Workshop on Environment Statistics

San Ignacio, Belize, 2 to 11 August 2000

United Nations Statistics Division
Report of the Workshop

I. ORGANIZATION OF THE WORKSHOP

1.   The Workshop was organized by the United Nations Statistics Division (UNSD) in collaboration with the Caribbean Community (CARICOM) Secretariat in San Ignacio, Belize from 2 to 11 August 2000. The Workshop was hosted by the Central Statistical Office of Belize. Administrative support was also provided by the United Nations Development Programme (UNDP) of Belize.

2.   Twenty-nine participants from the fifteen Member States of CARICOM attended the Workshop, and in most cases, one was from the national statistical office and the other from the environmental agency. The following institutions also participated in the Workshop: the Caribbean Development Bank, the Caribbean Tourism Organization, Caribbean Planning for the Adaptation to Global Climate Change, the Philippines National Statistical Coordination Board, Statistics Sweden, the University of Technology and the United Nations Division for Sustainable Development. The full list of participants is attached as Annex 1.

II. OPENING SESSION (agenda item 1)

3.   Mr. Sylvan Roberts, Chief Statistician of the Central Statistical Office of Belize (CSO) delivered the opening address and welcomed the following persons that participated in the official opening ceremony: the Honorary Mr. Servulo Baeza, Minister of State in the Ministry of Natural Resources, Mr. Orlando Habet, Mayor of San Ignacio and Santa Elena town, Ms. Consuelo Vidal, Deputy-Resident Representative, UNDP-El Salvador, Ms. Reena Shah and Mr. Yacob Zewoldi, UNSD, Mr. Lowell Flanders, United Nations Division for Sustainable Development, Ms. Anya Thomas, CARICOM Secretariat and as well as the delegates of the participating CARICOM Member States and the representatives from the United Nations and its specialized agencies. Following are other welcome statements.

4.   Mr. Zewoldi of UNSD, thanked the Government of Belize for hosting this Workshop and welcomed the participants. He mentioned that the Workshop was part of the project "Strengthening Capacity in the Compilation of Statistics and Indicators for Conference Follow-up in the CARICOM Region" whose Implementation Plan was endorsed by the Standing Committee of Caribbean Statisticians (SCCS) that met in Georgetown, Guyana from 10 to13 January 2000. He reiterated the goals of the Workshop, that were as follows:

- to familiarize the participants with concepts and methods of environment statistics;
- to provide a forum for exchange of information on the status of environment statistics at the national level;
- to promote a regional programme of environment statistics; and
- to develop an outline of a regional publication on environment statistics.

5.   Mr. Habet, Mayor of San Ignacio and Santa Elena town, welcomed the participants on behalf of the Town Council and the people of the twin towns of San Ignacio and Santa Elena. He noted that environment statistics were important to monitor environmental issues in Belize, such

as river pollution, changes in natural habitat for flora and fauna, and the increasing intensity and size of flash floods precipitated by deforestation.

6.   Ms. Vidal, Deputy Resident Representative, UNDP-El Salvador, raised the issue of the environment being integrated into the human and sustainable development debate, and that the time had come for statistics to catch up with the myriad of activities and initiatives in this area. In addition, she noted that developing accurate statistics and, more importantly, the skills to translate them into useful, people-focused policies and programmes, was becoming more and more urgent.

7.   Mr. Baeza, Minister of State in the Ministry of Natural Resources, stressed that data should be relevant to people's lives and cautioned on the potential for misuse of statistics, especially those that were highly aggregated. Statisticians should thus endeavour to present data in an easily comprehensible manner both to the public and to policy makers. He also emphasized that statistics should be verifiable and objective.

8.   Ms. Thomas of the CARICOM Secretariat, pointed out that the Workshop was timely for the CARICOM Member States and emphasized the need for information generation in order to avoid erroneous and costly policy decisions. She stressed that the CARICOM Secretariat would employ every effort to support both the national programmes in the implementation of the United Nations Project and the implementation of sustainable development policies in its Member States.

9.   A vote of thanks was given by Mr. Edgar Ek of the Central Statistical Office of Belize on behalf of the participants.

III. ADOPTION OF AGENDA AND WORK SCHEDULE (agenda item 2)

10.   The provisional agenda and work schedule were adopted by the Workshop (Annex 2). The list of documents presented at the Workshop is attached as Annex 3. It was agreed that the chairing of the Workshop would be shared by the following persons: Mr. Sylvan Roberts, Mr. Yacob Zewoldi, Ms. Reena Shah, Mr. Selwyn Allen, Mr. Franck Jacobs, Ms. Anya Thomas and Ms. Vidiah Ramkhelawan.

IV. PRESENTATION OF THE CARICOM PROJECT (agenda item 3)

United Nations Statistics Division
11.   Mr. Zewoldi described the overall objective of the Project as strengthening intra-regional cooperation among national statistical systems and developing a critical mass of statisticians in the CARICOM region. The Project would, inter alia, reinforce existing south/south networks and create opportunities for experts to learn from their peers in order to diminish isolation of national offices.

12.   An assessment of the statistical situation was carried out with missions to nine of the fifteen CARICOM Member States from 15 August to 8 September 1999. The purpose of the assessment was to determine the needs of countries in the region in the fields of social/gender statistics, environment statistics, and information technology (IT). The assessment in environment statistics addressed the following issues:- (a) the situation of environment statistics in the national statistics offices; (b) institutions in the country responsible for environment statistics; (c) linkages between the national statistics office (NSO) and environment-related institutions including other government offices, research institutions, universities, monitoring stations and laboratories; (d) major environmental concerns; (e) data requirements, e.g. reporting requirements to major environmental conventions; (f) data availability for environmental concerns in the region drawing upon lists of environmental indicators at international level; (g) training requirements in environment statistics in the NSO and related institutions, including frameworks, concepts, methods and definitions, data sources, preparation of analytical reports, (h) requirements for technical advisory services; and (i) training facilities in the region.

13.   The assessment missions noted that despite the efforts of the national statistics offices and regional institutions to develop and strengthen statistical capacity in the CARICOM Member States, the following gaps still remain in the areas of:

- **statistical coordination**: There have been attempts to improve coordination among the main data producing and data using institutions in some of the countries, but these have not been sustained over a sufficiently long period.

- **environment statistics:** At the regional level, environment is a relatively new area and there is no agreed list of environmental indicators for the region. There is a lack of basic environment statistics in most of the countries visited. Data are available for some of the environmental issues but they are dispersed among many different sources and are not routinely compiled. There is a need for more training specifically with regard to the overall concepts, methods and classifications for the compilation and dissemination of environment statistics.

14.   In mid-June 2000, UNSD recruited two United Nations volunteers under the Project, one information technology expert and one statistician, to assist the CARICOM Secretariat in enhancing its capacity in both information technology and in statistics, and provide substantive support to the Project. UNSD will provide some ad-hoc technical advisory services as well as organize study tours during the Project subject to the availability of resources.

15.   One of the main outputs of the Project will be the publication of two analytical reports on environment and social/gender statistics based on data supplied by countries. The Workshop should result in an agreed list of environmental statistics and indicators to be compiled on a regional basis by CARICOM. The participants in the Workshop are expected to form a network of experts in the field of environment statistics, which will collaborate with UNSD and CARICOM in the compilation of statistics and indicators relevant to the region from their respective countries in the production of the analytical report which will be printed towards the end of 2001.

V. INTERNATIONAL AND REGIONAL PROGRAMMES OF ENVIRONMENTAL STATISTICS AND INDICATORS (agenda item 4)

United Nations Statistics Division

16.   Ms. Reena Shah provided a historical perspective of the development of environmental statistics and indicators at the international level, ranging from the Stockholm Conference of 1972, through the Rio Conference of 1992.   She observed that, contrary to the field of economic accounting as in the System of National Accounts (SNA), in the area of environment statistics there was no common underlying theory and numJraire (such as the market price). Rather than developing a system of environment statistics, UNSD proposed a *Framework for the Development of Environment Statistics* (FDES) in 1984 that was endorsed by the United Nations Statistical Commission in 1985. She further explained that FDES was a description of statistical topics reflecting general environmental concerns but did not contain statistical variables, indicators, classifications, tabulations or methods of data collection. However, those variables were described in follow-up publications: *Concepts and Methods of Environment Statistics: Human Settlements Statistics* and *Concepts and Methods of Environment Statistics - Statistics of the Natural Environment*.

