caribbean Public Health Agency (CARPHA)

Shermaine Clauzel, CARPHA Environmental Health & Sustainable Development Department, Saint Lucia

CARPHA has recently executed a project on defining waste control areas in St Lucia. The project seeks to set out a methodology to designate waste control areas and define management controls regarding the disposal of liquid and solid waste based on sensitivity criteria. The project will build on a long series of pollution control initiatives the agency has undertaken that will be of high relevance to nutrient loading and pollution of coastal waters. CARPHA (then the Caribbean Environmental Health Institute) was a co-executing agency along with UNEP Car/RCU in the execution of the GEF-Integrating Watershed and Coastal Areas Management (IWCAM) Project. There was significant work undertaken across participating Caribbean countries in assessment and monitoring of pollution, building of capacities including laboratory capabilities and strengthening policy support. CARPHA will be engaged with the IWCAM successor project, the GEF-IWEco Project and anticipates continued support through this engagement to the work of the Caribbean nutrient platform.

Food and Agriculture Organization (FAO)

Lystra Fletcher-Paul, FAO, Trinidad & Tobago

The FAO's mandate is achieving food security for all by ensuring people have regular access to enough high-quality food to lead active, healthy lives. The FAO facilitates information and knowledge sharing, provides policy advice, technical assistance and expertise, supports countries in preventing and mitigating risks and provides a neutral forum to facilitate dialogue in development of the agriculture sector. In terms of relevance to the regional platform on nutrient

management, Strategic Objectives (SO) 2 and 4 are closely aligned. SO-2 seeks to increase and improve provision of goods and services from agriculture, forestry and fisheries in a sustainable manner. In this regard focus is on principles of sustainable land management, integrated plant nutrition management, water management (and water information systems) and pollution reduction. SO-4 focuses on enabling inclusive and efficient agricultural and food systems; this entails strengthened value chains and enhanced food safety. A related relevant area of FAO's programme in the Caribbean includes sustainable crop intensification. The FAO is an executing partner of the CLME+ Project where there is a strong component related to nutrient load pollution.

Refer to presentation in Annex 3.10.

Proposed workplan for the regional platform

Dr. Christopher Cox, UNEP

A draft operational plan (for a 2-year short-term timeframe) for the platform was prepared by the GPNM Secretariat based on the first meeting of the platform in 2013 in Trinidad & Tobago. This was contained on Page 9 in the Draft Proposal for the Operationalization of a Caribbean Platform for Nutrient Management (CPNM).

The activity areas proposed by the participants (from the 2013 meeting) were reformulated under the four broad work areas of the GPNM so as to achieve consistency with the platforms being shaped and to be shaped in other regions.

The draft workplan comprises of the following main activities:

- Solicit official national buy-in and commitment
- Designation of the CPNM Secretariat
- Formal constitution of the Platform
- Convene first working meeting of the Platform
- Formulate national chapters/steering committees
- Awareness-raising at the national level
- National work planning
- Define national plan of action. Take stock of allied interventions seek out opportunities for new initiatives
- Meeting of regional science agencies to internalize work agenda; coordinate efforts
- Project formulation and resource mobilization for national and regional-level actions
- Develop first programme of work
- Review of First Programme of Work and preparation of Second Programme of Work
- Meeting of Platform - review second programme of work
- Participation of Platform at the GPNM steering committee meeting
- Participation of Platform at the Inter-Governmental meeting of the Cartagena Convention
- Participation and the annual general meetings of relevant regional fora

- Contribution to a web presence within the GPNM web portal

This meeting was invited to comment on the elements of the draft with a view to discuss in the Day 2 deliberations. Emerging issues should be considered in the discussions that could be picked up in rolling out activities of the platform.

Refer to presentation in Annex 3.11.

Discussion:

In the launch meeting of the Platform in 2013, the question of representation on the regional platform was raised but this process was never formalized subsequently. The meeting leaned toward UNEP Car/RCU taking up this role but recognizing the multi-stakeholder nature of the issue it would have been useful to have engaged other entities that could assist with the work of the platform. An immediate question that has to be addressed is how the GPNM platform can meets needs at the national level; what services can it provide to stakeholders.

The issue of sargassum proliferation as related to wider geographic scale nutrient loading into the Atlantic could be one of the 'unifying' agendas that the GPNM platform could contribute toward in terms of bringing partners from global regions together such as from the Amazon and Congo river basins. This can complement existing efforts being carried out in the region. The Regional Activity Centre for Biodiversity based on Guadeloupe has already established a sargassum network and is collaborating with other centers in the Caribbean such as UWI-CERMES. A great deal of science has been generated on the subject but there is a sense that the knowledge and profile on the issue may not be getting out at the global level. The Caribbean Large Marine Ecosystem SAP Implementation Project (CLME+) intended to widen the geographic scope to include Brazil which will be helpful in consideration of the issues around nutrient loading from the Amazon and relation to the sargassum among other issues.

It is important to develop and implement a good communications strategy to help foster buy-in among external stakeholders to assist their understanding of the relationships associated with the nutrient cycle, consequences and impacts and roles in addressing the nutrient challenge.

DAY 2

Reflections on Day 1:

The issue of not being able to publish data particularly on coastal water quality in the public domain constitutes an impediment to driving action to address source issues that impact on water quality. The approach in Colombia in making such monitoring data publicly available was noted and should perhaps be a model that can be aspired to. In Colombia it is policy enshrined in law that all research and resultant monitoring data that is funded from public funds must be made available for public access and scrutiny. Jamaica also has a freedom of information policy that can facilitate reporting on environmental quality status in the public domain.

In many Caribbean countries laboratory capacities remain a major concern; this compromises the ability to do routine state of environment assessments and reporting, which then presents challenges to lend to evidence (indicator) based decision making.

Within the context of the Wider Caribbean under the Cartagena Convention and the LBS Protocol there is a legal obligation by signatory parties to report under the State of the Convention Area Report (SOCAR) mechanism and countries have been reporting, however it should be considered how does raw reported data gets packaged and transformed appropriately, so that it is objective and meaningful to decision making. In light of the sensitivities of data publication in the public domain, discussions continue within the Cartagena Convention framework as to how to package information in a way so as to not to cause undue alarm and that it is effective in supporting decision making.

The matter of data and information access is one that needs to be brought to high-level policy makers and ministers. The issue needs to be contextualized in terms of the actual and potential social and economic implications of doing nothing where data is not used to drive decision making.

There are opportunities to build on the reach of the GPNM through paying attention to the sargassum issue. The potential economic benefits of washed-up sargassum is being recognized that may turn the problem into market opportunity. The upstream at-source issue with nutrient loading from land-based activities is of clear relevance to the GPNM.

Draft Platform Operational Plan proposal

Dr. Clement Lewsey, NOS-NOAA

The aim is to orient the work of the Caribbean platform so that it consistent with Global GPNM work areas. This will also harmonize the work of this platform across other regional platforms.

The four proposed main work areas (that are inter-connected) are:

1. **Knowledge generation:** Create and/or develop regional knowledge-base on policy experiences, identify key national research needs to fill gaps and support the development of targets / indicators.
2. **Extension and technical services:** Facilitate / develop new approaches, projects on sustainable nutrient management, contribute to dissemination of knowledge and experiences to support actions, facilitate exchange of scientific data, methodologies and research applications.
3. **Outreach and advocacy:** Develop networks among members to establish and strengthen communities of practice, Identify, review and compile best practices and disseminate through web and face-to-face meetings/workshops.
4. **Governance, partnership and network development:** Facilitate dialogues for policy reform in support of technological and management innovation to promote nutrient use efficiency, support countries in the development of required legal/regulatory instruments and fiscal incentives to enhance the ability to make and sustain investments in nutrient management and pollution control.

Need to consider the following in shaping the Platform:

- Priority areas for intervention
    - What are the main/emerging issues of interest
- Contribution of the Platform to ongoing/planned national and regional efforts (mainstreaming & synergies)
    - What is the 'value-added'?
    - Identify key relevant initiatives
    - Linkages to existing frameworks and the global SGD agenda
- Building advocacy
    - Core messages to establish relevance and gain buy-in
- Partnership building
    - How to enlist partners; sectors of interest - wastewater, hospitality, agriculture, fisheries
- Lead national government focal point on the GPNM (global level)
    - Desirous to designate a lead government on behalf of Caribbean region; proactive support to drive policy; serve on global GPNM
    - Rotation of platform chairmanship
    - DOES NOT HAVE TO BE GOV'T AGENCY TO CHAIR
- Regional host agency arrangements/expectations
    - Desirous to have a node for Caribbean – to be supported by the GPNM Secretariat
- National representation on Platform national focal point designates, roles/expectations
    - How best can national entitles feed into process?
- Non-governmental representation and roles
    - How best can these entities support?
- Inter-agency cooperation mechanisms
    - How to gain synergy among various agendas; effectively uptake best practice and draw on experiences

The meeting was tasked to consider the strategic directions from the first platform meeting, review the draft proposal presented in this meeting, validate activities, reformulate as appropriate and align along the 4 core work areas.

Refer to presentation in Annex 3.12.

Discussion:

The most importance consideration is defining clear roles among the actors within the platform. This will need to be established based on what the partners bring to the table and expectations of what the platform is expected to deliver. This must be made clear.

The best approach is to identify and focus on 'quick wins'. There are likely existing opportunities through ongoing initiatives that can be linked to almost immediately and aligned to the work of the GPNM.

The question of identifying the national entry points is important. Given the nature of the agenda which for the Caribbean will be largely within the purview of nutrient loading and pollution of coastal waters it can rest within the responsibility of the LBS Protocol focal points. However it is recognized that the platform will need to include entities that have responsibility for 'up-stream' source control, hence the need for bringing contact points for agriculture and wastewater management. This may necessitate designation of multiple focal points, or arrive at an arrangement

where there is an established coordination from the country level so that there is a seamless feed-in to national representation on the platform.

It is advised that in figuring out the administrative configuration of the platform not to get bogged down in institutional issues and making it overly complex. The approach may be to identify two or three issues that are of common relevance to countries and use the appropriate national designate that can exert the relevant influence. The structure of the platform has to 'follow function'.

Interactive plenary session:

The meeting participants were asked to list top three issues of relevance to the nutrient management agenda in the region from their (national and agency) perspective. The results are presented in the following table.

Identified priority areas	**GPNM Key Work Areas**			
	1. Knowledge generation *(assessment and monitoring)*	**2.** Technical services *(Best practices – agriculture; wastewater mgmt.)*	**3.** Governance and policy	**4.** Outreach and advocacy
Countries				
Antigua & Barbuda				
Strengthen lab capacity and train personnel	O			
Train field extension personnel		O		
Develop a communications strategy to raise local awareness				O
Develop a national programme for improved nutrient management			O	
Strengthen national inter-agency cooperation			O	
Colombia (INVEMAR)				
Assist design and develop regional projects to improve knowledge sharing on nutrient management	O			O
Mobilize resources to support work of scientific personnel				
Contribute to ratification of the LBS Protocol			O	
Costa Rica				
Build capacity to implement best practices for nutrient management		O		
Invest in modelling approaches to identify nutrient load hotspots in agricultural areas	O			
Advance LBS Protocol ratification efforts			O	
Dominican Republic				
Strengthen lab capacity to support data capture associated with nutrient loading	O			
Strengthen financing / resource mobilization efforts			O	
Invest in ecosystems restoration		O		
Haiti				
Advance process toward LBS Protocol ratification			O	
Train relevant stakeholders at all levels (farmers to technical government personnel for improving nutrient management)		O		
Trinidad & Tobago (EMA)				

Identified priority areas	**GPNM Key Work Areas**			
	1. Knowledge generation *(assessment and monitoring)*	**2.** Technical services *(Best practices – agriculture; wastewater mgmt.)*	**3.** Governance and policy	**4.** Outreach and advocacy
Develop indicator baseline to support state of environment assessments	O			
Identify experts (regional and international) to inform projects and programmes of relevance to nutrient management		O		
Trinidad & Tobago (IMA)				
Update legislation for pollution reduction			O	
Make available best management practices (e.g. new and emerging technologies)		O		
Invest in demonstration projects for specific target groups (e.g. industrial sector)		O		
Agencies				
CARPHA				
Advance health considerations in nutrient management				O
Invest in economic valuation assessments related to nutrient management	O			
Strengthen partnerships to share best practices			O	
Enhance resource mobilization (linked to economic valuation)			O	
CWWA				
Support advocacy at political and technical levels and enhance stakeholder engagement especially in the tourism sector				O
Improve the research base and sharing of data on water quality	O			
Build capacity and carry out training in relevant areas		O		
Build the links with GPA Global Wastewater Initiative (GW^2I) in launch of a Caribbean Platform for wastewater			O	
GEF-CLME+ Project				
Support establishment of a baseline on nutrients management	O			
Assist in priority setting and development of a strategic action plan for improved nutrient management and accompanying investment portfolio			O	
Contribute to bridging the science-policy interface	O			
GWP-C				
Contribute to bridging the science-policy interface	O			

Identified priority areas	**GPNM Key Work Areas**			
	1. Knowledge generation *(assessment and monitoring)*	**2.** Technical services *(Best practices – agriculture; wastewater mgmt.)*	**3.** Governance and policy	**4.** Outreach and advocacy
Improve the data and information baseline to guide policy decisions	O			
Improve coordination of resource mobilization and use of resources			O	
Integrate ecosystem valuation related to the impact of wastewater/nutrient loading	O			
IICA				
Build the baseline; identify assessments undertaken, noting impacts and knowledge gaps	O			
Improve knowledge management and enhance sharing experiences; policies and models	O	O		
Sensitize and deepen advocacy to stakeholders in the agricultural sector on the impacts of their activities				O
UNEP Sub-regional Office				
Raising the profile of UNEP's work in nutrient management and other relevant areas			O	
Advance the agency programme of work, UNEP resolutions and their implementation			O	
Mobilize resources for the regional platform			O	
Collective priority areas (from plenary discussion)				
Promote the platform to the general public				O
Develop the communications strategy for the platform				O
Promote appropriate technologies - use of animal and human bio-solids		O		
Promote best practices and alternative options for wastewater use		O		
Strengthen and support ICZM approaches			O	

The following is a clustering of common country priority areas grouped by the GPNM key work areas and the areas of possible support by the agencies based on capabilities aligned to the key work areas **(this was done post-meeting)**

Relative implementation timeframes indicated as follows: ● short-term; ◉ medium-term; ○ long-term.

Re-ordered (and clustered) priority areas	**GPNM Key Work Areas**			
	1. Knowledge generation	**2.** Technical services	**3.** Governance and policy	**4.** Outreach and advocacy
Country priority areas				
Strengthen laboratory and human resource capacity for monitoring	○			
Develop indicator baseline to support assessments	◉			
Invest in assessment approaches to identify nutrient load hotspots and impacts	○			
Assist design and develop of regional projects to improve knowledge sharing on nutrient management	◉			
Build policy and technical capacity to implement best practices		○		
Identify and make available best management practices (e.g. new and emerging technologies; wastewater use, use of animal and human bio-solids)		●		
Identify experts (regional and international) to support work of the platform		●		
Develop projects and seek support for ecosystem affected restoration		◉		
Strengthen national inter-agency cooperation mechanisms			○	
Mobilize resources to support national and regional initiatives			◉	
Develop national programmes for improved nutrient management			○	
Contribute to ratification of the LBS Protocol			○	
Update/strengthen legislation for pollution reduction			○	
Strengthen and support ICZM approaches			○	
Develop and execute regional and national communications strategies to raise awareness				●
Promote the platform to the general public				●
Develop the communications strategy for the platform				●
Agency contributions (will need to update in consultation with other agencies not present at meeting)				
Invest in economic and ecosystem valuation assessments related to nutrient management; wastewater/nutrient	CARPHA;			

Re-ordered (and clustered) priority areas	**GPNM Key Work Areas**			
	1. Knowledge generation	**2.** Technical services	**3.** Governance and policy	**4.** Outreach and advocacy
loading	GWP-C			
Improve the research base and sharing of data on water quality to guide policy decisions	CWWA; GWP-C			
Support establishment of a baseline on nutrients management; identify assessments undertaken, noting impacts and knowledge gaps	CLME+; IICA			
Contribute to bridging the science-policy interface	CLME+; GWP-C			
Improve knowledge management and enhance sharing experiences; policies and models	IICA			
Build capacity and carry out training in relevant areas		CWWA		
Strengthen partnerships to share best practices			CARPHA	
Enhance coordination of resource mobilization (linked to economic valuation)			CARPHA; GWP-C	
Build the links with GPA Global Wastewater Initiative (GW^2I) in launch of a Caribbean Platform for wastewater			CWWA	
Assist in priority setting and development of a strategic action plan for improved nutrient management and accompanying investment portfolio			CLME+	
Raising profile of UNEP's work in nutrient management and other relevant areas			UNEP	
Advance the agency programme of work, UNEP resolutions and their implementation			UNEP	
Mobilize resources for the regional platform			UNEP	
Advance health considerations in nutrient management				CARPHA
Support advocacy at political and technical levels and enhance stakeholder engagement especially in the tourism and agricultural sectors				CWWA; IICA

Based on the foregoing discussions the draft workplan that had been circulated in advance of the meeting was presented and participants commented on the main elements of focus for a short-term (2-year) work programme for the Platform around the priority issues identified. The revised proposal captured general agreement on activities and process, with further post-meeting refinements provided by the GPNM Secretariat. The revised work programme is presented below.

Short-term (2-year) Work Plan for the Caribbean Platform for Nutrient Management

Activities	Means and approaches	Year One		Year Two		Lead responsibility and core partners
		First half	Second half	First half	Second half	
Solicit official national buy-in and commitment	Via formal report, disseminate workshop reports (from the May 2013 and February 2016) to stakeholders in attendance and directly to corresponding officials agency heads along with proposal for Platform establishment					UNEP CEP
Designation of the CPNM Secretariat	Through direct negotiation with countries gain 'formal' consensus on the designation of UNEP/Caribbean Environment Programme (CEP) as the regional secretariat for the Platform					UNEP CEP; UNEP GPNM Secretariat
Establish the administrate framework	Establish an Executive Committee of the CPNM based on volunteers from engaged countries through solicitation by the UNEP/GPNM Secretariat, supported by UNEP/CEP					UNEP CEP; UNEP GPNM Secretariat
Designate the platform technical and policy support network	Identify experts (regional and international) to support work of the platform					
Convene the first working meeting of the Platform	Develop terms of reference, establish the rules of procedure, set work priorities, objectives and targets, determine final constituency of Platform. This may likely be a virtual meeting (via GoTo Meeting) or perhaps held in conjunction with an existing scheduled event.					CPNM Exec Comm; UNEP CEP; UNEP GPNM Sec
Assemble existing knowledge and make available online	Identify and make available best management practices (e.g. new and emerging technologies; wastewater use, use of animal and human bio-solids). Resources are to be hosted on the GPNM website at www.nutrirntchallenge.org and the CEP website at http://www.cep.unep.org/ as well as other partners.					CPNM Exec Comm;
Develop the platform communications strategy	Develop a communications strategy for the Platform, based on the global GPNM partnership. Make clear the target audiences (policy makers, private sector in the area of tourism and agriculture, water and wastewater sectors)					CPNM Exec Comm;
Roll-out of awareness-raising activities	Execute initial series of regional and national sensitization events within existing fora/events among the partners agencies based on resources material provided by the GPNM secretariat.					CPNM Exec Comm; CWWA; GWP-C; IICA
Convene meeting of regional science and policy experts to 'internalize' work agenda; coordinate efforts	Convene a face-to-face workshop amongst lead regional agencies and national designates to further validate common areas of work; take stock of progress and relevant initiatives/work programmes (avenues to 'internalize' the work of the platform in agency workplans) and identify gaps that will require further funding. Develop indicative investment proposal/concept note for resource mobilization as outcome from					CPNM Exec Comm; UNEP CEP

Activities	Means and approaches	Year One		Year Two		Lead responsibility and core partners
		First half	Second half	First half	Second half	
	this workshop. This can be programmed through UNEP-AMEP work programme (e.g. SOCAR; projects)					
Project formulation and resource mobilization for national and regional-level actions	Prepare funding proposal(s) (through contracted services) to source funding and submit to prospective donors. This should include resources to contribute to Secretariat support.					CPNM Exec Comm; UNEP CEP; UNEP GPNM Sec.
Review of progress and preparation of Second Programme of Work	Review of 1st PoW with national and regional stakeholders and preparation of 2nd PoW. This will be based on progress within the 1st PoW (possibly through a virtual process)					CPNM Exec Comm
Meeting of Platform - review second programme of work	Meeting of the Platform members to finalize review of the 1st PoW and formally endorse the 2nd PoW. This could be a face-to-face meeting (possibly held within an existing forum to be efficient) or done virtually if funding is limited.					CPNM Exec Comm
Participation of Platform at the GPNM steering committee meeting	Chair/lead of Platform attend the GPNM Steering Committee to report on progress on the 1st PoW and highlight strategic outlook of the 2nd PoW, support requirements and advances made in resource mobilization. This may be virtual or face-to-face depending on resource availability.					UNEP GPNM Sec.; CPNM Exec Comm
Participation of Platform at the technical and policy segments of the Inter-Governmental meeting for the Cartagena Convention	Chair/lead of Platform presents the Caribbean Platform to highlight progress made under the 1st PoW and outlook. The critical emphasis will be on partnership building and strengthening alliances with meeting attendees, seeking out opportunities for resource mobilization and coordinate efforts. This should be at the LBS Protocol Scientific and Technical Advisory Committee (STAC) and/or the Inter-Governmental Meeting.					UNEP CEP; CPNM Exec Comm
Participation and the annual general meetings of relevant regional fora	Chair and/or designates of the Platform participate at meetings of the Caribbean Week of Agriculture, the Caribbean Water and Wastewater Association, the Caribbean Water and Sewage Association, the Caribbean Alliance of Sustainable Tourism. This will be to highlight progress made under the 1st PoW and outlook. The critical emphasis will be on partnership building and strengthening alliances with meeting attendees, seeking out opportunities for resource mobilization and coordinate efforts					CPNM Exec Comm; UNEP CEP; UNEP GPNM Sec.; CWWA; CAWASA; others
Contribute to a web presence within the GPNM web portal	A node on the GPNM web portal 'The Nutrient Challenge' to be established that will host all the relevant public knowledge information about the Platform. Consideration to be given to administration of the content and management of user needs and expectations					CPNM Exec Comm; UNEP CEP; UNEP GPNM Sec

Activities	**Means and approaches**	**Year One**		**Year Two**		**Lead responsibility and core partners**
		First half	Second half	First half	Second half	

Governance arrangements of the Platform (facilitated discussion)

Facilitated by Dr. Greg Crosby, GPNM

A key question is whether or not the leadership of the platform and the national designates should be exclusively from formal government. It may be considered that this may not be the case as some countries may opt to propose designates who represent based on qualification/interest rather than job assignment in a government institution. It may be advised to leave the choice up to the country but maybe best to get endorsement from an appropriate national agency so at least there is some level of 'national formalization'. It is agreed that it is best to avoid the possibility of representation becoming overly politicized; keep the spirit of a network, yet anchored in some level of national endorsement.

Another question is that of the level of required stakeholder involvement. How wide should representation be? Should this be open-ended? This will have implications in the process of bringing people together and managing the group. These considerations will be related to expectations of what the platform will deliver to the countries in terms of services. Roles can then be appropriately defined that then determines the level of engagement. It is acknowledged that it may be more of a challenge to get private sector involved on the platform unless there is some perceived direct economic benefit. The hospitality sector will have vested interest given the very direct impacts nutrient pollution has on the quality of recreational waters; the case for engagement will still need to be sold to this sector.

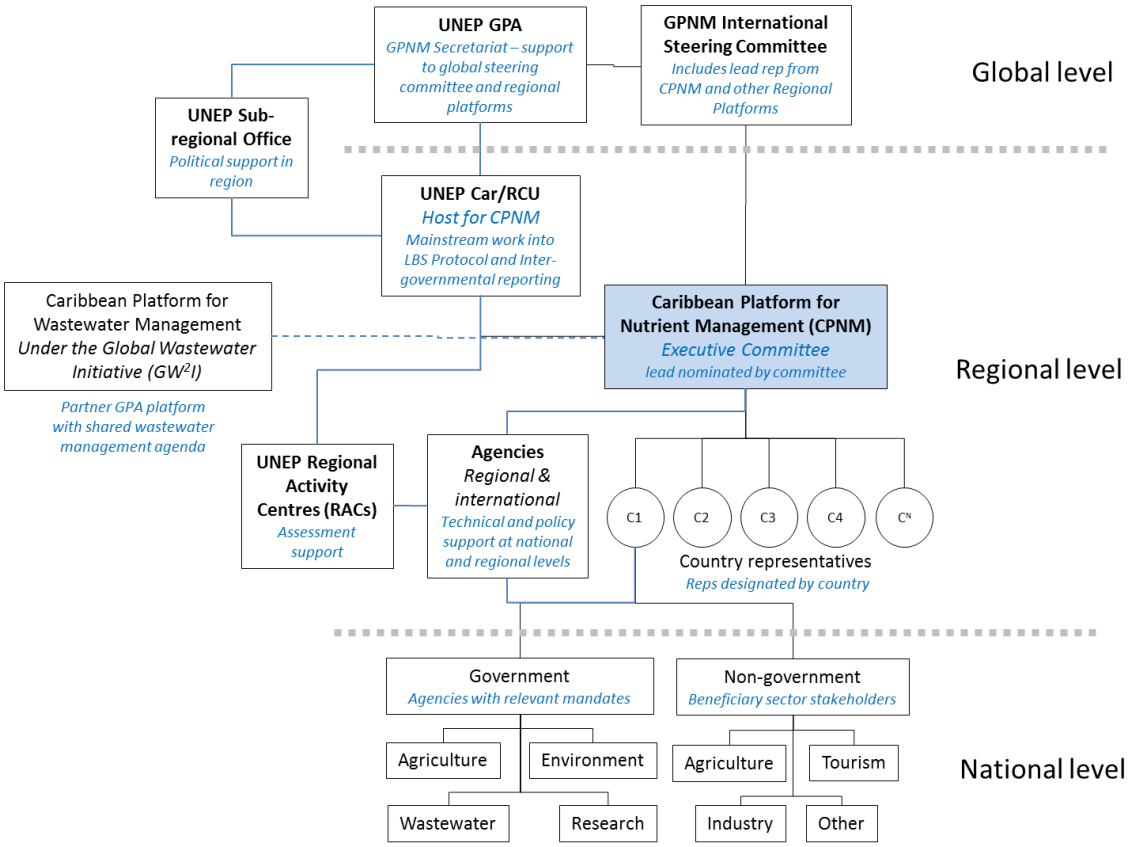
The platform may need a 'champion' country to represent on behalf of countries represented within the GPNM at the global level, for example being represented within the GPNM global steering committee. How to determine the country may be challenging in the absence of a defined procedure. This should be considered. This also leads to the question as to who is accountable for the operation and sustainability of the platform. This will inform what governance structure look like. There may be consideration of the appointment of a Chair and Co-chair arrangement.

The Association of Caribbean States (ACS) is a potential stakeholder that may be considered although recognizing that its mandate may not extend to all the countries in the Wider Caribbean. This should be explored.

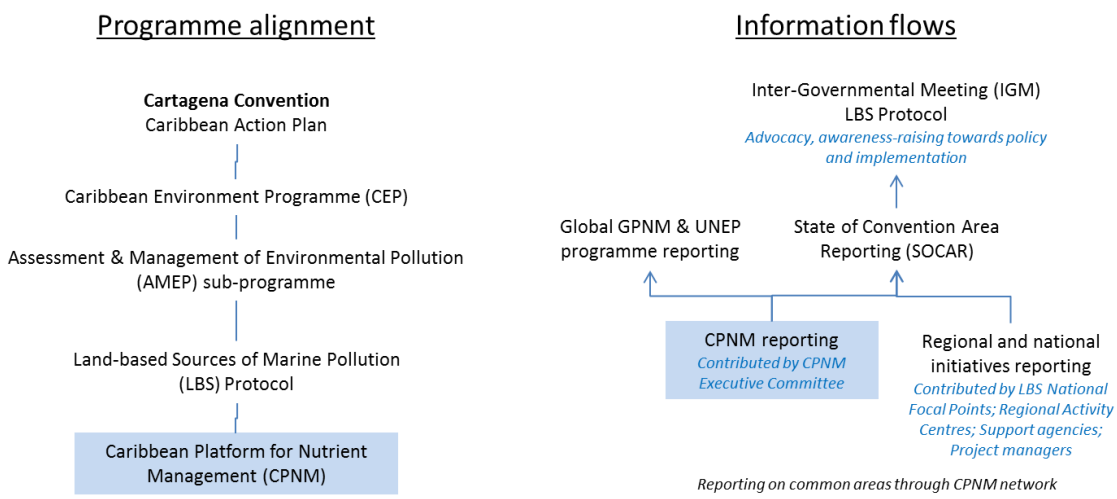
There is agreement that the key role of the platform is to share knowledge. INVEMAR (Colombia) will be keen to work with countries in enhancing the capabilities in improving monitoring regimes and demonstrate how data can be used toward relevant decision making in fostering good practices. It should be noted however that INVEMAR is not a government agency; some discussions will need to be held with the national authority in Colombia to formalize collaboration.

The platform's activities must be rooted in a workplan which should be communicated to governments. The workplan must clearly identify what the platform is intended to do and achieve. Related, the platform must have well-articulated terms of reference. This has to be prepared by the Secretariat.