17.   Ms. Shah noted that the two technical reports contained over a thousand statistical variables that were found to be overwhelming by countries just embarking on environment statistics programmes. Ms. Shah, therefore, described the development of a list of approximately fifty environmental statistics and indicators that was produced in collaboration with the Inter-governmental Working Group on the Advancement of Environment Statistics and approved by the Statistical Commission for international compilation by UNSD in 1995. UNSD developed a Questionnaire on Environmental Indicators that was circulated to all non-OECD countries in 1999. These fifty variables represent a subset of the broader list of sustainable development indicators of the Commission on Sustainable Development (CSD) and UNSD collaborated with the United Nations Division for Sustainable Development in this regard. Ms. Shah noted that both these lists developed by UNSD and the CSD were used as reference points in the development of the list of environmental statistics and indicators that was included as Annex 4 in the Implementation Plan for the CARICOM project. The list contained in the Implementation Plan is reproduced in this report, also as Annex 4.

18.   With regard to environmental accounting, Ms. Shah explained that conventional national accounts, in their assessment of cost and capital, neglected new scarcities of natural resources, as well as the degradation of environmental quality. She noted that the System of integrated Environmental and Economic Accounting (SEEA) was developed by UNSD as a satellite system of the SNA to analyze environmental and economic concerns in a common and flexible framework. A *Handbook of Integrated Environmental and Economic Accounting* was published by UNSD in 1993 and an "Operational Manual on Integrated Environmental and Economic Accounting" will be published by UNSD and the United Nations Environment Programme (UNEP) later this year.

Division for Sustainable Development

19. 	Mr. Lowell Flanders presented an overview of the work of the United Nations Division for Sustainable Development. He noted that the Commission on Sustainable Development (CSD), at its third session in April 1995), approved a work programme on indicators of sustainable development. The work programme included a list of 134 indicators organized in the Driving Force-State-Response (DSR) framework. In this framework, Driving Force indicators represent human activities, processes and patterns that impact on sustainable development, State indicators denote the "state" of sustainable development, and response indicators refer to policy options and other responses to changes in the state of sustainable development.

20. 	In order to assess the appropriateness and validity of the list of indicators and related methodologies, twenty-two countries from all regions of the world volunteered to test the indicators. The countries did not find the DSR framework very useful. A new approach was therefore developed using themes and sub-themes of sustainable development and using the original approach of the four dimensions of sustainable development as a backdrop to set the stage for the selection of a core set of indicators of sustainable development. The newly proposed list of indicators consists of 15 different themes (equity, health, education, housing, security, population, atmosphere, land, oceans, seas and coasts, freshwater, biodiversity, economic structure, consumption and production patterns, institutional capacity, and institutional framework), with 40 sub-themes and 59 core indicators.

21. 	Mr. Flanders noted that there were over 300 definitions of sustainable development but no precise or operational definition thereof. He presented the objectives of indicator development and criteria for indicator selection. In addition, he highlighted the weaknesses of aggregated indicators and cautioned that it was difficult to draw conclusions from a single indicator or index. He stressed the importance of each country developing its own approach, starting with a core set of indicators.

CARICOM Secretariat

22. 	Ms. Anya Thomas described the Programme of Action (POA), the main outcome of the United Nations Global Conference on the Sustainable Development of Small Island Developing States (SIDS) that was held in Barbados in 1994. The POA presents a basis for action in 14 agreed priority areas and defines a number of actions and policies related to environmental and developmental planning that should be undertaken by SIDS with the cooperation and assistance of the international community. She noted that the CARICOM region had seen the onset of, inter alia, Agenda 21, the POA and multilateral environmental agreements and that meeting their obligations and reporting requirements all demanded the collection of environmental statistics and indicators.

23. 	Ms. Thomas indicated that although countries in the region had attempted to draw up National Environmental Action Plans, there was still a lack of reliable and timely information that could form the basis of sound policy decisions. She noted that the Member States, as well as the CARICOM Secretariat, needed to develop and strengthen existing national and regional programmes of environment statistics respectively.

University of Technology
24.　　Dr. Earl Brown provided an overview of the programmes and activities of the University of Technology (UTECH), particularly in the area of statistics. He pointed out that UTECH wanted to play a larger role in developing training programmes in environment statistics and that he hoped that the Workshop would provide some guidance on the regional needs to enable UTECH to best direct their work.

Caribbean Development Bank
25.　　Mr. Clairvair Squires mentioned that the Caribbean Development Bank (CDB), as a development agency and the agency responsible for the coordination of the Sustainable Development Indicators (SDIs) programme of the SIDS/POA, was obligated to assist in the determination of SDIs in a broader perspective. He stated that CDB have had close ties with UNSD in sharing information and programmes in the development of indicators at the international and regional levels. He said that both the United Nations Division for Sustainable Development and UNSD were represented at a CDB/CIDA conference held in Barbados to discuss and to agree as far as possible among CARICOM Member States, agencies and academia, on a generic set of SDIs.

26.　　With regard to a regional programme Mr. Squires said that CDB was still seeking donor assistance for the countries to fund a national consultation process to adapt generic set of indicators to their individual country situation. He also felt that there was a need to examine the entire monitoring and evaluation system of SDIs to identify resources, information dissemination, requirements for training and public education, standards and lessons to be learnt for the review and revision of the system for the SDIs. National focal points should be set up to ensure that all persons involved in the development of indicators are brought together along with other sectoral specialists and other relevant professionals, private sector, NGOs etc. All the sets of indicators could be used by the countries who may add or subtract from these lists. He indicated that CDB would continue to formulate a regional mechanism which could assist the SDIs development process. He said that after implementation of the SDI programme, Governments would have to commit to the on-going operations of programme by providing the required resources and appropriate responses to the changes in environmental quality and overall quality of life.

VI. PRESENTATION OF COUNTRY PAPERS (agenda item 5)

27.　　The list of indicators contained in Annex 4 was sent to the countries before the Workshop and was used in the preparation of the country papers. Annex 5 reflects a summary of the data availability for these indicators as found in the papers.

Antigua & Barbuda
28.　　Mr. Franck Jacobs introduced his presentation with a description of Antigua's geographical characteristics. He pointed out that in the past there has been no particular focus on the development of environment statistics. Antigua is a signatory of various international environmental conventions and treaties. It was stressed that the implementation of the regulations adopted in these treaties was inhibited by a lack of cooperation among some agencies.

No current action plan exists but a proposal has been made. Mr. Jacobs presented in detail the data available and their sources for the environmental topics listed in Annex 4 of the Implementation Plan for the CARICOM Project.

The Bahamas
29.	Ms. Lorca Bowe noted that the main problem with respect to the current situation in the development of environment statistics was a lack of institutional capacity and trained human resources. Another problem was the multitude of islands that constitute the country. Most of the nation's natural resources and habitats remain undocumented and unmonitored. Ms. Bowe pointed out that although environmental data were available, they were generally not accessible to the public as they were mainly held by research institutes. As major environmental challenges she listed urbanization and its apparent problems, such as illegal squatter settlements, insufficient sewerage and waste collecting systems and increased coastal zone settlements. Another issue was the apparent weak institutional capacity to manage natural resources and biodiversity.

Barbados
30.	Ms. Amrikha Singh pointed out that most of Barbados' population of 267,400 lives along the coastline, thus creating a series of threats to its natural environment. The development of environment statistics could rely on the traditional awareness of the public on environmental issues. Ms. Singh explained that data collection in fishery started as early as in the 1950's. Thus far, about 159 indicators have been identified for socio-economic and environmental topics. A first pilot study that was conducted in 1996 indicated that the major data sources were widely spread across the different governmental institutions. In 1998, a workshop on Sustainable Development Indicators further promoted the development of environment statistics. A Steering Committee is now implementing the National Indicators Programme.

Dominica
31.	Ms. Augustina Robinson stressed the fact that Dominica lacked a comprehensive strategy for environmental data collection and compilation, and that to date almost no data documentation existed. She explained further that environmental issues fell under the responsibility of various institutions, e.g. the Forestry Division, the Pesticide Control Board and the Ministry of Agriculture and the Environment. Data collection was carried out mainly by the Central Statistics Office, the Division for Physical Planning, the Ministry of Health and the Water and Sewage Companies, DOWASCO and DOMLEC. Ms. Robinson pointed out that while Dominica is a recipient of various funds these mainly cover technical assistance for limited projects but there is a lack of institutional capacity building and implementation of their recommendations.

Grenada
32.	Ms. Kenita Paul began her presentation with a general introduction to Grenada's geographical and socio-demographic characteristics. She pointed out that although the country does not yet have the necessary capacities to implement a full system of environmental statistics, data collection was of great concern and considered as very important to assist in policy making. The government has recently embarked on its Biological Diversity Strategy and Action Plan (GBSAP) under the Convention on Biological Diversity. As a basis for the development of the plan an assessment of the following key sectors was made: land use and environmental planning,

agriculture and forests, wildlife, fisheries, marine and coastal areas, tourism as well as the identification of data gaps.

Guyana
33.   Ms. Monica Sharma noted that in Guyana environment statistics was a very new field and although data sources may be available, they still needed to be fully identified. Many agencies in place were not aware of what environmental data they have and Ms. Sharma expressed the urgent need for staff training. Guyana recognized the importance of data collection to evaluate and protect Guyana's rich natural environment.