Participants deliberated in the plenary discussions on the structure and organizational relationships of the platform. The proposed structure and relationships that emerged from the discussions are presented in the two graphics below:



***(A)** Proposed organizational relationship of the Caribbean Platform for Nutrient Management*



***(B)** Alignment of the Caribbean Platform for Nutrient Management within the Caribbean Environment Programme (Regional Seas) and information flows*

Building sustainability of the Platform

Facilitated by Christopher Corbin, UNEP Car/RCU

Realizing sustainability will require strong private and non-governmental stakeholder engagement and will need to be underpinned by a good communication strategy and execution.

The inter-agency cooperation at the regional level will need to be considered so as to draw on the strengths of the partners, share expertise and seek out synergies within existing initiatives and programmes being undertaken by these regional partners.

An 'executive committee' body is recommended so as to constitute the administrative core of the platform; a group that will drive the platform agenda. Related, consideration has to be given to the mechanism of designating national representation on to the platform. The LBS national focal points should be regarded the front-line entry point, but at the national level is may be likely that other 'more appropriate' nominees with experience on the nutrient management agenda may be favoured. In any case there should be a process where that nominee is 'formally' nominated on to the platform. There will need to be a 'lead' or chair on the platform execute committee. This person will be expected to represent the Caribbean on the global GPNM Steering Committee.

The roles and expectations of partners must be made clear, hence a well-defined terms of reference for the platform is necessary. The roles of partners

It is agreed that UNEP Car/RCU (with responsibility for the Caribbean Environment Programme) play the role of host node for the platform, thereby embedding the platform within the existing governance arrangements under the LBS Protocol and the Caribbean Regional Seas governance mechanism. There must be links made to the wider OECS and CARICOM environmental governance frameworks.

Next steps

Dr. Christopher Cox, United Nations Environment Programme

Finalize the meeting report and circulate for consideration and adoption by the countries in attendance. This will also be sent to the other countries in the region and relevant partner agencies including those that attended the first meeting of the Platform in 2013. This will be undertaken by the CEP Secretariat supported by the GPNM Secretariat.

The key areas for consideration out of the meeting will need to be the proposed administrative configuration of the Platform, agreement on designating of the Caribbean Environment Programme Secretariat as the host node for the Platform (and association within the LBS Protocol and governance framework), the appointment of an Executive Committee to lead the process moving forward and the proposed workplan.

The report of the meeting and recommendations should be tabled at the next Scientific and Technical Advisory Committee of the LBS Protocol and the Inter-Governmental Meeting of the Parties to the Cartagena Convention for recognition and adoption.

_____

Workshop participants (not all pictured)

L-R: Luisa Espinora, *INVEMAR, Colombia*; Exil Lucienna, *Ministry of Ministry of Environment, Haiti*; Natalie Boodram, *GWP-Caribbean*; Antony De Oleo, *Ministerio de Medio Ambiente y Recursos Naturales, Dominican Republic*; Leonardo Cascante, *Ministerio de Ambiente y Energía, Costa Rica*; Darryl Banjoo*, IMA, Trinidad & Tobago*; Laël Bertide-Josiah, *Fisheries Division Laboratory Antigua & Barbuda*; Alicia Noel, *Housing Development Corporation, Trinidad & Tobago*; Xiomara Chin, *EMA, Trinidad & Tobago*; Ambika Ramoutar, *Housing Development Corporation, Trinidad & Tobago*; Toylan Arneaud, *IMA, Trinidad & Tobago*; Greg Rawlins, *IICA*; Lorna Inniss, *UNEP Car/RCU*; Greg Crosby, *USDA*; Vincent Sweeney, *UNEP*; Laverne Walker, *Caribbean Large Marine Ecosystem Project*; Shermaine Clauzel, *CARPHA*; Christopher Corbin, *UNEP Car/RCU*; Clement Lewsey, *NOAA*; Patricia Shako, *GWP-Caribbean*; Christopher Cox, *UNEP-GPA*; Patricia Aquing, *CAWASA*

Photos of the meeting are posted on the GPNM Flickr online photo gallery at https://www.flickr.com/photos/140082532@N06/albums/72157666847744250

Annex 1 List of participants

Name	Country	Title	Organization	E-mail
Toylan **ARNEAUD**	TRINIDAD & TOBAGO	Director (Ag)	Institute of Marine Affairs Hilltop Lane, Chaguaramas	imaDIRECTOR@ima.gov.h
Patricia **AQUING**	TRINIDAD & TOBAGO	Executive Director	Caribbean Water and Wastewater Association c/o WASA Farm Rd, St. Joseph Trinidad & Tobago	paquing@cwwa.net
Darryl **BANJOO**	TRINIDAD & TOBAGO	Principal Research Officer	Institute of Marine Affairs Hilltop Lane, Chaguaramas	dbanjoo@ima.gov.h
Lael **BERTIDE-JOSIAH**	ANTIGUA & BARBUDA	Scientist Officer-Senior Analyst	Analytical Services Friars Hill Road, St. John, Antigua	lael.bertide-josiah@ab.gov.ag
Natalie **BOODRAM**	TRINIDAD & TOBAGO	Program Manager WACDEP	Global Water Partnership-Caribbean 9 Serpentine Rd, St. Clair Trinidad	nboodram@gwp-caribbean.org
Leonardo **CASCANTE**	COSTA RICA	Coordinator	Ministerio de Ambiente y Energía MINAE San Jose, Costa Rica	lcascante@cla.go.cr
Xiomara **CHIN**	TRINIDAD & TOBAGO	Coordinator Strategy and Research	Environmental Management Authority 8 Elizabeth St. Clair, POS, Trinidad	xchin@ema.co.tt
Christopher **CORBIN**	JAMAICA	Programme Officer	c/o UNEP CAR/RCU 14-20 Port Royal Street, Kingston, Jamaica	christopher.corbin@unep.org
Christopher **COX**	KENYA	Programme Officer	United Nations Environment Programme United Nations Avenue, Gigiri PO Box 30552, 00100 Nairobi, Kenya	christopher.cox@unep.org
Greg **CROSBY**	UNITED STATES	Chair, GPNM	USDA-NIFA 1400 Independence Ave, SW PO BOX 2210 Washington DC 20250	gcrosby@nifa.usda.gov
Antony **DE OLEO**	DOMINICAN REPUBLIC	Program Coordinator	Ministerio de Medio Ambiente y Recursos Naturales Averida Luperan Esqu. Cayetano Gertrosen	anthony.DeOleo@ambiente.gob.do anthony.deopleo@gmail.com
Luisa F. **ESPINOSA**	COLOMBIA	Research Coordinator	INVEMAR Calle 25 N-2-55, Playa Salgueso-Saint Marte-Colombia	luisa.espinosa@invemar.org.co
Lystra **FLETCHER-PAUL**	TRINIDAD & TOBAGO		FAO Scott House Frederick St. P.O.S	lystra.fletcherpaul@fao.org
Edric **HARRY**	TRINIDAD & TOBAGO	Policy Analyst and Planning Specialist	IICA Trinidad, 10 Austin Street, St. Augustine Trinidad	edric.harry@iica.int
Lorna **INNISS**	JAMAICA	Coordinator	c/o UNEP CAR/RCU 14-20 Port Royal Street, Kingston, Jamaica	lorna.inniss@unep.org
Clement **LEWSEY**	UNITED STATES	Senior Advisor	NOAA/NOS,	clement.lewsey@noaa.gov

Name	Country	Title	Organization	E-mail
			1320 East West Highway Silver Spring, MD 20110	
Exil **LUCIENNA**	HAITI		Ministry of Environment Pitan Sieno, 11 Rue 4, Sacot, Port-au-Prince, Haiti	exillucienna@yahoo.fr
Alicia **NOEL**	TRINIDAD & TOBAGO	CWWA/ Housing Development Corporation	44-46 South Quay, Port of Spain, Trinidad	alicia-n@live.com
Ambika **RAMOUTAR**	TRINIDAD & TOBAGO	CWWA/ Housing Development Corporation	44-46 South Quay, Port of Spain, Trinidad	a_ramoutar22@hotmail.com
Patricia **SHAKO**	TRINIDAD & TOBAGO	Regional Coordinator	Global Water Partnership-Caribbean 8 Serpentine Rd, St. Clair Trinidad	pshako@gmail.com
Marissa **SHEPPARD**	TRINIDAD & TOBAGO	Programme Support	FAO Scott House Frederick Street, Port of Spain, Trinidad	marisa.sheppard@fao.org
Vincent **SWEENEY**	JAMAICA	Head, Caribbean Sub-Regional Office	UNEP, 14-20 Port Royal St. Kingston, Jamaica	vincent.sweeney@unep.org
Adrianus **VLUGMAN**	BARBADOS	Senior Advisor	PAHO/WHO P.O. Box 508, Bridgetown	vlugmana@paho.org
Laverne **WALKER**	COLOMBIA	Senoir Project Officer	Edificio Chambaca Cra 26-78 Sector Torica, Cartagena, Colombia	LaverneW@unops.org
Wayne O. **WILLIAMS**	TRINIDAD & TOBAGO	CWWA Past President/ Housing Development Corporation	44-46 South Quay, Port of Spain, Trinidad	wayneowilliams@gmail.com

Annex 2

Second Regional Planning Meeting of the Caribbean Platform for Nutrient Management

Facilitated by the GEF-Global foundations for reducing nutrient enrichment and oxygen depletion from land based pollution, in support of Global Nutrient Cycle (GEF-GNC) Project

February 24-25, 2016

Venue – Hilton Hotel, Port of Spain, Trinidad & Tobago

Agenda

Objectives:

- To understand the current priorities in respect to nutrient management in the region
- To agree on a plan of action for the operationalization of the Caribbean Platform for Nutrient Management
- To agree on mechanisms for mainstreaming and building sustainability for the Platform into existing frameworks
- To identify immediate opportunities from ongoing or planned projects to support nutrient related activities in the region

Time	Session	Detail	Lead Resource person(s)
DAY 1: 24th February, 2016			
8:30 -9:00	Registration		• UNEP Secretariat
9:00 - 9:20	Opening remarks	Welcome by the Institute of Marine Affairs (IMA), the Global Partnership on Nutrient Management (GPNM), the United Nations Environment (UNEP) and the Ministry of Planning and Development, with very brief perspectives on the issues of interest.	• Toylan Arneaud, Director (Ag.) IMA, Trinidad & Tobago • Dr. Lorna Inniss, Coordinator, UNEP Car/RCU • Vincent Sweeney, Head, Caribbean Sub-Regional Office • Dr. Greg Crosby, Chair, GPNM
9:20 - 9:30	Participant introduction		
9:30 – 9:40	Workshop Objectives and expectations	Outline of the agenda, the workshop objectives and the learning objectives.	Dr. Christopher Cox, UNEP-GPA and GPNM Secretariat
9:40 – 10:00	UNEP's GPA, the Global Partnership on Nutrient Management (GPNM) and relationship with the Caribbean Regional Seas Programme	Overview of the GPNM and relationship within UNEP's Global Programme of Action for Protection of the Marine Environment	Dr. Greg Crosby, GPNM Chair Dr. Christopher Cox, UNEP-GPA and GPNM Secretariat
		Contextual relationship of the GPNM within the Caribbean regional Seas Programme with emphasis on the Land-based Sources of Marine Pollution Protocol and the development of the first State of Convention Area Report (SOCAR)	Chris Corbin, Programme Officer, UNEP
10:00 – 10:15	**BREAK**		
10:15 – 10:45	Overview of status of the Caribbean Platform	Recap of the lead-up to the establishment of the Caribbean Nutrient Platform, expectations and recommendations from the inaugural meeting of 2013	Dr. Clement Lewsey, NOS-NOAA
10:45 – 12:30	The national context and issues relating to nutrient management	Brief overviews on (i) relevant emerging issues/impacts, (ii) response measures and (iii) existing national governance frameworks and gaps/challenges where assistance is required *Presentations must be no longer than 10 minutes per country*	Country representatives
12:30 – 1:30	**LUNCH**		
1:30 - 2:30	National perspectives on nutrient management and emergent issues	Brief agency perspectives on ongoing support work at regional and national levels to address challenges with focus on wastewater nutrient recovery, nutrient use efficiency in agriculture and runoff management, advocacy	Attending agencies

Time	Session	Detail	Lead Resource person(s)
		for pollution control, sectoral responses to nutrient challenge. *Presentations must be no longer than 10 minutes per agency*	
2:30 – 2:45	**BREAK**		
2:45 – 4:30	Proposed workplan for the regional platform	Presentation of the draft Operational Plan for the Caribbean Platform – developed based on recommendations from 2013 inaugural meeting	Dr. Clement Lewsey, NOS-NOAA

DAY 2: 25th February 2016			
9:00 – 9:10	Recap of Day 1		Dr. Christopher Cox, UNEP-GPA
9:10 – 10:00	Reflections on the draft Platform Operational Plan proposal	Facilitated discussion on the elements of the proposal in consideration of: • priority areas based on emerging issues, • linkages to existing frameworks and the global SGD agenda • operational structure of the Platform, • contribution of the Platform ongoing and planned national efforts (mainstreaming), • contribution to regional advocacy strategies to ensure broad based buy-in from diverse stakeholders • partnership building	Facilitated by Dr. Clement Lewsey
10:00 – 10:20	**BREAK**		
10:20 – 12:30	Governance arrangements of the Platform	Facilitated discussion on platform governance • Lead national government to focal point on the GPNM (global level) • Regional host agency arrangements/ expectations • National representation on Platform national focal point designates, roles/expectations • Non-governmental representation and roles • Inter-agency cooperation mechanisms • Succession of platform chairmanship	Facilitated by Dr. Greg Crosby, GPNM
12:30 – 1:30	**LUNCH**		
1:30 – 3:00	Building sustainability of the Platform	Discussion on recommendations on • Resource mobilization - international and regional-level funding • Establishing relationship within the Caribbean Regional Seas governance mechanism(s) • Establishing relationship within the wider OECS and CARICOM environmental governance frameworks • Private and non-governmental stakeholder engagement • Building a communications and outreach strategy that enhances communications both within the platform and with external audiences	Facilitated by Christopher Corbin, UNEP Car/RCU
3:00 – 3:45	**BREAK**		
3:45 – 4:30	Next steps	Summary of core recommendations and next steps with focus on upcoming activities/programmes that might support of the work of the GPNM Platform or related regional issues could be highlighted	Dr. Christopher Cox, UNEP-GPA

Annex 3 Presentations

3.1

Global Partnership on Nutrient Management

Overview of the GPNM and relationship within UNEP's GPA Programme

Second Regional Planning of the Caribbean Platform for Nutrient Management

24 & 25 February 2016
Hilton Hotel, Trinidad & Tobago

Dr. Greg Crosby
GPNM Chair
USDA-NIFA

Dr. Christopher Cox
GPNM Secretariat
UNEP-GPA

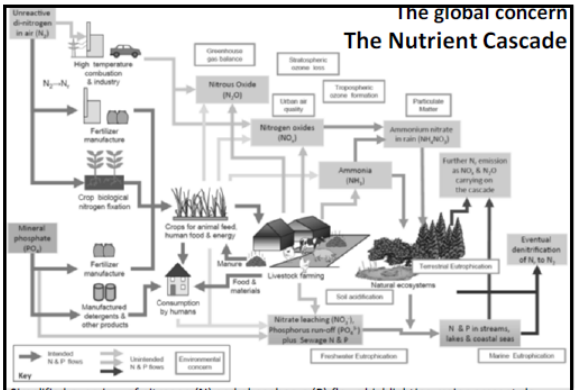
The global concern

- Oceans and Coasts – the very basis of much of the world's economy.
  - 350 million jobs globally linked to the oceans.
- Marine environment supplies planet with key services
  - climate regulation, storm protection, food security, nutrients cycling etc..
  - All these services underpin lives and livelihoods in different sectors from tourism to fisheries.
- Oceans are suffering from advanced degradation mainly as a result of human activities.
  - Over the past decades marine pollution has become an increasingly significant problem.
- Marine pollution occurs when harmful, or potentially harmful, effects result from the entry into the ocean of chemicals, particles, industrial, agricultural and residential waste, noise, plastic debris or the spread invasive organisms.
- With growing population, set to reach nine billion by 2050 - marine pollution and impacts are likely to build up unless global action is taken to sustainably manage and protect oceans and coastal ecosystems

The global concern

- Approximately 80% of marine pollution stems from land-based activities
- Bathing in polluted water – millions of cases of gastro-enteritis and respiratory disease every year
- Eating infected shellfish is a common cause of infectious hepatitis and long-term liver damage
- The social cost of treating diseases caused by sewage contamination is comparable to that of diseases such as diptheria and lung cancer

The global concern
The Nutrient Cascade

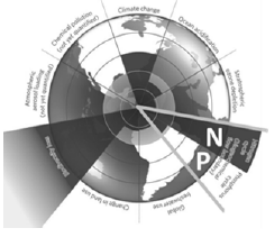


Simplified overview of nitrogen (N) and phosphorus (P) flows highlighting major present-day anthropogenic sources, the cascade of reactive nitrogen (Nr) forms and the associated environmental concerns (in: Our Nutrient World, from Sutton et al., 2011b)

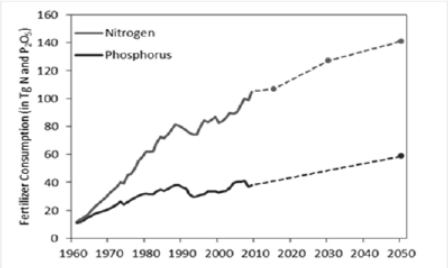
The global concern
Nitrogen and phosphorus inputs to the biosphere and oceans

In the context of the Planetary Boundaries framework (Johan Rockström et al., 2009)

- Planetary boundaries define safe operating space for humanity with respect to the Earth system; associated with the planet's biophysical subsystems or processes
  - Boundary for N_2 is greatly exceeded
  - Boundary for P is being approached



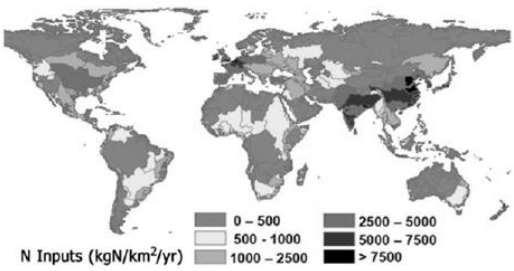
Source: Johan Rockström et al., Nature 461, 472-475 (24 September 2009)



Trends in global consumption of mineral fertilizer (nitrogen and phosphorus) and projected possible futures.
Source: FAO 2012

The global concern

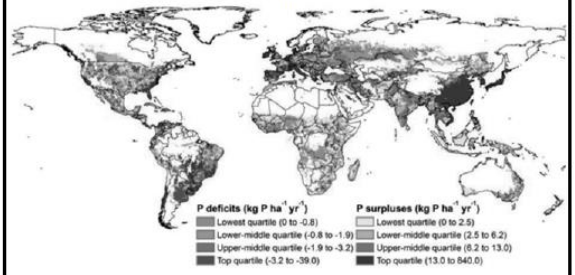
Too Much and Too Little Nutrients: regional variations in Nitrogen



Estimated net anthropogenic nitrogen inputs according to the world's main river catchments (Source: Our Nutrient World 2013).

The global concern

Too Much and Too Little Nutrients: regional variations in Phosphorous



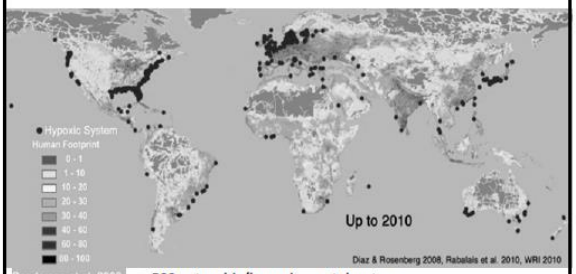
Estimated global phosphorus surplus and deficit.

Source: Our Nutrient World, 2013, citing (MacDonald et al., 2011)

The global concern

Impacts of nutrient loading

mortality of benthic organisms, collapse of fisheries and shellfish poisoning



Sanderson et al. 2002

>500 eutrophic/hypoxic coastal systems
>245,000 km² of water area worldwide
Global loss of ecosystem services =USD 200 billion/year

The five key threats of excess nutrients

The **WAGES** of too much or too little N and P

Water quality
Air quality
Greenhouse balance
Ecosystems
Soil quality

Modified from the European Nitrogen Assessment (2011)

Water quality

- Climate change drivers?
  - Warmer ocean temperatures, chemistry, circulation patterns
    - Sargassum proliferation (Caribbean, West Africa); Harmful algal blooms (worldwide)
    - Under active research

Harbour in St. Thomas (Caribbean)
Source: The St. Thomas Source

HAB and fish kills in Seychelles
Source: Seychelles News Agency

Qingdao, China, province of Shandong

Air quality & Greenhouse balance

- Climate drivers also important in land-atmosphere interactions with respect to pollution through emissions of greenhouse gas nitrous oxide (N_2O) and ammonia (NH_3) to the atmosphere
- N_2O contributes to stratospheric ozone depletion, increasing the risk of skin cancer from UV-B radiation

Soil quality and land degradation

- Nutrient deficits in parts of the globe – African continent of note
  - Extraction of nutrients without replenishment, physical erosion
  - Land degradation and declining yields
- Climate change will exacerbate conditions
  - Deeping land degradation with changes in temperature and moisture/water regimes

Towards global action…

The Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities (GPA)

- Washington Declaration
  - Over 108 governments declared commitment to protect and preserve the marine environment from impacts of land-based activities
  - **GPA adopted in 1995**
    - Only global intergovernmental mechanism explicitly addressing the linkages between freshwater, coastal and marine environments.
    - Voluntary, action-oriented, intergovernmental programme led by UNEP
  - GPA designed to address accelerating degradation of the world's oceans and coastal areas

About the GPA

- UNEP has focused on key pollution sources since the 2006 Inter-Governmental Review-2 in Beijing – marine litter, nutrients & wastewater
- The Manila Declaration in 2012, gave GPA the mandate to establish global multi-stakeholder partnerships for these 3 priority areas
- The GPA secretariat has established and is strengthening three global multi-stakeholder partnerships
  - The **Global Partnership on Nutrient Management (GPNM)**, which was launched at the UN CSD in New York, May 2009
  - The **Global Partnership on Marine Litter (GPML)**, which was launched at Rio+20, June 2012
  - The **Global Wastewater Initiative (GW²I)**, which was announced by UNEP's Executive Director, Achim Steiner in May, 2013

Global Partnership on Nutrient Management (GPNM)

- Established in 2009
- Key roles:
  - Catalyze strategic advocacy and co-operation at the global and regional levels
  - As a knowledge platform to support science policy interaction and translating science for policy makers
  - To provide information and enhance capacities to address the growing problem of nutrient over-enrichment and eutrophication
  - To position nutrient issues as part of the international sustainable development agenda
    - advance Sustainable Development Goals, in particular under **Goal 14 on conservation of the oceans and Goal 2 on sustainable agriculture**

GPNM Steering Committee, December 2014

Global Partnership on Nutrient Management (GPNM)

- Key roles:
  - Catalyze strategic **advocacy** and co-operation at the global and regional levels
  - As a **knowledge** platform to support science policy interaction and translating science for policy makers
  - To provide information and **enhance capacities** to address the growing problem of nutrient over-enrichment and eutrophication
  - To position nutrient issues as part of the international sustainable development agenda
    - Guided by a Steering Committee; United States is the current Chair; UNEP is the Secretariat under the GPA
  - **Mainstreamed within UNEP' Programme of Work**

GPNM strategic outlook

Key work areas:

- Development of **knowledge** products to inform decision making (policy makers, professionals, farmers, private sector)
- Support for piloting and replication of **appropriate pilot solutions** and BMPs for sustainable nutrient management and pollution reduction
- Generate **awareness** resources to drive change in behaviours and practice
- Strengthening **partnerships** - expanded global and regional partnerships, particularly through Regional-level Platforms mainstreamed in relevant national and regional development programmes

Partnership strengthening:

Support under GEF-Global Nutrient Cycling Project

- **Global partnership of stakeholders actively engaged in addressing nutrient over-enrichment in coastal waters**
  - Engage international and regional fora to promote the GPNM /seek new members
    - Over 40 Partners engaged; research academia, government, private sector
  - Communications and outreach strategy
  - Publish and disseminate an advocacy documents e.g. Our Nutrient World
  - Engage with other GEF LME projects e.g., BOBLME
  - Develop and maintain partnership (and project) web-based knowledge platform

GPNM Steering Committee, December 2014

Knowledge generation:

Support under GEF-Global Nutrient Cycling Project

Analysis of relationship between nutrient sources and impacts

- **Global database development with documentation of data on nutrient loading and occurrence of harmful algal blooms, hypoxia, and effects on fish landings, fish abundance, and composition of fish populations.**
  - Data Base: Global-Nutrient Export from Watersheds (NEWS) data for river nutrient export
  - Data base: Nutrient release from aquaculture - several publications available
  - Global database development - coastal conditions, non-land based nutrient sources, as well as coastal effects
  - Synthesis report and maps on occurrences of hypoxia and harmful algal blooms
  - Synthesis report "impacts on fisheries" based on data and model output from regions - develop relationships between fishery production and potential controlling variables and hypoxia

Best practices and solutions:

Support under GEF-Global Nutrient Cycling Project

Scientific, technological and policy options

- Production of a fully operational 'policy toolbox' and delivery of the training.
  - Case studies of BMP examples that are being implemented around the world by key partners
  - agricultural BMPs and urban BMPs database
  - policy database
- Replication and up-scaling of BMPs, measures etc. through training workshops; up-scaling strategy
- Holding of training sessions within global meetings of nutrient relevance

Knowledge contributions and best management practice

Support under GEF-Global Nutrient Cycling Project

Demonstration - source-impact modeling and best practices in Manila Bay watershed, Philippines

- **Strengthening decision support system for Manila Bay watershed**
  - State of the Coasts reports of the Provinces of Bataan, Cavite and Pampanga
  - Updating Manila Bay Environmental Atlas
- **Building the Foundations and Agreement on nutrient reduction strategies for Manila Bay**
  - Application of source-impact models and best practices
  - Presentation and adoption of nutrient reduction strategies

Knowledge contributions and best management practice

Support under GEF-Global Nutrient Cycling Project

Demonstration – Lake Chilika, India and Laguna de Bay, Philippines

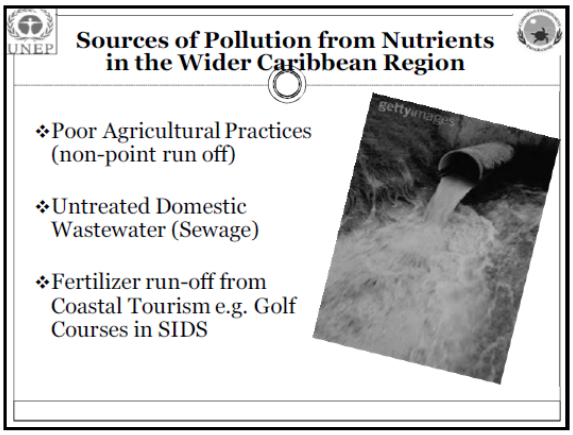
- Application of ecosystem health report card in Lake Chilika, India and Laguna de Bay, Philippines
- Management plan for application/implementation of report card
  - incorporation into nutrient reduction strategies for Manila Bay watershed
- Lessons drawn for replication and up-scaling

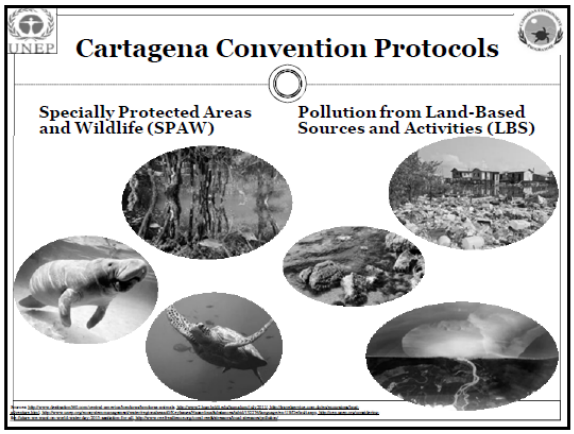
GPNM – a growing partnership

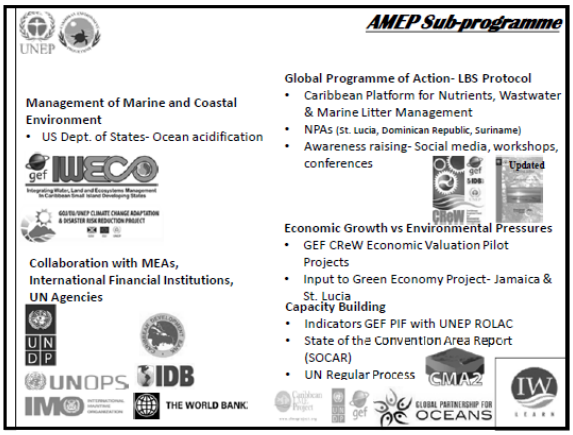
Kingdom of the Netherlands · International Fertilizer Industry Association · IFDC · UNEP · UNDP · gef · USDA · Utrecht University · IPNI International Plant Nutrition Institute · International Nitrogen Initiative · UN-HABITAT · FAO · Nebraska · Washington State University · ING · NOAA · IAEA · SACEP · Laguna Lake Development Authority · saln · Global Environment & Technology Foundation · World Resources Institute · Centre for Ecology & Hydrology · ECN · LRTAP · PEMSEA · Bay of Bengal LME