Haiti
34.   Mr. Pierre Jacques Vil explained that Haiti faces serious environmental problems due to its rapid population growth. Mr. Vil pointed out that basic indicators on population and natural resources and the environment must serve as a guideline for policy making to address the current key issues. He noted the following as the main environmental issues in Haiti: coastal zone management (destruction of mangroves), land and soil (erosion), forest (deforestation), biodiversity (threatened species), freshwater (depletion of natural reserves), waste (solid waste generation) and energy (mainly charcoal used as fuel). The agencies that are compiling and disseminating relevant data are the Department of the Environment, the Ministry of Agriculture, non-governmental organizations and the Central Statistical Office.

Jamaica
35.   Ms. Janet Martin pointed that Jamaica established a first Environmental Action Plan in 1995 but there still exists deficits in data availability. The Natural Resources Conservation Agency (NRCA) has produced two State of the Environment reports in 1995 and 1997. The Statistical Institute of Jamaica (STATIN) has recently established an environment statistics unit and NRCA and STATIN will produce a joint compendium on environment statistics in 2001. STATIN noted that once established, environmental statistics and indicators would provide very useful input for natural resource accounting.

Montserrat
36.   Mr. Trevor Howe stressed the special circumstances of a highly active volcano that deeply affected the small island's socio-economic and environmental development. Due to the eruption of the volcano more than 50% of the country's total population needed to be relocated to the North of the island within forty-eight hours. This led to serious overcrowding, waste management problems, increased air pollution due to fossil fuel burning and worsened sanitary conditions. The responsible agencies for addressing these issues and the development of a programme of environment statistics were the Ministry of Health, the Ministry of Environment and other agencies. Mr. Howe pointed out that although the eruption destroyed many of the data records from the past, Montserrat had a relatively good coverage of data for the major environmental indicators. Current activities included the draft of a National Environment Management Policy with assistance from NRMU, the enforcement of sand-mining regulations, the enforcement of a Turtle Protection Act as well as the processing of present projects and staff training. Mr. Howe noted that there were weaknesses in the following areas: lack of political commitment, staff, resources, coordination, standards, office space and laboratory facilities.

St. Kitts & Nevis
37.   Mr. Lindsey Archibald provided a brief description of the geographical and demographical characteristics of his country. St. Kitts and Nevis consists of two small islands in the Eastern Caribbean Sea. The combined size is about 104 sq. miles with a population of 45,000. Economically most important was the sugar-cane growing industry together with an increasing tourism industry. He indicated that the data sources for the main environmental issues in St. Kitts were dispersed and included the Department of Environment, the Department of Water Resources, the Ministry of Trade and Industry, the Ministry of Tourism and the Department of Agriculture.

St. Lucia
38.   Ms. Donnalyn Charles described the situation regarding environment statistics in St. Lucia as similar to many of the small island countries: presently, no report on environment statistics is generated, little information (both quantitative and qualitative) on environmental issues is available and most of it is widely spread amongst the different ministries and other agencies (e.g. Fisheries Department, Agriculture Department and Forestry Department). In order to merge this information, a common format needed to be agreed upon. Ms. Charles elaborated further that in the past Saint Lucia conducted a few one-time projects such as the Greenhouse Gases Emission Inventory and some data were collected periodically. She also emphasized the need for institutional and financial support to establish a functioning system for the compilation of environment statistics.

St. Vincent & the Grenadines
39.   Mr. Gregg Francois explained that in St. Vincent the Ministry of Health and the Environment was the coordinating ministry but not the executive ministry for the development of environment statistics. The data situation was similar to that of many of the Caribbean countries: some relevant information was available but usually scattered across various agencies. Due to a lack of coordination this information was not easily accessible. Mr. Francois mentioned that some progress was achieved with the country's participation in the CPACC agreement and the establishment of an Environmental Services Unit in 1998. As a major drawback in the development of environment statistics, Mr. Francois considered the neglect of the development of a meta-database as was recommended by CPACC.

Suriname
40.   Mr. Nathaniel Heyde explained that the first environmental protection policies date back to 1948 but that the country had never been forced to make extensive use of its natural resources, including minerals, rain forest and gold. With increasing challenges due to globalization environmental issues were increasingly debated. The National Council for the Environment (est. 1997) was in charge of establishing an environmental management structure in cooperation with the involved Ministries. The council was placed at the highest level – under direct supervision by the Cabinet of the President. Its executing agency was the National Institute for Environment and Development (NIMOS). The institute consisted of 8 offices: Administration, Environment and Social Assessment, Environmental Monitoring and Enforcement, Environment Legal Services, Environment Planning and Information, Environment Public Education and Outreach, Environment Funding and Investments and Environment Research.

Trinidad and Tobago

41.　　Ms. Vidiah Ramkhelawan noted that in Trinidad and Tobago environment statistics have not received high priority so far as the focus had been on socio-economic statistics. The country's main industry was petroleum refinery, which associated a series of environmental impacts and concerns. Much of the data available in this area were proprietary but an envisaged environmental clearance certificate aimed at making this information publicly available. Furthermore, much of the data collected by government agencies was lost due to improper archiving techniques. The main data processing agency was the Central Statistical Office. Others included the Institute of Marine Affairs, the Solid Waste Management Company Limited, the Water Resources Agency and the Ministries of Environment and Energy. As a step forward, the government passed the Environmental Management Act in 1995, which provided a comprehensive legislative framework for sound environmental policies and practices.

VII.　ENVIRONMENTAL STATISTICS AND INDICATORS: CONCEPTS, METHODS AND USE (agenda item 6)

Uses of environment statistics (Statistics Sweden)

42.　　Mr. Polfeldt described environment statistics as including both the natural environment and human settlements. He noted that the main uses of such statistics by government were for the purposes of:

- formulating policies
- planning
- formulating laws and regulations
- designing market instruments
- follow-up on measures taken
- assessment of results achieved
- public participation

43.　　He indicated that governmental decision-making often involves the following chain of events:

$$\text{Recognition} \wedge \text{Policy} \wedge \text{Solution} \wedge \text{Control}$$

Mr. Polfeldt noted that with reference to statistical data, the typical situation was the following: recognition would depend on some overview data; policy formulation implied further and more detailed data needs; solution was followed up by the detailed data; and control would be supported by continued detailed data.

44.　　In addition to government, Mr. Polfeldt noted that there were other users such as NGOs, political parties, media, research, the educational system and individuals. However, it is not always easy to understand all the needs of the various users, besides government, and it was suggested that a holistic approach to identifying environmental issues, environmental statistics and indicators, data sources and data availability be taken.

A Framework for the Development of Environment Statistics (UNSD)

45.   Ms. Reena Shah described the nature of and different approaches to the organization of environment statistics, namely the media approach, the stress-response approach, the resource accounting approach and the ecological approach. The media approach organizes environmental issues from the perspective of major environmental components of air, water, land/soil and the man-made environment. The stress-response approach focuses on impacts of human intervention within the environment (stress) and the environment's subsequent transformation (environmental response). The resource accounting approach aims at tracing the flow of natural resources from their extraction (harvest) from the environment, through successive stages of processing and final use, to their return to the environment as waste or to the economic sector for recycling. The ecological approach includes a variety of models, monitoring techniques and ecological indices. She introduced the FDES, which is a combination of the media and stress-response approaches.

46.   She described the purposes of the FDES, namely to review environmental problems and concerns, determine statistical topics, identify statistical variables, assess data requirements, sources and availability, and to structure databases, information systems and statistical publications. The main properties of the FDES are flexibility, consistency and comprehensiveness. Ms. Shah presented its format, that relates components of the environment, i.e. flora, fauna, atmosphere, water, land/soil and human settlements, to information categories consisting of: social and economic activities, and natural events; environmental impacts of activities/impacts; responses to environmental impacts; and inventories, stocks and background conditions. The information categories reflect a sequence of action, impact and reaction.

47.   Ms. Shah also presented the two technical reports that are based on the FDES: *Concepts and Methods of Environment Statistics: Human Settlements Statistics* and *Concepts and Methods of Environment Statistics - Statistics of the Natural Environment*. She described the structure of these reports that provide detailed sets of statistical variables to facilitate the identification and selection of statistical series for national and international data collection.

Other international frameworks and their major differences (UNSD)

48.   Ms. Shah described the Pressure-State-Response model (PSR) developed by the Organization for Economic Cooperation and Development (OECD) that is similar to the FDES. An even more detailed approach is the Driving force-Pressure-State-Impact-Response model (DPSIR) developed by the Statistical Office of the European Communities (Eurostat) and the European Environment Agency.