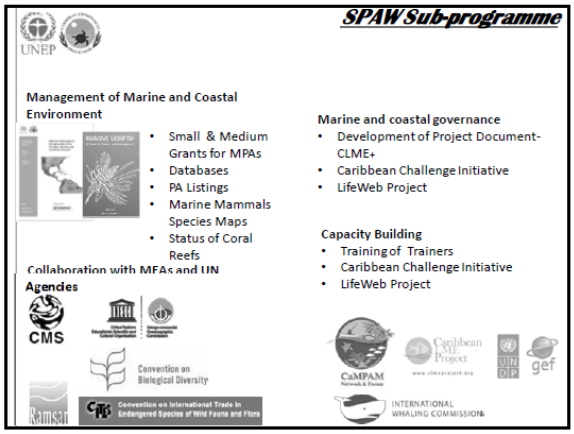
3.2

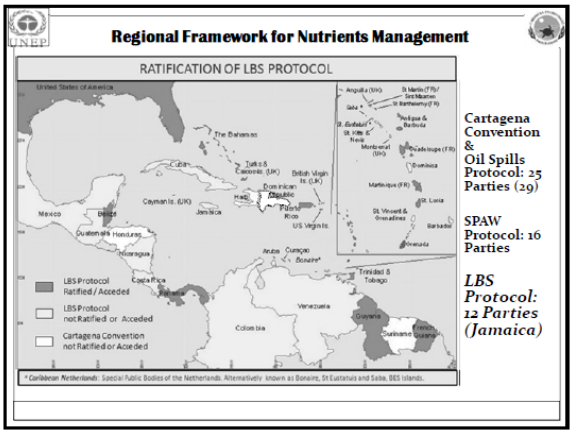

UNEP
CARIBBEAN ENVIRONMENT PROGRAMME
SECRETARIAT TO THE CARTAGENA CONVENTION
UNEP CEP & Nutrients Management in the Wider Caribbean Region
Meeting of the Caribbean Platform for Nutrients Management
Port of Spain, Trinidad & Tobago
Christopher Corbin
Programme Officer
UNEP CAR/RCU


UNEP
Sources of Pollution from Nutrients in the Wider Caribbean Region
❖Poor Agricultural Practices (non-point run off)
❖Untreated Domestic Wastewater (Sewage)
❖Fertilizer run-off from Coastal Tourism e.g. Golf Courses in SIDS


UNEP
Cartagena Convention Protocols
Specially Protected Areas and Wildlife (SPAW)
Pollution from Land-Based Sources and Activities (LBS)


UNEP
AMEP Sub-programme
Management of Marine and Coastal Environment
• US Dept. of States- Ocean acidification
Collaboration with MEAs, International Financial Institutions, UN Agencies
UNOPS
IDB
THE WORLD BANK
Global Programme of Action- LBS Protocol
• Caribbean Platform for Nutrients, Wastwater & Marine Litter Management
• NPAs (St. Lucia, Dominican Republic, Suriname)
• Awareness raising- Social media, workshops, conferences
Updated
Economic Growth vs Environmental Pressures
• GEF CReW Economic Valuation Pilot Projects
• Input to Green Economy Project- Jamaica & St. Lucia
Capacity Building
• Indicators GEF PIF with UNEP ROLAC
• State of the Convention Area Report (SOCAR)
• UN Regular Process
GMA2
GLOBAL PARTNERSHIP FOR OCEANS


UNEP
SPAW Sub-programme
Management of Marine and Coastal Environment
• Small & Medium Grants for MPAs
• Databases
• PA Listings
• Marine Mammals Species Maps
• Status of Coral Reefs
Collaboration with MEAs and UN Agendes
CMS
Convention on Biological Diversity
Ramsar
Convention on International Trade in Endangered Species of Wild Fauna and Flora
Marine and coastal governance
• Development of Project Document- CLME+
• Caribbean Challenge Initiative
• LifeWeb Project
Capacity Building
• Training of Trainers
• Caribbean Challenge Initiative
• LifeWeb Project
CaMPAM
Caribbean Challenge Project
INTERNATIONAL WHALING COMMISSION


UNEP
Regional Framework for Nutrients Management
RATIFICATION OF LBS PROTOCOL
LBS Protocol Ratified / Acceded
LBS Protocol not Ratified or Acceded
Cartagena Convention not Ratified or Acceded
Cartagena Convention & Oil Spills Protocol: 25 Parties (29)
SPAW Protocol: 16 Parties
LBS Protocol: 12 Parties (Jamaica)

LBS Protocol and Nutrients

- **Annex I** lists Primary Pollutants of Concern, which include nitrogen and phosphorous compounds
- **Annex III** establishes specific regional effluent limitations for domestic sewage
- **Annex IV** refers to Agricultural Non-point Sources of Pollution

Obligations under Annex IV

Parties shall develop plans for the prevention, reduction and control of agricultural non-point sources of pollution

Evaluation and assessment of agricultural non-point sources of pollution which may include:

- Estimation of loadings;
- Identification of associated environmental impacts and potential risks to human health;
- Evaluation of the existing administrative frameworks to manage agricultural non-point sources of pollution;
- Evaluation of existing best management practices and their effectiveness, and
- Establishment of monitoring programmes.

Obligations under Annex IV

Education, training and awareness programmes, which may include:

- Establishment and implementation of programmes for the agricultural sector and the general public to raise awareness of agricultural non-point sources of pollution and their impacts on the marine environment, public health and the economy
- Establishment and implementation of programmes at all levels of education on the importance of the marine environment and the impact of pollution from agricultural activities

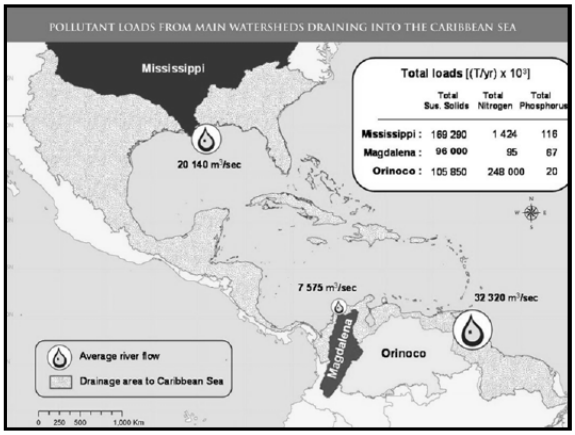
CEP Reports & Partners

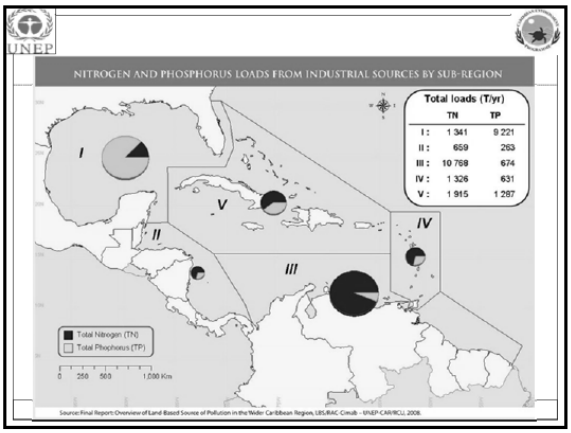
http://www.cep.unep.org/publications-and-resources/technical-reports/technical-reports

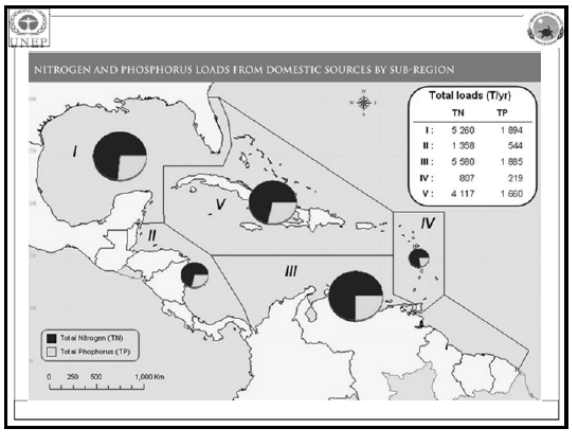
- Sediment Control Practices (TR 32)
- Pollutant Loads into Caribbean Sea (TRs 33 & 52)
- Wastewater Baseline Assessment (TR 55)
- Regional Hotspot Analyses (Know Why Network & SIDS Specific Methodology (TR 67 & ?)
- LBS RACs – CIMAB (Cuba) & IMA (Trinidad and Tobago) & RAN
- INVEMAR – Colombia
- CARPHA – Saint Lucia (former CEHI)
- Universities & Research Institutions

CEP Workshops: Training & Awareness Raising

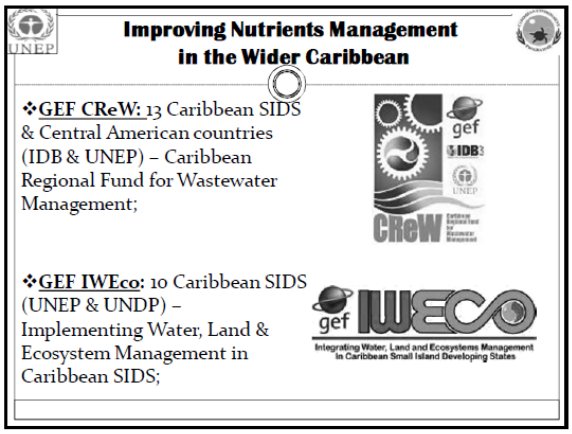
- Nutrients Workshop in 2003 – RAC IMA
- Modelling Non-Point Sources of Marin Pollution and Sediment Discharges using Geographical Information Systems (GIS), Panama & Cuba, 2008
- GEF Contaminated Bays, IWCAM & REPCar Projects
- Earth University: Best Management Practices in Agriculture in Central America
- Nutrient Removal Technologies for Domestic Wastewater
- National Programmes of Action

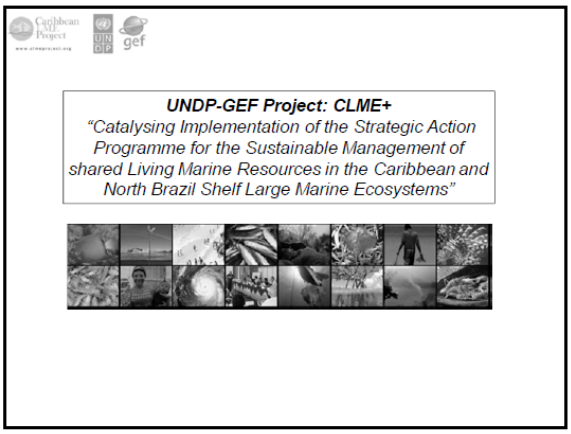


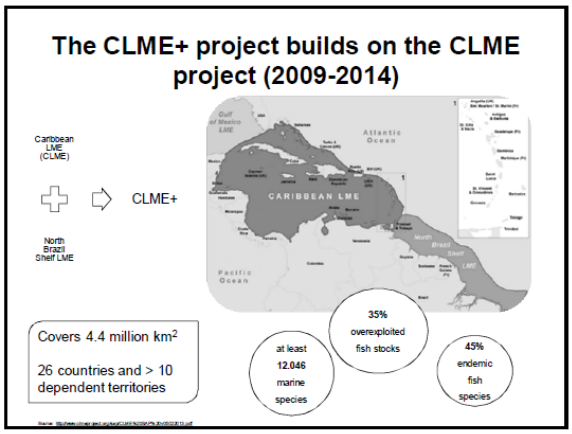

UNEP
NITROGEN AND PHOSPHORUS LOADS FROM INDUSTRIAL SOURCES BY SUB-REGION
Total loads (T/yr)
TN TP
I : 1 341 9 221
II : 659 263
III : 10 768 674
IV : 1 326 631
V : 1 915 1 287
I
II
III
IV
V
Total Nitrogen (TN)
Total Phosphorus (TP)
0 250 500 1,000 Km
Source: Final Report: Overview of Land Based Source of Pollution in the Wider Caribbean Region, UBS/RAC Cimab - UNEP-CAR/RCU, 2008.

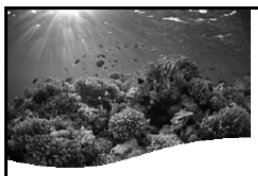

UNEP
NITROGEN AND PHOSPHORUS LOADS FROM DOMESTIC SOURCES BY SUB-REGION
Total loads (T/yr)
TN TP
I : 5 260 1 894
II : 1 358 544
III : 5 580 1 885
IV : 807 219
V : 4 117 1 660
I
II
III
IV
V
Total Nitrogen (TN)
Total Phosphorus (TP)
0 250 500 1,000 Km


UNEP
THANK YOU!
United Nations Environment Programme
Caribbean Environment Programme
14-20 Port Royal Street, Kingston, Jamaica
Tel: +876-922-9267; Fax: +876-922-9292
Website: www.cep.unep.org
Facebook: UNEP-Caribbean Environment Programme
Twitter: @UNEP_CEP


UNEP
Improving Nutrients Management in the Wider Caribbean
❖GEF CReW: 13 Caribbean SIDS & Central American countries (IDB & UNEP) – Caribbean Regional Fund for Wastewater Management;
gef
IDB
UNEP
CReW
❖GEF IWEco: 10 Caribbean SIDS (UNEP & UNDP) – Implementing Water, Land & Ecosystem Management in Caribbean SIDS;
gef IWECO
Integrating Water, Land and Ecosystems Management in Caribbean Small Island Developing States


Caribbean Coral Project
www.coralproject.org
UNDP
gef
UNDP-GEF Project: CLME+
"Catalysing Implementation of the Strategic Action Programme for the Sustainable Management of shared Living Marine Resources in the Caribbean and North Brazil Shelf Large Marine Ecosystems"


The CLME+ project builds on the CLME project (2009-2014)
Caribbean LME (CLME)
North Brazil Shelf LME
CLME+
Gulf of Mexico LME
Atlantic Ocean
CARIBBEAN LME
North Brazil Shelf LME
Pacific Ocean
Covers 4.4 million km²
26 countries and > 10 dependent territories
at least 12.046 marine species
35% overexploited fish stocks
45% endemic fish species



Threats to ecosystems: coastal development, overfishing, mining, marine and land-based sources of pollution and climate change

CMLE+ marine ecosystems provide *essential services* to the Caribbean population

Services:
- Fisheries
- Tourism
- Coastal defense
- Nutrient filter
- Carbon sequestration

etc.

UNEP CEP within CLME+

…acts as **administrative and coordination executing agency**

Responsibilities:

Supports joint implementation of actions under different Protocols of the Cartagena Convention

- elaborate a **formal agreement** between **Brazil** and UNEP CEP
- **Regional Strategy and Action Plans**
- **Baseline assessment reports**
- **Investment plans**
- Create **web portals** and report relevant information through them
- **Develop a sub-project**

Regional Strategy and Action Plans

- For the **valuation**, **protection** and/or **restoration** of **key marine habitats** in the CLME+ **(SPAW)**
- For the **reduction of impacts** from excess **nutrient loads** on marine ecosystems **(LBS)**

Baseline and (pre-)feasibility assessment reports

… to assess the needs and opportunities for investments

- for the **enhanced protection** and restoration of **key habitats (SPAW)**
- to **reduce** the **impacts of pollution (including Nutrients)** on human well-being **(LBS)**

→to **safeguard the goods & services delivered by marine ecosystems** and associated living resources to human society

… followed by investment plans

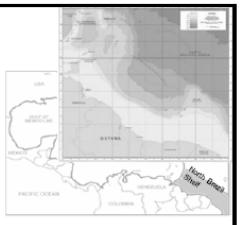
- For **large-scale action on habitat protection** and **restoration (SPAW)**
  - habitats of critical importance in terms of current and potential future provisions of ecosystem goods & services
- Outlining **costs for high-priority actions** to **reduce LBS pollution (LBS)**
  - pollution sources (including nutrients) known to cause substantial impacts on the provision of essential ecosystem goods and services

The sub-project

Links to SAP

SAP Strategy 6: implement EBM/EAF of the Guianas-Brazil continental shelf with special reference to the shrimp and groundfish fishery

SAP Strategy 4: enhance the governance arrangements for ecosystem-based management of reefs and associated ecosystems



Activities to be undertaken at the specific sites in the NBSLME under O3.4. will seek to integrate with the work conducted under Output 3.3 towards more sustainable fisheries and/or the enhancement of associated livelihoods. This is in alignment with the aim of the activities under O3.4. to come to a site-level demonstration of the concept of EBM, through the coordinated implementation of a holistic package of actions that will allow to also consider and address the impacts arising from the 3 inter-linked priority issues identified under the CLME TDAs: **FISHERIES** ↔ **HABITATS** ↔ **POLLUTION**

Objectives of the Sub-Project

1. Operationalize the coordination and cooperation mechanisms established under Output 1.1., to test and demonstrate application of EBM principles at the intervention level.
2. Demonstrate, through on-the-ground initiatives, innovative and participatory, cross-sectoral approaches to deal in a holistic way with the 3 priority problems of pollution, habitat degradation and unsustainable fishing, within the NBSLME and CLME
3. Capture and disseminate best practices and lessons learnt, for the replication and up-scaling of the EBM approach within and beyond the CLME+

Sub-project activities may include:

- Identification (and where feasible the mapping of) important spawning and nursery areas (local, national, sub-regional) for economically and ecologically important species along the North-Brazil Shelf LME; determine whether important spawning and nursery areas are associated with habitats such as mangroves, coastal wetlands and seagrass beds
- Develop and test the implementation of a methodology to identify (and where feasible map) marine pollution hotspots, and characterize pollution sources and types, and magnitude of (potential) impacts
- Habitat protection and restoration initiatives that will support enhanced community participation (particularly the participation of women) and management of coastal habitats
- Initiative on alternative livelihoods (seamoss farming) compatible with national-level efforts towards EBM/ICM in the leeward islands, based on the experience and lessons learnt from a similar initiative in Saint Lucia

Web portals

Creation of web portals or set of portals on:

- "Strategic Action Plan **Implementation** M&E"
- "**State of the Marine Ecosystems and shared Living Marine Resources in the CLME+**" *(linked to State of Convention Area Report - SOCAR under LBS)*

→ Online **reporting of information**

State of the Convention Area Report (SOCAR)

- Obligation under Article XII of the Land Based Sources (LBS) Protocol
- Condition of watersheds and coastal areas
- Description of watersheds, coastal areas, and marine areas
- Comparison of current environmental information on watersheds and coastal area conditions compared to cut values and previous information
- BMP to prevent, reduce and control pollution of the convention area
- Challenges for LBS implementation (policy, technical and information)
- Emerging issues

**To report every 4-6 years*

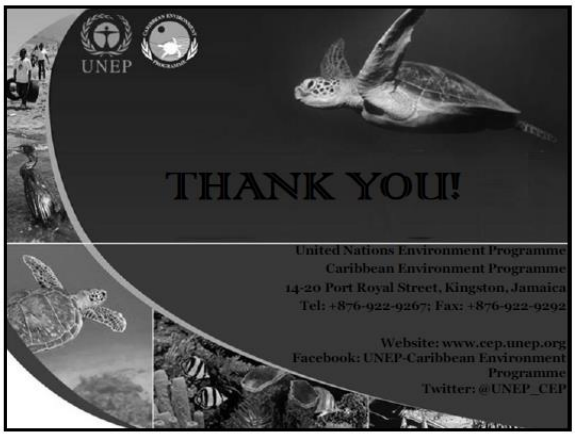
Development of SOCAR

- Supported by IWEco and CLME+ Projects
- Development guided by Working Group on Monitoring & Assessment chaired by US EPA – Outline approved
- Consultant selected – should be on board by March 2016
- First draft to be presented to 4th LBS STAC - Oct/Nov 2016
- Include Existing Nutrient Data and Information
- Link to Global Platforms such as UNEP Live and Transboundary Water Assessment Project (TWAP)

Summary of UNEP CEP Support for Nutrients Management

- **Identify National Needs & Opportunities**
  - Periodic Monitoring, Evaluation & Assessment
  - Resource Mobilization for selected Priorities
  - Regional Cooperation through the LBS Protocol & recently formed Caribbean Platform for Nutrients
- **Build National Capacities**
  - Improve policies, laws & regulations;
  - Implement Projects incl. Best Management Practices;
  - Strengthen Institutional Arrangements e.g. Laboratory Capacity & Monitoring


UNEP
Contracting Parties called for:
Guidelines, Tools, Methodologies, Technologies & Best Practices for Nutrients Management (GEF Projects)
Improved data & information on nutrient sources, loadings & impacts – State of Convention Area Report (SOCAR);
Pilot Projects, Activities & Regional Partnerships for Nutrients Management – e.g. Nutrient Recovery from Wastewater; Links to Agriculture & Food Security;
Further Development of the Caribbean Platform for Nutrients Management under the GPNM


UNEP
THANK YOU!
United Nations Environment Programme
Caribbean Environment Programme
14-20 Port Royal Street, Kingston, Jamaica
Tel: +876-922-9267; Fax: +876-922-9292
Website: www.cep.unep.org
Facebook: UNEP-Caribbean Environment Programme
Twitter: @UNEP_CEP

3.3

Global Partnership on Nutrient Management

Review of Inaugural Meeting (2013) and Recommendations for the Caribbean Nutrient Platform

February 24-25, 2016
Hilton Hotel, Port of Spain, Trinidad & Tobago

Dr. Clement Lewsey
Director, International Program Office, NOAA

Overview

- Launch event of Caribbean Platform in Trinidad and Tobago from May 7th to 9th, 2013
- Workshop attended by representatives from Colombia, Costa Rica, Cuba, Dominican Republic, Guatemala, Jamaica, Panama, Saint Lucia and Trinidad and Tobago
- Workshop aims:
  - provide a regional forum for member countries to share information on their level of awareness of nutrients management
  - share strategies to address surplus/excess nutrients run-off at the national level
  - provide recommendations to promote effective sustainable nutrient management across the region

Review of meeting report

Presentations and perspectives

- UNEP-GPA – overview of the nutrient challenge
- Country perspectives from:
  - Belize
  - Jamaica
  - Columbia
  - Costa Rica
  - Cuba
  - Dominican Republic
  - Guatemala
  - Mexico
  - Panama
  - Trinidad and Tobago

Presentations and perspectives

- NOAA's programme of assistance
  - development of National Plans of Action (NPAs)
- Special initiatives / case examples
  - GEF-funded Project to Reduce Pesticide Runoff into the to the Caribbean Sea (GEF-REPCar)
  - BMPs examples in the Caribbean – livestock runoff
  - North-west Coastal Water Quality Demonstration Project; St. Lucia

Workshop visioning activity

- Break-out sessions
  - Consider main areas of focus for Caribbean Platform
  - Suggest core elements of a mid-term workplan
- Working groups split:
  - English-speaking countries
  - Spanish-speaking countries
- Recommendations compiled for adoption

Recommendations

- Endorse the Regional Platform, supported by regional technical experts on nutrients management
- Establish the Platform as a voluntary mechanism of relevant stakeholders to assist influence government action and decision-making
- Define mandate and operation of the Platform, outlining goals, structure, plans of action and partners of the Platform
- Seek formal ministry adoption/recognition of the process by meeting delegates; supported by written documentation from the GPA Secretariat

Recommendations

- Organize work of Platform around thematic groups (eg agriculture; ports and shipping; tourism; mining; solid waste management, etc) comprising representation from countries
- Document case studies and best practices for knowledge sharing
- Adopt a formalized approach through each respective government - build on existing linkages via the LBS Protocol (Cartagena Convention)
- Define process for inviting countries / partners to subscribe to the GPNM

Recommendations

- Mobilize support for country (government) and partner membership in Platform
- Identify resources (financial and human) to carry out work programme
- Set up an administrative body / Secretariat for purposes of communicating and coordinating
  - UNEP/CAR recommended as Secretariat

Questions?

3.4

Nutrient Management in Antigua & Barbuda

Laël Bertide-Josiah

ANTIGUA & BARBUDA

Issues/Emerging Issues

- Domestic pollution: liquid wastes from septic tank/soak away systems drain into waterways.
- Agricultural run-off.
- Hotels: use of grey water for irrigation.
  - inefficient treatment of effluent: process does not significantly reduce nutrient content
  - Inconsistent treatment: TSS and organic matter are often elevated.
- Yachts/Cruise ships: indiscrete disposal of on-board wastes.

Nutrient Management Framework

- Environmental Protection and Management Act (2015):
  - Sustainable Island Resource Mgt Mechanism (SIRMM) approach;
  - Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region: LBS Protocol;
  - LBS Monitoring and Assessment Group;
  - Technical Advisory Committee (TAC)
- Tools:
  - Environmental Information Management System (EIMAS). Geo-referencing tool commissioned under the SIRMM. Mapping of resources and environmental indicators;
- Agencies: CBH, NPA, NEMMA, EGA, Environment Div., Fisheries Div. and Analytical Services.

Challenges and Gaps

- Testing Methodology: nitrate
  - Sea Water nutrient testing:
    - interference from the high Cl- content.
    - Also the use and disposal of cadmium as a reagent.
- Public Awareness:
  - Limited publication or reporting to public.
- Lab Capacity Building.
- Consistency of surveillance programme.
- Regulatory system

Way Forward

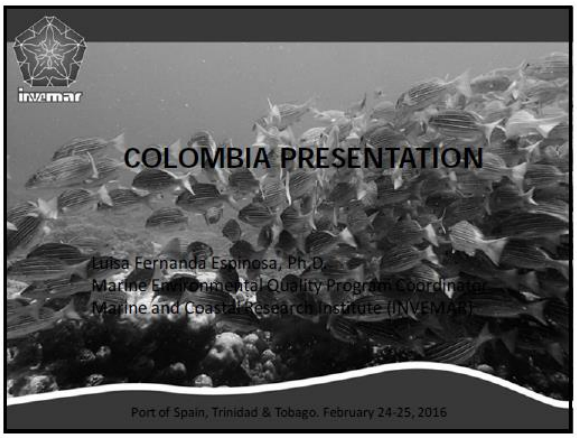
- Use of existing mechanism with agencies such as CBH and NPA
  - More effective monitoring for nutrients.
  - Mapping of sources of pollution and pollution loading.
- TAC meetings: stakeholder engagement on nutrient mgt.
- Awareness raising.

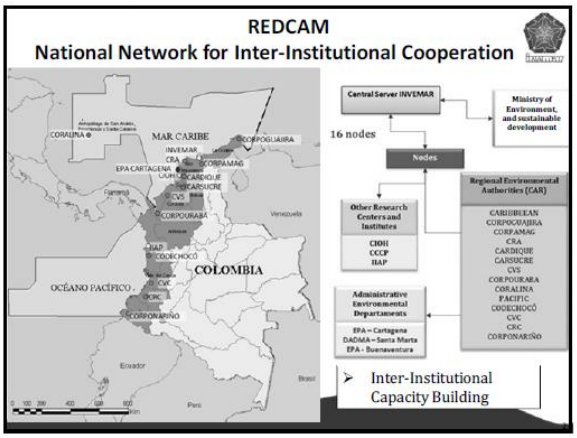
Acknowledgements

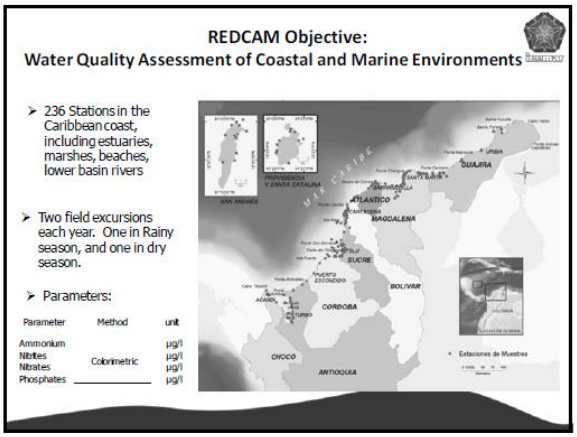
- Special Thanks to Dr. Linroy Christian.

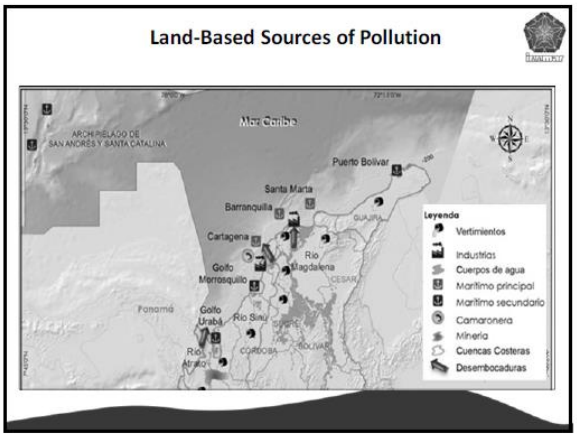
QUESTIONS?