49.   The FDES is divided into four categories as described earlier. The PSR and DSR frameworks have three categories, pressure/driving force, state and response and are cross-related to issues in the PSR and to chapters of Agenda 21 in the DSR. The main difference between the FDES and the PSR/DSR frameworks lies with the state category in the PSR/DSR and the breakdown, scope and coverage of the different categories. In the FDES this category is divided into two categories, the impacts and the inventories/stocks/background conditions while in the PSR/DSR these two categories are combined to make one, state, category. The reasons for the FDES approach are twofold. Firstly, it allows for the separation between the stocks and the flows

or changes in stocks. Secondly, the inventories category provides a direct link between the stock data presented in this category and the flow categories of quantitative and qualitative change in stocks by means of natural resource accounting.

50.   The main differences between the FDES and the DPSIR with regard to the categories are that the FDES has four and the DPSIR has five. Indicators that are presented under the 'Inventories, stocks and background conditions, 'Activities' and 'Impact' components in the FDES framework, are presented for each category in two different components thus: 'Driving Forces' and 'State'; 'Driving Forces' and 'Pressure'; and 'State' and 'Impact'; respectively, in the DPSIR framework. The DPSIR framework requires very detailed statistics and in countries that are just embarking on the development of environment statistics and where data availability is limited, the FDES framework might be simpler to use than the DPSIR framework in this regard.

Application of the FDES to the Philippines (National Statistical Coordination Board)

51.   Ms. Estrella Domingo presented the experience of the Philippines in the implementation of the United Nations FDES, namely the PFDES. She described the steps taken in the development of the PFDES, that were the review of the country's environmental concerns, the establishment of the organizational structure and institutional linkage, the learning of the United Nations FDES, the development of the conceptual framework, the development of the statistical framework, the data assessment and the compilation of the PFDES.

52.   The framework provided the basis for coordinating, organizing and assessing, and collecting environment statistics. It helped identify data gaps that could be filled over time. Ms. Domingo pointed out the usefulness of the United Nations FDES in establishing the environment statistics programme in the Philippines. She concluded by noting that the PFDES was currently being institutionalized and that it would continue to be revised/improved to make it more useful and attuned to the current needs of environmental planners and policy-makers.

Development of Environmental indicators (UNSD)

53.   Ms. Shah described the development of environmental indicators from environment statistics. She also presented the differences between raw data, statistics, indicators and indeces. She noted that to date, no single, widely-applied definition of an indicator existed. However, from several definitions, an indicator could generally be characterised by two basic elements:

- it is a statistic, fact, measurement, statistical series (quantitative) or some form of evidence or perception (qualitative)
- it has a purpose of defining objectives, assessing present and future direction with respect to goals and values, evaluating specific programmes, demonstrating progress, measuring changes in a specific condition or situation over time, determining impact of programmes and conveying messages.

54.   Ms. Shah desribed some of the criteria for indicator selection, including the following: policy relevant, specific, valid, reliable, sensitive, measurable, user friendly and cost effective. She, however, noted that in several lists of environmental indicators, including that in Annex 4,

there was not always a clear distinction made between a statistic and an indicator and that the list contained variables from both.

First Working Group Session on the Selection and Use of Indicators (UNSD)

55.   Ms. Shah described the objectives of the first working group session. She explained that the proposed list of environmental indicators that was included as Annex 4 of the Project Implementation Plan and endorsed by the Standing Committee of Caribbean Statisticians (SCCS) that met in Georgetown, Guyana from 10 to13 January 2000 was to be consulted during the session. The list was since revised in light of further research on the major environmental issues in the region, data sources and data availability. The list was used in preparation of the joint country paper submitted to the Workshop.

56.   Ms. Shah further explained that the list of indicators would be used as a starting point for discussion at the Workshop for a regional programme of environment statistics. The list was based on a number of different sources at international, regional and national levels. In drawing up the list, a balance between data demand and supply was kept in mind. It was hoped that by the end of the workshop, a consensus for a list of regional environmental statistics and indicators would be achieved that would be used for the regional publication on environment statistics, one of the main outputs of the project. Ms. Shah also indicated that the list focused only on environmental statistics and indicators, with the understanding, however, that environmentally-related socio-economic and demographic statistics would be incorporated into both national and regional compilation and dissemination of environment statistics.

57.   The participants were divided into 4 groups with the following country representation:

Group 1	Group 2	Group 3	Group 4
Antigua	Antigua	Bahamas	Bahamas
Belize	Belize	Barbados	Barbados
Dominica	Dominica	Haiti	Belize
Grenada	Guyana	Montserrat	Jamaica (x 2)
St. Kitts	St. Kitts	St. Vincent	Suriname
St. Lucia	St. Vincent	Suriname	Trinidad
	Trinidad		

Before the working groups convened, Ms. Shah explained that the groups were expected to discuss the following issues using the list of proposed indicators in Annex 4 as a starting point:

- What are the priority environmental issues and/or the statistical topics in your country?
- What are some of the statistical variables/indicators that reflect each of these issues/topics?
- Which indicators exist in your country?
- Are the data readily available for the selected indicators?
- Who are the main data users for the selected indicators?
- Does the proposed list of environmental indicators fully reflect these priority issues?
- Are there priority indicators for your country, which are not included in the list?

The groups were asked to report back to the plenary upon completion of the discussion. Annex 6 contains a summary of their findings.

VIII. COLLECTION AND COMPILATION OF ENVIRONMENT STATISTICS (agenda item7)

Data sources for environment statistics (Statistics Sweden)

58.   In his presentation, Mr. Polfeldt stressed the fact that environment statistics were very complex in nature and were usually obtained from widely dispersed sources. It was thus a challenge to identify and tap all these sources and at the same time work with data that have different characteristics. The main data sources were classified by Mr. Polfeldt as survey data, register data, monitoring data and sometimes project and research data. The latter were often one-time data collection efforts and limited in scope, and in spatial and temporal coverage. Mr. Polfeldt elaborated on the characteristics of statistical data, namely:

- national coverage
- repeated at regular intervals
- data comparable over time
- quality aspects are mainly under control
- definitions, categories are selected according to needs for information

59.   Survey data often needed modifications such as regrouping or selection before being usable for environmental issues. Add-on surveys were more cost and time efficient than new specifically designed surveys. Examples of full-scale surveys included the use of fertilizers and pesticides in agricultural holdings, industrial waste, environmental investments and running costs in industry. Furthermore, Mr. Polfeldt noted that one also needed to distinguish between primary and secondary sources.

60.   Examples of registers were motor vehicle registers, licenses for mining and forestry operations, connection to utilities such as gas, electricity etc. and protected areas. Mr. Polfeldt pointed out that registers were maintained for other purposes than statistics, which may affect the applicability of the data to issues of interest.

61.   Mr. Polfeldt explained that monitoring data were characterized by:

- physical measurements based on scientific instruments
- carried out by many agencies sometimes using different methods
- refer to specific points in time and location
- raw data requiring aggregation and analysis

An important problem was how representative monitoring data are with respect to spatial and temporal generalization and also how meaningful they were.

62.   Finally, Mr. Polfeldt described data from research and projects as useful supplements for areas where no other data were available but noted that they were often limited in coverage and applicability.

63.   During the one-day field trip to Belmopan, Ms. Shah gave a computer presentation of international data sources available on the Internet, focusing on those that contain relevant data for the CARICOM region.

National experiences in the compilation of environment statistics

64.   During this agenda item, two countries, Belize and the Philippines, made in-depth presentations about their experiences in the compilation of environment statistics.

Central Statistical Office of Belize

65.   Mr. Edgar Ek gave a brief overview of the main geographic, demograhpic and economic characteristics of Belize. He explained in detail the organizational structure of the Central Statistical Office (CSO). He mentioned that the Environmental Statistics Unit was established in 1996 and that the Unit was fully operational in July 1998. The CSO was responsible for the identification of environmental issues in Belize, the revision of data sources, data compilation from other sources, the regular publication of a compendium of environment statistics and the conduction of surveys. A first Compendium of Environment Statistics was published in 1999 with the support of a consultant from Statistics Sweden and the second edition was just released. Mr. Ek pointed out that four environmentally relevant questions were incorporated in the Census 2000. Future plans included the full utilization of all surveys conducted by the CSO and the regular publication of the compendium. As problems, Mr. Ek identified the lack of human and financial resources, the lack of cooperation among the agencies and the lack of continuous data.

66.   During the one-day field trip to Belmopan, Mr. Ek introduced the participants to the publishing program used by the CSO for the second edition of the Compendium of Environment Statistics just released.

Philippines National Statistical Coordination Board

67.   Ms. Estrella Domingo explained that the rationale for compiling the PFDES arose from the problems of the country in terms of its environment statistics, which were disorganized, lacking reliability, inadequate, and not disseminated. She noted that it was only recently that environment statistics in the Philippines was given more focus. The statistical agencies, especially the National Statistical Coordination Board (NSCB), started environmental data collection as inputs to its environmental accounts and the PFDES. Other statistical agencies, on the other hand, have just started to incorporate this into their surveys and censuses. The environmental and other agencies have been collecting environmental data as part of their administrative records. She mentioned that the methods used for collecting environmental data were surveys, administrative records as well as research case studies and she enumerated the problems encountered in using each method.

68.   Ms. Domingo described the development of the Philippine Compendium of Environment Statistics (PCES) and provided an outline of its contents. She indicated that in this initial publication the conceptual and statistical frameworks as well as the data assessment were

presented. She noted that the PCES was a joint effort of the NSCB and other agencies represented in the six inter-agency technical working groups that were established to institutionalize environment statistics in the Philippines.

Methodological problems concerning data and examples (Statistics Sweden)

69.   Mr. Thomas Polfeldt noted that environmental data often came from scientific measurements. Such data would usually be quite complicated since the quantity of raw data was very large, data were quite scattered, data management was extremely heterogeneous, the data structure may be complex, there may be spatial and temporal specifications that must be taken into account, and the quality may be unknown or known to be low.

70.   Through the use of examples, he described some of the more important methodological problems in developing environment statistics, namely:

- the identification of the most suitable variables and/or indicators to measure specific environmental issues
- the use of appropriate definitions and classifications
- the breakdown into relevant subdivisions, particularly geographical
- the identification of a suitable population and ways of sampling it
- the use of different measurement methods for the same variable and, at times, imprecise measurements from instruments
- the use of models that contain assumptions and could be very complex, and the use of proxy variables
- data quality in general.

Second Working Group Session on Indicator Compilation: Data Availability, Collection and Compilation (UNSD)

71.   Ms. Shah described the objectives of the second working group session. She explained that the Proposed List of Environmental Indicators included as Annex 4 of the Implementation Plan and as Annex 4 in this report, should be consulted to discuss a set of issues listed in para. 73 below for each of the indicators. The same four working groups were reconvened with the addition of the other Grenadian participant to Group 1, the other St. Lucian participant to Group 2, and a fourth Belizian participant to Group 3. In this working group session, the participants examined the full list of 33 indicators and not just the 22 indicators that were included in the table in Annex 4.

72.   The working group session was seen more as an illustratation of the thinking process of data users and producers faced with the task of data collection in their own countries. It would hopefully be of assistance in discussions in inter-agency working groups that might be set up in the countries to establish environment statistics programmes. Major recommendations were not expected from this session but only discussion on the indicators and suggestions of additional variables for inclusion in the list. It was decided, however, that there would be a separate plenary session to discuss and agree on additional variables to be included in the list and that this session should focus on the existing variables. Group 1 focused on the coastal zone and natural disasters indicators. Group 2 focused on the land/soil and forest indicators. Group 3 focused on the

freshwater and energy indicators. Group 4 focused on the waste, biodiversity, air/climate and tourism indicators.

73.   Each group was asked to address the following points for the indicators in the respective areas:

- Name of indicator
- Unit of measurement
- Are the data available for this indicator (available, partially available, and not available)?
- What are the data sources (national statistical service, appropriate ministry, and university, monitoring station, research institute, other)?
- How are the data collected (censuses and surveys, administrative records, ad-hoc surveys, monitoring, remote sensing, others)?
- What is the data coverage (national, sub-national, urban, rural, other)?
- What is the periodicity of the data collection (annual, biannual, monthly, weekly, daily, hourly)?
- What is your assessment of the data quality (good, varies, poor)?
- What is the relevance of the indicator to environmental policy (crucial, important, potentially important, and marginally relevant)?
- If the data are not available for this indicator, is it feasible and cost-effective to compile these data?

The groups were then asked to report back to the plenary. Annex 7 contains a summary of their findings.

Inclusion of additional environmental indicators (UNSD)

74.   Before convening the discussion on the inclusion of additional indicators, Ms. Shah pointed out that the proposed list of indicators in Annex 4 was based on the data available from international, regional and national sources. As criteria for the judgement on the inclusion of additional indicators, she suggested that the variables should be definable, measurable, readily and regularly available for at least 8 countries.

75.   The following indicators were proposed for coastal zones:

a) Change in composition of fish landings and average size by species
b) Coastal and marine water quality
c) Algae index
d) Discharge of bilge and ballast from ships

The inclusion of the first two indicators for regional compilation was agreed upon, as they are generally available but often not published. The latter two were regarded as important but not feasible for regional compilation at this stage.

76.   With regard to sustainable tourism, the participants agreed to remove the indicator on tourist intensity/growth from the list and include the following indicators:

a) number of tourist nights

b) number of passengers on cruise ships
c) tourist penetration ratio (average no. of tourists per 1000 inhabitants of the country at any point in time.

The Workshop acknowledged that these indicators were available, easy to compile and suitable to measure the impact of tourism on the environment, from which further variables such as water and energy consumption per tourist may be estimated.

77.   Finally, the production of minerals was added to the indicator list.

IX.   DISSEMINATION OF ENVIRONMENT STATISTICS
(agenda item 8)

Development of an outline for national compendia of environment statistics (UNSD)

78.   Ms. Shah made a presentation about environment statistics compendia, both in terms of the approaches to the organization and coverage of the environmental statistics and indicators. She presented examples of compendia from selected countries. She described the differences between compendia and State of the Environment (SOE) reports as follows: SOE reports normally describe the state of the environment through environmental monitoring information, contain analysis and are more policy related, and sometimes include statistical tables in an annex. Environment statistics compendia usually contain tables, graphs and charts describing statistical information in a synthetic manner comprising socio-economic, demographic and environment statistics, for example, as presented in the FDES.

Development of an outline for the regional publication of environment statistics (UNSD)

79.   Ms. Shah described the main ideas behind the regional publication in terms of its content, layout and design. The publication would contain a short description of the main environmental issues in the region, statistical tables, an interpretation and analysis of the data, and graphic presentation. She asked the participants to give consideration to the publication and to put forward their own ideas in preparation of a more detailed discussion on this subject that would take place under agenda item 13.

General presentation about dissemination of statistics (UNSD)

80.   Mr. Zewoldi described the dissemination of statistics in various forms and their implications and advantages. He mentioned that a data collection activity was not complete until the information collected was made available to potential users in a form suited to their needs. The information may be included in published tables and reports for general distribution, produced as tables in unpublished form for limited distribution or stored in a database and supplied upon request either on magnetic or optical media, or on-line.

81.   In addition, Mr. Zewoldi explained the ways in which data can be transferred, including diskettes, CD-Rom, electronic media and printed matter. Regarding dissemination, he noted that users should be familiar with various statistical publications and other statistical outputs in order to work with statistical offices in designing products and services that can most effectively meet their needs. To be relevant, national statistical offices should also be sensitive to the needs of

users. He concluded by saying that if a cost-recovery scheme was being planned from the dissemination programme, early study and analysis of the potential data users and their requirements are particularly important.

X.   APPLICATION OF GIS TO ENVIRONMENT STATISTICS
(agenda item 9)

Land Information Centre of Belize

82.   During the one-day field trip to Belmopan the participants visited the Land Information Centre (LIC) for a presentation on the application of a Geographical Information System (GIS). Ms. Noreen Fairweather, Principal Officer of LIC, gave a demonstration of the GIS system, ArcView that is being used by LIC with great success. She pointed out that Belize had a sound basis for the implementation of the system (originally for the forestry sector) as land systems data were already available. The Centre was now looking at new projects, e.g. land administration, computerizing title information, soil types, land uses and incorporation of revenue information.

83.   The cartographic unit explained to the participants how the maps for ArcView were produced by using a complex system of geo-reference points around the country and how subsequent information was digitalized.

XI. COASTAL ZONE MANAGEMENT (agenda item 10)

Caribbean Planning for the Adaptation to Global Climate Change (CPACC)
Inventory of Coastal Resources and Uses

84.   Mr. Ian King acknowledged the fact the Caribbean was internationally recognized as a region particularly vulnerable to climate change. Possible effects on the islands included coastal zone erosion due to rising sea levels, coastal bleaching and increased risk of flooding. He noted that the overall purpose of CPACC was to support Caribbean countries in their preparation to cope with the adverse effects of global climate change, particularly sea-level rise, on coastal areas through vulnerablity assessment, adaptation planning, and capacity building.

85.   The CPACC project was conceived by CARICOM and the Organization of American States (OAS) to prepare its member countries for these effects by capacity building, vulnerability assessment, institutional strengthening, etc. It is funded by the Global Environment Facility that consists of UNEP, the World Bank and UNDP. The OAS is the executing agency for the project.

86.   Mr. King descibed the CPACC project components as follows:
Regional
- Design and establishment of sea-level/climate monitoring system
- Establishment of databases and information systems
- Inventory of coastal resources and use
- Formulation of a policy framework for integrated coastal and marine management
Pilots
- Coral-reef monitoring for impacts of climate change
- Coastal vulnerability and risk assessment

- Economic valuation of coastal and marine resources
- Formulation of economic/regulatory proposals
- Greenhouse gases inventory/vulnerability of agriculture and water resources sectors

87.   CPACC has established a Coastal Resources Inventory System that is based on a GIS approach. The current status of the project includes the completed assessment of data, the provision of at least 100 metadata measurements by the participating countries and the preparation of a draft implementation plan. Mr. King stressed the challenges that CPACC is facing, among which are varying capacities in the countries, the lack of national data, uncertainty about the existence and status of data and a limited budget and timeframe.