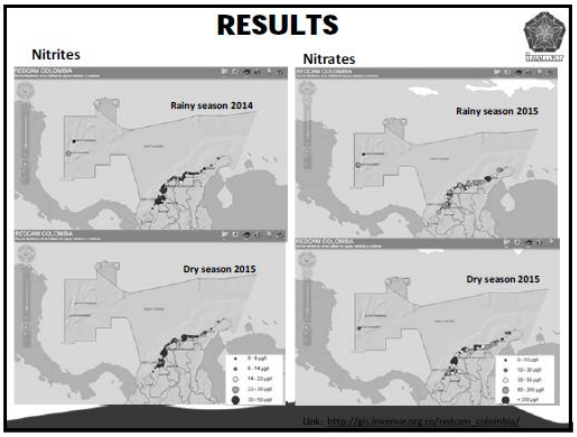
3.5

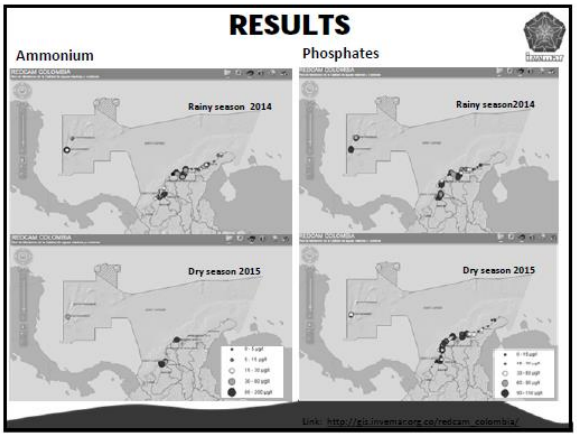

COLOMBIA PRESENTATION
Luisa Fernanda Espinosa, Ph.D.
Marine Environmental Quality Program Coordinator
Marine and Coastal Research Institute (INVEMAR)
Port of Spain, Trinidad & Tobago. February 24-25, 2016


REDCAM
National Network for Inter-Institutional Cooperation
MAR CARIBE
COLOMBIA
OCÉANO PACÍFICO
Central Server INVEMAR
Ministry of Environment, and sustainable development
16 nodes
Nodes
Other Research Centers and Institutes
CIOH
CCCP
IIAP
Regional Environmental Authorities (CAR)
CARIBBEAN
CORPOGUAJIRA
CORPAMAG
CRA
CARDIQUE
CARSUCRE
CVS
CORPOURABA
CORALINA
PACIFIC
CODECHOCÓ
CVC
CRC
CORPONARIÑO
Administrative Environmental Departaments
EPA – Cartagena
DADMA – Santa Marta
EPA - Buenaventura
Inter-Institutional Capacity Building


REDCAM Objective:
Water Quality Assessment of Coastal and Marine Environments
236 Stations in the Caribbean coast, including estuaries, marshes, beaches, lower basin rivers
Two field excursions each year. One in Rainy season, and one in dry season.
Parameters:
Parameter Method unit
Ammonium µg/l
Nitrites Colorimetric µg/l
Nitrates µg/l
Phosphates µg/l
MAR CARIBE
GUAJIRA
ATLANTICO
MAGDALENA
SUCRE
BOLIVAR
CORDOBA
CHOCO
ANTIOQUIA
Estaciones de Muestreo


Land-Based Sources of Pollution
Mar Caribe
ARCHIPIELAGO DE SAN ANDRÉS Y SANTA CATALINA
Puerto Bolivar
Santa Marta
Barranquilla
Cartagena
Golfo Morrosquillo
Golfo Urabá
Rio Magdalena
Rio Sinu
Rio Atrato
Panamá
Leyenda
Vertimientos
Industrias
Cuerpos de agua
Marítimo principal
Marítimo secundario
Camaronera
Minería
Cuencas Costeras
Desembocaduras


RESULTS
Nitrites
Nitrates
Rainy season 2014
Rainy season 2015
Dry season 2015
Dry season 2015
Link: http://gis.invemar.org.co/redcam_colombia/


RESULTS
Ammonium
Phosphates
Rainy season 2014
Rainy season2014
Dry season 2015
Dry season 2015
Link: http://gis.invemar.org.co/redcam_colombia/

RESULTS

- In general the highest concentrations of nutrients are recorded during the rainy season.
- The higher concentrations are recorder in the stations located in the principal coastal cities (Santa Marta, Barranquilla and Cartagena), due to domestic waste water discharges.
- Colombia have low coverage of sewerage. For this reason nutrient concentrations have been maintained in similar ranges between 2001 and 2016. Except in the coastal areas of Cartagena, Santa Marta and San Andres where Marine outfall where installed.

Colombia 50% Mar

invemar

Thank you for your attention ....

3.6

Caribbean Platform for Nutrient Management

MINAE
Leonardo Cascante
lcascante@da.go.cr

[redacted]

- Topics:
- relevant emerging issues.
- response measures .
- existing national governance frameworks and gaps

Relevant emerging issues

- Climate change
- Humans need more food
- Pest and crops diseases
- Coordination among institutions

Response measures

Information

- Digital database (Sinigirh y SICA)

Monitoring

- Water quality monitoring (surface water bodies and aquifers)

Non-Point Sources of Pollution

- Create a legal framework

Other actions

- Small project to raise awareness on climate change and wastewater management

Framework/gaps/challenge

National framworks

- Water Act (1942)
- National regulations on:
  - wastewater treatment plants
  - wastewater dumping and reuse
  - economic instruments for water use and wastewater discharge on water bodies.

Challenges

- New Water Act and LBS Protocol: need to be approved by Legislators
- Create a national regulation on non - point sources of pollutions and emerging pollutants

Assistance required

- Capacity building on:
  - Best practices for nutrients management
  - Rise awareness
  - Technical regulations needed

Thank you

3.7

An Overview of Challenges/Issues Affecting Nutrient Management in Trinidad and Tobago.

Presented By

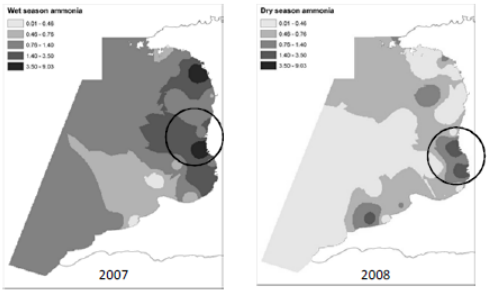
Darryl Banjoo

Environmental Quality Division
Institute of Marine Affairs, Hilltop Lane
Chaguaramas

Presented at Second Regional Planning of the Caribbean Platform for Nutrient Management, *24-25 February 2016, Hilton, Trinidad and Tobago*

1

Nutrients (Ammonia) Concentration in the Gulf of Paria



US EPA guideline limit of 1.43 uM or 0.02 mg/l is used to indicate chronic toxicity to aquatic life.

2

Key Legislative and Regulatory Tools in Wastewater (Nutrients) Management

- Environmental Management Act (2000).
- Certificate of Environmental Clearance Rules (2001).
- National Environmental Policy, 2006.
  - Helps to achieve environmentally sustainable development
- Draft ICZM Policy Framework, Strategies and Action Plan for Trinidad and Tobago (2015).
- TTS 547: 1998 Water Pollution Rules (2001, 2006)
  - ✓ Specification for the Effluent from Industrial Processes Discharged into the Environment.
- TTS 417: 1993
  - ✓ Specification for the Liquid Effluent from Domestic Wastewater Treatment Plants into the Environment.
- TTS 638 : 2015 (Voluntary).Trade Effluent Standard for Discharge into Public Sewer.

3

Constraints with Management of Industrial Wastewater

Improvement in policies, laws and regulations

- **Enforcement of existing laws and regulations (Water Pollution Rules)**
  - **Technologies to deal with untreated toxic waste**
  - **Permitting system.**
  - **Non-Point Source Pollution Management**
  - **Treatment technology should be mandatory for industries.**
  - **Polluter pay principle needs updating, fee structure improvement.**
- **Fragmented approach to industrial wastewater management.**
- **Many of the industries discharge wastewater into public sewers. Possible cause of traditional WWTP break down- design improvement. Improvement required in the management of industrial wastewater in Trinidad and Tobago.**
- **The Cartagena Convention and LBS protocol highlights domestic wastewater as a priority concern. Little or no action plan for management of Industrial wastewater.**

4

Key Factors Relating to Management of Nutrient Pollution in T&T

Factor	Concern
Low % sewerage coverage	30 % of population centrally sewered. 70% of population sewered by septic tanks and pit latrines.
Mal functioning sewer treatment plants, poor maintenance	Untreated effluents enters environment.
Poor agricultural practices	Deforestation, slash and burn leads to increased surface run-off of nutrients. Siltation, loss of sea-grass beds. Habitat alteration
Untreated industrial effluents	Some wastewater plants may not be designed for type and capacity of wastes.
policies, enforcement, information and awareness.	Environmental policies effectivenes in lowering levels of pollution, Uninformed public. Lack of awareness in environmental matters.

5

On Going Activities in Nutrient Management in T&T

- IDB loan secured in 2013- US$246 million loan for upgrade of waste -water management.
- Includes water recycling for industrial use.
- IMA monitoring capacity
  - National monitoring projects
  - draft ICZM Policy framework

6

3.8

CARIBBEAN WATER AND WASTEWATER ASSOCIATION

2nd Meeting of the Caribbean Regional Platform for Nutrient Management

24th to 25th February 2016

Port of Spain, Trinidad

Patricia Aquing
Executive Director

CARIBBEAN WATER AND WASTEWATER ASSOCIATION

WHO WE ARE

- Largest professional association for water, wastewater and waste management in the Caribbean
- Largest pool of expertise in the water, wastewater and waste management sectors
- Membership: individuals, water and waste management utility companies, private sector, other professional associations
- Established by an Act of Parliament of TT in 1991 (25 yrs old in 2016)

MANDATE

- Research, studies (presented at Annual Conference)
- Capacity Building/ Training for Members
- Technical cooperation activities (projects)
- Included in governance arrangements for regional projects in Water and Wastewater (CReW, IWeco)
- Advocacy
- Technical advice
- Exchange of expertise, information

- Caribbean Water Operators Partnership (CariWOP): joint Secretariat with CAWASA
- UNEP GPA Global Wastewater Initiative (GWI): Caribbean Platform (TOR being reviewed)
- Co-organise the High Level Forum of Caribbean Ministers Responsible for Wastewater (with UNEP Car/RCU, GWP-C)
- Status in Caricom COTED for Water, wastewater and waste management: voice of the professionals

Linkages

- Water sector representative in the Regional Response Mechanism of Caribbean Disaster and Emergency Management Agency (CDEMA)
- Water Sector representative on the **Consortium of Regional Sectoral Early Warning Information Systems across Climate Timescales (EWISACTs)** of the Caribbean Institute of Metrology and Hydrology (CIMH)

- Flagship event : Annual Conference attracts over 400 persons, approximately 60 exhibitors nationally, regionally and internationally

CWWA Conference

HLF 11 Miami 2015

Support for the Caribbean Platform of the GPNM

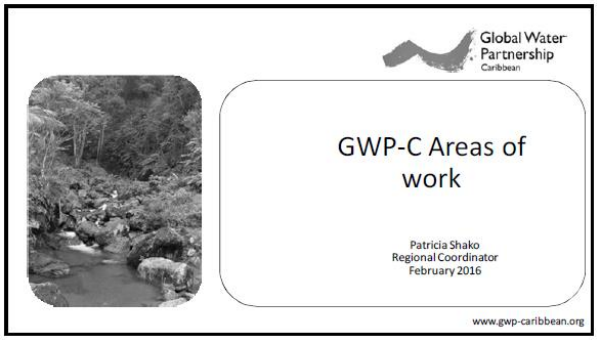
- Research and studies in WW re nutrient management within an established professional forum (Annual Conference)
- Political and policy entry points through the HLF for advocacy (governments, development partners)
- Network of support for work of the Platform through CWWA membership (water utilities, individuals, private sector

25th Silver Anniversary Conference and Exhibition 24-28 October 2016

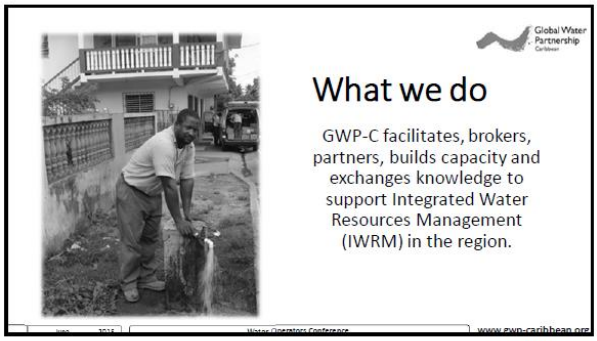
THANK YOU!

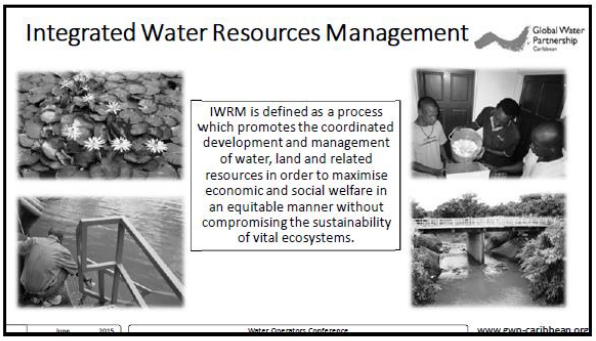
Caribbean Water and Wastewater Association
c/o Water and Sewerage Authority
Farm Road, St. Joseph
Trinidad
Tel: (868) 645 8681
Fax: (868) 645 7849
E:mail: paquing@cwwa.net
Skype: pataquing
Website: www.cwwa.net

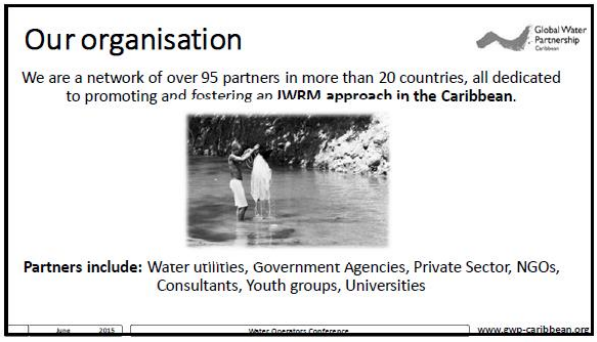
3.9

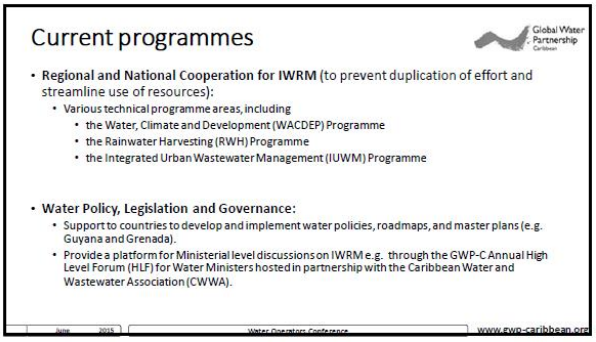

Global Water Partnership Caribbean
GWP-C Areas of work
Patricia Shako
Regional Coordinator
February 2016
www.gwp-caribbean.org


Who we are
GWP-C is a non-governmental organisation (NGO) representing one of thirteen regions of the Global Water Partnership Organisation (GWP-O).


What we do
GWP-C facilitates, brokers, partners, builds capacity and exchanges knowledge to support Integrated Water Resources Management (IWRM) in the region.


Integrated Water Resources Management
IWRM is defined as a process which promotes the coordinated development and management of water, land and related resources in order to maximise economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.