Coral Reef Monitoring for Impacts of Climate Change

88.   Mr. Ian King presented a definition of the characteristics of coral reefs emphasizing that the Caribbean accounts for about 12% of the World's coral reefs. For undisturbed growth, coral reefs need an average water temperature of 23-30 degrees Celsius, low levels of sedimentation, organic and inorganic nutrients, salinity levels of 25-40 ppt and low UV radiation levels. Mr. King stressed the importance of coral reefs as spawning grounds for many fish species, recreational activities, white sand beaches and habitats for endangered species.

89.   The coral reef monitoring project corresponds to Component 5 of the CPACC project and its objectives are: to develop appropriate methodology, to establish and maintain monitoring sites, to ensure continuous monitoring, to strengthen existing institutional capacities, to raise public awareness and to ensure that benefits and experiences are transferred to other countries and institutions. The project design consists of site selection, monitoring, data processing and data analysis. Two primary indicators were identified: change in live coral over time and the percentage of coral cover subject to bleaching. Mr. King concluded his presentation by saying that the data generated and processed by CPACC are compatible with those of the Caribbean Coastal Marine Productivity Programme (CARICOMP).

XII. SUSTAINABLE TOURISM (agenda item 11)

Caribbean Tourism Organization

90.   Ms. Mercedes Silva provided a comprehensive and detailed overview on the role of tourism in the Caribbean, how it affects the natural and man-made environment and what progress the Caribbean Tourism Organization (CTO) has made to date in the development of sustainable tourism, including the development of indicators for sustainable tourism. She elaborated on the relationship between tourism and the environment. She discussed the negative and positive effects of tourism on the environment and stressed the fact that sustainable tourism ensures not only the durable quality of the tourists' experience but also that of the local community and the natural environment. In the Caribbean, sustainable tourism is defined as: the optimal use of natural, cultural, social and financial resources for national development on an equitable and self-sustaining basis in order to provide a unique visitor experience and an improved quality of life through partnerships among all stakeholders.

91.   Ms. Silva presented some facts and figures about the tourism industry in the world and in the Caribbean. She stressed that tourism is and continuous to be the major foreign-currency earner and fastest growing industry in the Caribbean. She listed as major data sources she listed the entry/departure card, hotel registries, surveys on tourist expenditure, customer satisfaction, etc. by the Tourism Boards as well as reports by journalists, researchers, the internet and the mass media as major data sources.

92.   The identification of sustainable tourism indicators began in 1992 with the launch of a taskforce by the World Tourism Organization (WTO). CTO as the recognized body in the Caribbean region developed a strategy for Sustainable Tourism that comprises of eight priority areas. CTO also conducted a study on the identification of indicators of sustainable tourism in the Caribbean categorized into Nature Environment, Social Aspects, Culture and Economy, which also includes topics such as data availability, comparability, robustness, etc. Ms. Silva also mentioned that CTO was collaborating with various agencies such as tourism boards and environmental agencies to identify suitable indicators for sustainable tourism.

93.   Ms. Silva stressed the existence of many inter-linkages between indicators for the environment and those for tourism, as the relationship between the two areas is reciprocal. She pointed out that a number of statistics and indicators relevant for measuring the impact of tourism on the environment, such as water supply and quality, waste disposal and energy consumption, were already included in the Proposed List of Environmental Indicators in Annex 4. It was concluded that it would be difficult in the short term to include tourism as a further breakdown in the classification of these indicators. The participants agreed to delete the indicator on tourism intensity/growth from the list and include the following three indicators: number of tourist nights, number of passengers on cruise ships and tourist penetration ratio. It was acknowledged that these indicators are available, easy to compile and that they give a picture of the impact of tourism on the environment, from which further variables such as water and energy consumption per tourist can be estimated.

XIII. INSTITUTIONALIZATION OF ENVIRONMENT STATISTICS (agenda item 12)

94.   During this agenda item, two countries, Belize and the Philippines, made presentations about the institutionalization of environment statistics in their respective countries.

Central Statistical Office of Belize
95.   Mr. Rafael Lima noted that the importance of the development of environment statistics was fully recognized in Belize. The Central Statistical Office (CSO) actively and successfully searched for funding to establish an environment statistics programme in the office. Currently there are two statisticians employed in the Environment Statistics Unit.

96.   Among the main activities of the CSO are the identification of environmental issues, the development of environmental statistics and indicators for Belize, data collection and publication. For these purposes, the CSO held meetings with data producers to assess the data that were

available, to identify data gaps and to establish focal points. Mr. Lima stressed that there now exists a close cooperation between the various agencies. Mr. Lima also mentioned that the CSO actively supports staff training in the field of environment statistics, for example, participation in various workshops.

Department of Environment of Belize

97.   During the one-day field trip to Belmopan the Department of Environment (DOE) gave two presentations to the participants, one by Mr. Martin Alegria and the other by Mr. Albert Roches. Mr. Alegria elaborated on the structure and legislative basis of the DOE while Mr. Roches gave an overview of the current activities, responsibilities and challenges that the DOE faces. The participants considered the presentation very useful for the exchange of information and experiences made among the participating countries.

Philippines National Statistical Coordination Board

98.   Ms. Estrella Domingo noted that the Philippines was currently integrating environment statistics into its regular system of activities and she provided a detailed overview on this process of institutionalization. The Philippine Statistical System is highly decentralized and consists of all those agencies that produce primary or secondary data. Ms. Domingo emphasized that the National Statistical Coordination Board (NSCB) serves as the highest policy-making and coordinating agency on statistical matters in the country. It links data users with data producers and is involved in the development of relevant methodologies.

99.   With regard to the coordination of inter-agency concerns on environment statistics, Ms. Domingo pointed out that the NSCB technical staff coordinates inter-agency committees and technical working groups. Six inter-agency technical working groups composed of representatives from the NSCB and other agencies concerned with environment statistics were organized to develop and operationalize each component of the PFDES. The working groups provided the fora for the exchange of expertise and information towards building up the PFDES. Ms. Domingo concluded by stressing the importance of the inter-agency approach to institutionalize an environment statistics programme in the Philippines, to facilitate data collection and to share knowledge on environment statistics between the statistical and environmental agencies.

XIV. TOWARDS A REGIONAL PUBLICATION OF ENVIRONMENT STATISTCS (agenda item 13)

United Nations Statistics Division

100.   Mr. Zewoldi provided a brief summary again of the project objectives indicating that one of the major outputs will be the regional publication of environment statistics. He presented the work plan that had been slightly modified since there had been some delays encountered in the implementation of the project. He expressed his hope that this publication would become a regular output in the CARICOM region.

101.   Ms. Shah presented the objectives of the third working group session that was organized into five groups with country pairs represented in each group with the following breakdown:

Group 1: Antigua, The Bahamas and Barbados; Group 2: Dominica, Grenada, Guyana and Haiti; Group 3: Jamaica, Montserrat and St. Kitts; Group 4: St. Lucia and St. Vincent & the Grenadines. Group 5: Belize, Suriname and Trinidad.

102.   The participants were first asked to consult with their country partner the day before and then address in their respective working groups the following issues:

a) review the list of variables and indicators discussed and amended during the workshop
b) draft plans of action and discuss coordination of environment statistics
c) development of national compendia
d) contribution towards the regional publication
e) further training and ad-hoc technical assistance

103.   The working groups then reported their results to the plenary as follows:

a)   the groups adopted the list of variables and indicators as amended. Annex 8 contains a summary of the indicators available for the revised list based on discussion between the country pairs. This list will be circulated in October 2000 to the countries for further validation.

b)   with regard to the plans of action it was felt that the exact formulation and conducting of the plan would depend on the situation in the countries. It is planned to prepare a report on the results of the Workshop, which will be transmitted to the directors of the participating statistical and environmental offices as well as to those agencies in the country that are involved in the collection and dissemination of environmental relevant data. A Working Group will be established by the national statistical office in collaboration with the environmental agency and other relevant institutions, and arrive at a consensus with regard to the development and production of a national publication on environment statistics. The tasks of the Working Group will be to assess the availability of data, identify data gaps, develop appropriate methods for filling the gaps, and assessing human, technical and financial resources needed for the preparation of the compendium. An implementation schedule should be adopted by the involved agencies, in accordance to the project timeframe endorsed by the SCCS.

c)   several countries stated that they would incorporate tables and statistics as separate chapters into existing statistical yearbooks or digests, produce leaflets containing environment statistics, publish environment statistics compendia or include tables and statistics into State of the Environment Reports. The style and contents of the various types of publications would depend on the available human, financial and technical resources as well as the availability of data.

d)   with regard to the regional publication the participants suggested that in addition to the chapters describing environmental issues in terms of text, statistical tables, graphics, interpretation and analysis, short country profiles containing key indicators could also be included in the publication. The statistical tables produced by countries would be made be available to CARICOM for the regional publication.

e)   the participants expressed the need for technical assistance at national level from the United Nations and other organizations in the form of short-term advisory services and training sessions.   In addition, it was recommended that attachments to national statistical offices in the region with advanced programmes on environment statistics be supported.

XV. DATA REQUIREMENTS FOR ENVIRONMENTAL ACCOUNTING (agenda item 14)

Statistics Sweden

104.   Mr. Thomas Polfeldt explained that the main objective for the development of environmental accounting was to promote sustainable development and to bridge the gap between the traditional System of National Accounts (SNA) and natural resource depletion and environmental degradation. Environmental accounting is an ongoing field of debate and research and many aspects, especially how to measure the value of environmental impacts and resources, still remain unclear.

105.   Mr. Polfeldt noted that UNSD had engaged in the discussion since the Earth Summit in 1992 in Rio de Janeiro. The 1993 SNA already includes environmental information in terms of balance sheets and accumulation accounts that cover not only produced capital but also natural capital used in the production cycle. It allows for the incorporation of satellite accounts. The System of integrated Environmental and Economic Accounting (SEEA) was developed by UNSD as a satellite system of the SNA. A handbook of *Integrated Environmental and Economic Accounting* was published by UNSD in 1993. The Nairobi Group prepared the manual "Integrated Environmental and Economic Accounting – An Operational Manual", that reflects the experiences with the SEEA. It will be published by UNSD and UNEP later this year. Further research is conducted by the London Group that was founded in 1993. The London Group is currently participating in the revision of the SEEA, which will subsequently result in the SEEA-2000, a handbook of best practices.

106.   An overview on the implementation steps of the SEEA was provided by Mr. Polfeldt. Step 3 of the system corresponds to the compilation of produced natural assets accounts, which implies the evaluation of environmental assets used in the production cycle. These assets are already included in the SNA. Step 4 deals with the compilation of non-produced natural assets, including land and soil, sub-soil assets such as minerals, forests, fisheries and water. The main problem is the valuation of these assets in monetary terms. Different approaches, e.g. market value assessment and contingent evaluation, have been discussed but none of them could satisfactorily reflect the true value of natural assets.

107.   Mr. Polfeldt supported his arguments with several examples of stock and flow charts. He concluded his presentation by pointing out how important it was, when developing environment statistics, to have in mind the applications in environmental accounting. In particular, he noted that it would be necessary to break down emissions to air and water, generation of waste, consumption of energy and water, etc, by ISIC sectors. This sector breakdown should therefore be introduced as early as possible. It should be noted that a specific effort could be required with respect to environmental authorities, who collect emissions and waste data, but who would not

usually employ this classification. For a start on environmental accounting, he recommended satellite accounts, in physical units, on an important resource like fish or forests.

XVI. CLOSING SESSION: CONCLUSIONS AND RECOMMENDATIONS AND FUTURE ACTIVITIES OF THE PROJECT (agenda item 15)

108.   Mr. Zewoldi summarized the future activities to be carried out after the Workshop which included the following:

(a)   UNSD and CARICOM will finalize the list of environmental statistics and indicators and send it to the countries by October 2000 for validation of data availability and identification of sources and periodicity of data;

(b)   UNSD and CARICOM will develop statistical formats to send to the countries by the end of 2000 to obtain the requested data;

(c)   UNSD and CARICOM will develop the outline of the regional publication in collaboration with a Steering Committee that will oversee the activities of the publication;

(d)   UNSD, in collaboration with CARICOM, will convene an Expert Group Meeting to review the draft regional publication;

(e)   the regional publication will be launched at the SCCS meeting in 2001;

(f)   UNSD and CARICOM will provide technical advisory services to countries upon request subject to the availability of resources;

(g)   a progress report will be submitted to the next SCCS meeting in 2000 on the implementation of the above suggested activities.

Conclusions
109.   The Workshop adopted the following conclusions:

(a)   sustainable development calls for an integrated approach to economic, environmental and social policies. Such policy integration requires comprehensive databases organized in and compiled through appropriate statistical frameworks and systems;

(b)   Member States emphasized the importance of timely and reliable environmental statistics and indicators in the region. Only through such statistics and indicators can sustained monitoring and evaluation of the state of the environment and sustainable development be accomplished;

(c)   while it is apparent that there were several approaches for dealing with environment statistics, the Framework for the Development of Environment Statistics (FDES) presents a

particularly important and useful approach, encompassing components of a number of approaches;

(d)   the proposed list of environmental statistics and indicators that was distributed to the participants prior to the Workshop was discussed. An assessment of the availability of these variables was carried out during the Workshop. It was agreed that data were available for most of the variables for the majority of the countries. The list was adopted with some modifications and will be circulated again to countries to confirm with their national counterparts the availability and sources of data;

(e)   Member States committed themselves to contribute to the regional publication on environment statistics to be produced by CARICOM in 2001, according to the time schedule endorsed by the Standing Committee of Caribbean Statisticians that met in Guyana in January 2000;

(f)   Member States prepared draft national plans of action for the implementation of environment statistics programmes.

Recommendations
110.   The Workshop recommended that:

(a)   the availability and quality of environmental statistics and indicators produced in Member States be developed further to respond to the needs of sustainable development. The appropriate use of available international statistical concepts and definitions is recommended to enhance international comparability;

(b)   Member States present and disseminate available environmental statistics in environment statistics compendia. The compendia should contain a core set of environmental statistics and indicators common across countries and additional statistics and indicators that are specific to each country. If a separate environment compendium is not possible at this stage, countries can include a section or chapter on environment statistics in existing statistical publications such as yearbooks or digests;

(c)   National statistical services in the Member States organize inter-agency working groups or equivalent mechanisms to facilitate the coordination of environmental data collection and compilation;

(d)   Member States participate in the regional compilation of environmental statistics and indicators by CARICOM by providing the requested data in the prescribed format within the prescribed time frame;

(e)   UNSD and CARICOM encourage and facilitate the establishment of information exchange among Member States through appropriate information technologies. This will

promote networking between statisticians and environmental experts. It will also enhance cooperation and exchange of environmental data and experience between countries;

(f)	Training courses in environmental statistics and indicators, and in information technology be developed by relevant organizations and training institutes in the region subject to the availability of resources. The possibility of regional attachments should also be explored;

(g)	UNSD and CARICOM assist Member States, subject to the availability of resources, in the provision of technical support for the development of environment statistics programmes;

(f)	CARICOM establish a regional database on environmental statistics and indicators and strengthen and ensure the flow of information among Member States and regional and international organizations.

Annex 1

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Annex 2

Agenda

1. Opening session

2. Adoption of agenda and work schedule

3. Presentation of the CARICOM project

4. International and regional programmes of environmental statistics and indicators
   - United Nations Statistics Division
   - Division for Sustainable Development
   - CARICOM
   - University of Technology
   - Caribbean Development Bank

5. Presentation of country papers

6. Environmental statistics and indicators: concepts, methods and use
   - Uses of environment statistics
   - A Framework for the Development of Environment Statistics (FDES)
   - Other international frameworks and their major differences
   - Application of the FDES to the Philippines
   - Development of environmental indicators
   - First working group session on the selection and use of indicators

7. Collection and compilation of environment statistics
   - Data sources for environment statistics
   - National experience in the collection and compilation of environment statistics
   - Methodological problems concerning data production
   - Second working group session on indicator compilation: data availability, collection and compilation
   - Inclusion of additional environmental indicators

8. Dissemination of environment statistics
   - Development of an outline for national compendia of environment statistics
   - Development of an outline for the regional publication of environment statistics
   - General presentation about dissemination of statistics

9. Application of GIS to environment statistics

10. Coastal zone management

11. Sustainable tourism

12. Institutionalization of environment statistics

13. Towards a regional publication of environment statistics

14. Data requirements for environmental accounting

15. Closing session: conclusions and recommendations and future activities of the project

Wednesday, 2 August

9:00   Registration

9:00-11:00	**Opening session**
9:10-9:20	- Welcome address (Mayor of San Ignacio/Santa Elena Town)
9:20-9:30	- Presentation (UNSD, New York)
9:30-9:40	- Presentation (UNDP)
9:40-9:55	- Main address (Deputy Prime Minister and Minister of Natural Resources & the Environment, Belize)
9:55-10:00	- Vote of thanks (Central Statistical Office, Belize)
10:00-11:00	- Discussion with all delegates (Central Statistical Office, Belize)