Our organisation
We are a network of over 95 partners in more than 20 countries, all dedicated to promoting and fostering an IWRM approach in the Caribbean.
Partners include: Water utilities, Government Agencies, Private Sector, NGOs, Consultants, Youth groups, Universities


Current programmes
Regional and National Cooperation for IWRM (to prevent duplication of effort and streamline use of resources):
Various technical programme areas, including
the Water, Climate and Development (WACDEP) Programme
the Rainwater Harvesting (RWH) Programme
the Integrated Urban Wastewater Management (IUWM) Programme
Water Policy, Legislation and Governance:
Support to countries to develop and implement water policies, roadmaps, and master plans (e.g. Guyana and Grenada).
Provide a platform for Ministerial level discussions on IWRM e.g. through the GWP-C Annual High Level Forum (HLF) for Water Ministers hosted in partnership with the Caribbean Water and Wastewater Association (CWWA).

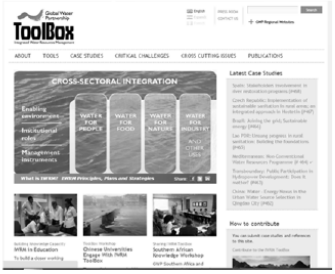
Current programmes

- **Investment Planning and Financing for IWRM**
  - Caribbean Regional Investment Plan for Water and Climate (support to regional agencies working in IWRM), including leveraging of funding for IWRM initiatives
  - National Investment Plans for Water and Climate
- **IWRM Demonstration Projects**
  - Facilitation of projects or support of partners' demonstration projects that provide new knowledge and lessons for IWRM in the Caribbean.
- **Capacity Building on IWRM Sub-themes, including**
  - IWRM as a tool for adaptation to climate change
  - Water and Sanitation
  - Water Use Efficiency

Current programmes

- **IWRM Expertise & Knowledge Exchange:**
  - Information hub for Caribbean IWRM stakeholders.
  - Development of information products on IWRM to support various Caribbean audiences e.g. videos, online databases, technical papers, models.
  - Dissemination of IWRM information and resources using various media including social media.
  - Knowledge exchange on IWRM among the global, regional and national levels.

GWP-C online resources



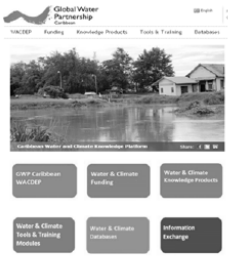
Global Toolbox on IWRM

- Tools
- Case Studies

GWP-C online resources

Caribbean Rainwater Harvesting Toolbox

GWP-C online resources



Caribbean Water and Climate Platform

- Databases of technical experts in IWRM
- Database of IWRM projects in the region

Water Governance

Governance:
"Government's ability to make and enforce rules, and to deliver services"

Water Governance:
"Political, social, economic and administrative systems used to manage water and deliver services."*

Good Water Governance determines:

- health of its people,
- success of its economy,
- sustainability of its natural environment.

*OECD Water Governance Programme - 2015

Case 1: Annual HLF for Ministers of Water

August 2015 - 11th Annual High Level Forum of Ministers Responsible for Water*

- 9 Ministers
- ASG of CARICOM
- supporting Regional Agencies

Recommended support to strengthen:

- policy
- decision making processes
- resource mobilization
- collaboration at regional and national levels
- capacity to support IWRM implementation

*hosted in partnership with the Caribbean Water and Wastewater Association (CWWA)

Case 2: Initiate IWRM in Curacao

Problems

1. Salt water intrusion in wells (agriculture)
2. Flooding associated with sea level rise

Contact initiated by NGO

Met with:

- Government
- Private Sector
- NGOs
- Citizens

Initiate IWRM in Curacao

Focus Areas

- Wastewater treatment and reuse,
- Sources of water for agriculture,
- Aquifer recharge
- Prevention of loss of rainwater
- Flood management

Success Factor

- Identification of change "Champion"

Thank you!

E-mail: info@gwp-caribbean.org
Website: www.gwp-caribbean.org

3.10

FAO's Work Related to Nutrient Management

WHAT IS FAO?

- A Specialized UN Agency
- Mandate: "Achieving food security for all".
  - ensure people have regular access to enough high-quality food to lead active, healthy lives
- Our Offices
  - 194 Member countries
  - 5 Regional Offices
  - 10 Sub-regional Offices
  - 74 Country offices
  - 5 Liaison Offices

FAO AT WORK IN THE CARIBBEAN

The Food and Agriculture Organization of the United Nations (FAO) Subregional Office for the Caribbean implements a Subregional strategic plan based on national consultative processes which prepare a Country Programming Framework (CPF) for each individual country. For the biennium 2014-2015, the FAO Caribbean Region Program Areas were approved at the 33rd Session of the Regional Conference for Latin America and the Caribbean (LARC) in Santiago (May, 2014).

FAO Caribbean Office Strategic Plan 2014-2015

Vision of the Strategy

" A Caribbean free from hunger and malnutrition where food and agriculture contribute to improving the living standards of all, especially the poorest, in economically, socially and environmentally sustainable manner".

FAO CARICOM Strategic Plan 2014-2015 contributes to:

LATIN AMERICA AND CARIBBEAN REGIONAL INITIATIVES (RIs)

- **RI1 -Support to the Hunger-Free Latin America and Caribbean Initiative (SO1, SO3)**
- **RI2 - Family Farming and Rural Territorial Development in Latin America and the Caribbean (SO3, SO5)**
- **RI3 - Improving Food and Feed Systems in the Caribbean (SO2, SO4)**

FAO STRATEGIC OBJECTIVES (SOs)

- **SO 1 - contribute to the eradication of hunger, food insecurity and malnutrition.**
- **SO 2 - increase and improve provision of goods and services from agriculture, forestry and fisheries in a sustainable manner.**
- **SO 3 - reduce rural poverty.**
- **SO 4 - enable inclusive and efficient agricultural and food systems.**
- **SO 5 - increase the resilience of livelihoods to threats and crises.**

FAO Caribbean Strategic Plan 2014-2015: Program Areas

This program fits into and implements in the Caribbean all five strategic objectives (SO) that represent FAO's vision and desired outcomes in terms of hunger eradication and agricultural development; as well as the three Latin America and Caribbean Regional Initiatives.

How We Work

- **Information and Knowledge sharing**
- **Policy advice**
- **Technical Assistance and Expertise**
- **Supporting countries prevent and mitigate risks.**
- **Neutral Forum to facilitate dialogue**

FAO's Work of Relevance to the Platform on Nutrient Management

- **SO 2 - increase and improve provision of goods and services from agriculture, forestry and fisheries in a sustainable manner.**
  - SLM, Integrated Plant Nutrition Management, Water management (Water information systems), pollution
- **SO 4 - enable inclusive and efficient agricultural and food systems.**
  - Value Chains, Food Safety

FAO's Work of Relevance to the Platform on Nutrient Management

- Sustainable Crop Intensification
- CLME+ Project – Executing partner
- Food Losses and Waste
- Thematic Group on CC, NRM and DRM
  - Water pollution
  - Water reuse and recycling
- Food and Feed Systems – Food Safety

Let's work together!

Thanks for your attention

3.11

Global Partnership on Nutrient Management

Draft Operational Plan

Recommendations from 2013 inaugural meeting

February 24-25, 2016
Hilton Hotel, Port of Spain, Trinidad & Tobago

Dr. Clement Lewsey
Director, International Program Office, NOAA

Proposal

- Draft developed from main recommendations of 2013 meeting
- Defined main activity areas
  - Means and approaches for each activity area proposed
- Should be noted that these activity areas as presented are not aligned to the 4 broad work areas of the GPNM at global level
  - Ideally, should seek alignment to make consistent across other regional platforms and at global level

Proposed Indicative Work Plan

- Solicit official national buy-in and commitment
  - disseminate workshop report from May 2013 to corresponding officials agency heads along with proposal for Platform establishment
- Designation of the CPNM Secretariat
  - negotiation with countries reach 'formal' consensus on designation of regional secretariat
- Formal constitution of the Platform
  - Launch event to precede a working session; signatories representing core constituents
- Convene first working meeting of the Platform
  - workshop to review/fine-tune terms of reference, establish rules of procedure, set work priorities, objectives and targets, determine final constituency of Platform

Proposed Indicative Work Plan

- Formulate national chapters/steering committees
  - Country reps to solicit interest in local chapters - gain acceptable representation.
- Awareness-raising at the national level
  - Series of national workshops, consultations - educate on the nutrient challenge, regional Platform, the GPNM.
- National work planning
  - Define national plan of action. Take stock of allied interventions seek out opportunities for new initiatives
- Meeting of regional science agencies to internalize work agenda; coordinate efforts
  - Determine common areas of work/progress through existing initiatives, identify gaps based on national needs. Include conduct of a baseline to assess state of nutrient loading and impacts

Proposed Indicative Work Plan

- Project formulation and resource mobilization for national and regional-level actions
  - Seek out funding opportunities. Include resources to contribute to Secretariat support
- Develop first programme of work
  - To emerge from the national and regional-level consultations - endorsed at a later meeting of Platform
- Review of First Programme of Work and preparation of Second Programme of Work
  - Review of 1st PoW with national and regional stakeholders; preparation of 2nd PoW
- Meeting of Platform - review second programme of work
  - Face-to-face meeting of the Platform members to finalize review of the 1st PoW; formally endorse the 2nd PoW

Proposed Indicative Work Plan

- Participation of Platform at the GPNM steering committee meeting
  - Chair of Platform attend the GPNM Steering Committee to report on progress
- Participation of Platform at the Inter-Governmental meeting of the Cartagena Convention
  - Chair of Platform presents the Caribbean Platform to highlight progress made under the 1st PoW and outlook.
- Participation and the annual general meetings of relevant regional fora
  - Chair and/or designates of the Platform participate at meetings of the Caribbean Week of Agriculture, the Caribbean Water and Wastewater Association, the Caribbean Water and Sewage Association, the Caribbean Alliance of Sustainable Tourism, others
- Contribution to a web presence within the GPNM web portal
  - A Caribbean node on the GPNM web portal 'The Nutrient Challenge' to be established

3.12

Global Partnership on Nutrient Management

Guidance for Facilitated Discussion

February 24-25, 2016
Hilton Hotel, Port of Spain, Trinidad & Tobago

Facilitated by
Dr. Clement Lewsey
Director, International Program Office, NOAA

Recall the meeting objectives

- To understand the current priorities in respect to nutrient management in the region
- To agree on a plan of action for the operationalization of the Caribbean Platform for Nutrient Management
- To agree on mechanisms for mainstreaming and building sustainability for the Platform into existing frameworks
- To identify immediate opportunities from ongoing or planned projects to support nutrient related activities in the region

Orienting the Caribbean Platform

- Aim is to make consistent with Global GPNM work areas
  - Also attempt to harmonize across other regional platforms
- 4 proposed main work areas (inter-connected)
  - Knowledge generation
  - Extension and technical services
  - Outreach and advocacy
  - Governance, partnership and network development

GPNM Work areas:

- **Knowledge generation**
  - Create/develop regional knowledge-base on policy experiences
    - make available through web-based tools
  - Identify key national research needs to fill gaps
  - Advise on development of targets / indicators relevant to region to assess progress (e.g. SDGs, Achi target 8, GPA/IGR-3 Declaration, etc.).

GPNM Work areas:

- **Extension and technical services**
  - Facilitate / develop new approaches, projects on sustainable nutrient management;
  - Secure commitments on regular reporting; publish periodic progressreports;
  - Contribute to dissemination of knowledge and experiences to support actions;
  - Contribute to a global "policy toolbox" on nutrient management;
  - Advise on design of cost-effective interventions;
  - Facilitate exchange of scientific data, methodologies and research applications;
  - Raise awareness and dissemination of information.

GPNM Work areas:

- **Outreach and advocacy**
  - Develop networks among members to establish and strengthen communities of practice;
  - Identify, review and compile best practices; disseminate through web and face-to-face meetings/workshops;
  - Produce Caribbean policy briefs, information documents and case studies;
  - Convene special sessions/side events along margins of global / regional meetings of relevance

GPNM Work areas:

- **Governance, partnership and network development**
  - Hold periodic meetings of the Platform to share experiences and defining agenda for action;
  - Facilitate dialogues for policy reform in support of technological and management innovation to promote nutrient use efficiency.
  - Support countries in the development of required legal/regulatory instruments and fiscal incentives to enhance the ability to make and sustain investments in nutrient management and pollution control

CARIBBEAN PLATFORM OPERATIONAL CONSIDERATIONS

Platform Work (operational) Plan

discussion led by Clement Lewsey

- Priority areas for intervention
  - What are the main/emerging issues of interest
- Contribution of the Platform to ongoing/planned national and regional efforts (mainstreaming & synergies)
  - What is the 'value-added'?
  - Identify key relevant initiatives
  - Linkages to existing frameworks and the global SGD agenda
- Building advocacy
  - Core messages to establish relevance and gain buy-in
- Partnership building
  - How to enlist partners; sectors of interest - wastewater, hospitality, agriculture, fisheries

Governance arrangements

discussion led by Greg Crosby

- Lead national government focal point on the GPNM (global level)
  - Desirous to designate a lead government on behalf of Caribbean region; proactive support to drive policy; serve on global GPNM
  - Rotation of platform chairmanship
  - DOES NOT HAVE TO BE GOVT AGENCY TO CHAIR
- Regional host agency arrangements/expectations
  - Desirous to have a node for Caribbean – to be supported by the GPNM Secretariat
- National representation on Platform national focal point designates, roles/expectations
  - How best can national entitles feed into process?
- Non-governmental representation and roles
  - How best can these entitles support?
- Inter-agency cooperation mechanisms
  - How to gain synergy among various agendas; effectively uptake best practice and draw on experiences

Our task:

- Consider the strategic directions from the first platform meeting
  - Review proposal and validate – activity areas from the meeting
- Reformulate activities as appropriate and align along the 4 core work areas
- Integrate the considerations for platform operationalization
- End result
  - Validated workplan in tabular format
- Discussion format: - plenary?

Building sustainability

discussion led by Chris Corbin

- Resource mobilization
  - Opportunities for international and regional-level funding – dedicated/special projects
  - Existing/planned initiatives the Platform may interface with
- Relationships within established mechanisms
  - Caribbean Regional Seas Programme
    - **Embed the Platform within the Cartagena Convention LBS Protocol**
  - OECS; CARICOM environmental governance frameworks
- Private and non-governmental stakeholder engagement
  - Approaches for establishing relevance; gaining buy-in
- Communications and outreach strategy
  - Enhancing communications both within the platform and with external audiences

Work plan format

Main Activities	Means and approaches (detail)	Lead entities for actions						Timeframe			
		National	Regional				Global	Year One		Year Two	
		National Gov't Agencies	Agency A	Agency B	Agency C	---	GPNM	First half	Second half	First half	Second half
1. Knowledge generation											
Activity X	XXXX	X			X		X		X	X	
2. Extension and technical services											
Activity X	XXXX	X		X							X

Questions?