11:00-11:30   *Coffee Break*

11:30-12:00	**Adoption of agenda and work schedule**

12:00-12:30	**Presentation of the CARICOM project (UNSD)**

12:30-2:00   *Lunch*

2:00-3:30	**International and regional programmes of environmental statistics and indicators**
2:00-2:30	- United Nations Statistics Division
2:30-3:00	- Division for Sustainable Development
3:00-3:30	- CARICOM

3:30-4:00   *Coffee Break*

4:00-4:30	- University of Technology

4:30-5:30	**Presentation of country papers**

Thursday, 3 August

9:00-10:30	**Presentation of country papers (cont.)**

10:30-11:00	*Coffee Break*

11:00-5:30	**Environmental statistics and indicators: concepts, methods and use**
11:00-11:45	- Uses of environment statistics (Statistics Sweden)
11:45-12:30	- A Framework for the Development of Environment Statistics (FDES) (UNSD)

12:30-2:00	*Lunch*
2:00-2:30	- Other international frameworks and their major differences (UNSD)
2:30-3:00	- Application of the FDES to the Philippines (National Statistical Coordination Board)
3:00-3:30	- Development of environmental indicators (UNSD)

3:30-4:00	*Coffee Break*

4:00-5:30	**First working group session on the selection and use of indicators (UNSD)**
4:00-4:15	- Description of exercise
4:15-5:00	- Group work
5:00-5:30	- Presentation to plenary

Friday, 4 August

9:00-5:30	One day visit to Belmopan for parallel visits to the: - Central Statistical Office for a computer presentation of Belize's experience in environment statistics, and for a presentation of international data sources on the Internet - Land Information Centre for a presentation of the application of GIS to environment statistics - Department of the Environment for a presentation of their activities.

Monday, 7 August

9:00-5:30	**Collection and compilation of environment statistics**

| 9:00-9:45 | - Data sources for environment statistics (Statistics Sweden) |

- National experience in the collection and compilation of environment statistics

| 9:45-10:15 | - Belize (Central Statistical Office) |
| 10:15-10:45 | - Philippines (National Statistical Coordination Board) |

| 10:45-11:15 | *Coffee Break* |

| 11:15-12:00 | - Methodological problems concerning data production (Statistics Sweden) |

| 12:00-12:30 | - Examples of some methodological problems (Statistics Sweden) |

| 12:30-2:00 | *Lunch* |

2:00-5:00	**Second working group session on indicator compilation: data availability, collection and compilation (UNSD)**
2:00-2:15	- Description of exercise
2:15-3:45	- Group work

| 3:45-4:15 | *Coffee break* |

| 4:15-5:00 | - Presentation to plenary |

5:00-5:30	**Coastal zone management (Caribbean Planning for the Adaptation to Global Climate Change)**

- Inventory of Coastal Resources and Uses

Tuesday, 8 August

9:00-9:30	**Coastal zone management (Caribbean Planning for the Adaptation to Global Climate Change)**

- Coral-reef Monitoring for Impacts of Climate Change

9:30-10:30	**Presentation of country papers (cont.)**

10:30-11:00   *Coffee Break*

11:00-12:30	**Collection and compilation of environment statistics**

- Inclusion of additional environmental indicators (UNSD)

12:30-2:00   *Lunch*

2:00-2:30	**International and regional programmes of environmental statistics and indicators (cont.)**

- Caribbean Development Bank

2:30-5:30	**Dissemination of environment statistics**

2:30-3:30   - Development of an outline for national compendia of environment statistics (UNSD)

3:30-4:00   *Coffee Break*

4:30-5:00   - Development of an outline for the regional publication of environment statistics (UNSD)

5:00-5:30   - General presentation about dissemination of statistics (UNSD)

Wednesday, 9 August

9:00-10:30	**Sustainable tourism (Caribbean Tourism Organization)**

10:30-11:00   *Coffee Break*

11:00-12:30	**Institutionalization of environment statistics**

    11:00-11:45   -   Belize (Central Statistical Office)

    11:45-12:30   -   Philippines (National Statistical Coordination Board)

12:30-2:00   *Lunch*

2:00-5:30   Environmental field trip

Thursday, 10 August

9:00-3:30	**Towards a regional publication of environment statistics (UNSD)**

    9:00-10:30   -   Discussion of regional publication of environment statistics including core set of regional environmental indicators

10:30-11:00   *Coffee Break*

    11:00-12:30   -   Discussion of regional publication of environment statistics including core set of regional environmental indicators

12:30-2:00   *Lunch*

    2:00-3:30   -   Presentation to plenary

3:30-4:00   *Coffee break*

4:00-5:30	**Data requirements for environmental accounting (Statistics Sweden)**

Friday, 11 August

9:00-12:30	Free (Preparation of draft report)
12:30-2:00	*Lunch*
2:00-4:30	**Closing session: conclusions and recommendations and future activities of the project (UNSD)**

Annex 3

List of Documents

Titles of Country Papers
Antigua & Barbuda: *Country Report for the Workshop on Environment Statistics for CARICOM Member States*

The Bahamas: *An Overview of Environmental Indicators for the Commonwealth of The Bahamas*

Barbados: *Report for the Workshop on Environment Statistics for CARICOM Member Countries*

Belize: *Establishing an Environmental Statistics Unit in a Small Developing Country: the Belize Experience*

Belize: *The Collection and Compilation of Environmental Statistics: the Belize Experience*

Commonwealth of Dominica: *Country Paper on Environmental Statistics for The Commonwealth of Dominica*

Grenada: *Environmental Statistics, Grenada Report*

Guyana: *Paper on Environmental Statistics, Guyana Report*

Haiti: *Workshop on Environmental Statistics, Haiti Report*

Jamaica: *State of Environment Statistics Programme*

Montserrat: *Montserrat Environment*

St. Kitts & Nevis: *Environmental Indicator and Statistics Profile*

St. Lucia: *Environmental Statistics in Saint Lucia*

St. Vincent & The Grenadines: *Country Paper for the Workshop on Environmental Statistics for CARICOM Member Countries*

Suriname: *Country Paper for the Workshop on Environment Statistics*

Trinidad & Tobago: *Development of Environmental Statistics in Trinidad and Tobago*

Titles of Publications cited during the course of the Workshop
A Framework for the Development of Environment Statistics, United Nations, 1984, ST/ESA/STAT/SER.M.78

Glossary of Environment Statistics, United Nations, 1997, ST/ESA/STAT/SER.F/67

Concepts and Methods of Environment Statistics: Statistics of the Natural Environment – A Technical Report, United Nations, 1991, ST/ESA/STAT/SER.F/57

Concepts and Methods of Environment Statistic: Human Settlements Statistics – A Technical Report, United Nations, 1988, ST/ESA/STAT/SER.F/51.

Proposed List of Environmental Indicators (Revised – 11 July 2000)

Activities of the Environment Statistics Section of the United Nations Statistics Division (2000)

Papers presented by Resource Persons during the course of the Workshop
Earl Brown, University of Technology, Jamaica: *A Presentation to the Workshop on Environmental Statistics*, Belize, August 2 – 11, 2000

Thomas Polfeldt, Statistics Sweden: *Data Sources for Environment Statistics*

Thomas Polfeldt, Statistics Sweden: *Some Methodological Problems in Environment Statistics*

Thomas Polfeldt, Statistics Sweden: *Uses and Needs of Environment Statistics*

Anya Thomas, CARICOM Secretariat: *Environmental Statistics as a Tool for Sustainable Development*

Lowell Flanders, United Nations Division for Sustainable Development: *Sustainable Development – What is it?*

Ian King, Caribbean Planning for Adaptation to Global Climate Change: *A Regional Approach to the Application of GIS for Adaptation Planning to Global Climate Change and Sea Level Rise*

Ian King, Caribbean Planning for Adaptation to Global Climate Change: *Coral Reef Monitoring for Climate Change Impacts*

Mercedes Silva, Caribbean Tourism Organization: *Sustainable Tourism Development in the Caribbean: Identifying Measurement Instruments*

Estrella Domingo, National Statistical Coordination Board: *Institutionalization of Environmental Statistics in the Philippines*

Estrella Domingo, National Statistical Coordination Board: *Philippine Compendium on Environmental Statistics*

Estrella Domingo, National Statistical Coordination Board: *Application of the UNFDES in the Philippines*

Proposed List of Environmental Indicators (revised – 11 July 2000)

The list of 33 environmental statistics and indicators is proposed as a starting point for the development of a regional programme in environment statistics. The list is by no means exhaustive and will be further refined as part of the preparation for the planned regional workshop on environment statistics. A further reduction to 22 indicators as a suggestion for implementation in the short term is listed in the table below. The list is based on the following sources:

International
1. List of environmental indicators agreed upon by the fourth meeting of the Inter-governmental Working Group on the Advancement of Environment Statistics, UNSD, 1995 and approved by the Statistical Commission in 1995 for international compilation by UNSD from national statistical services.
2. Indicators of Sustainable Development: Framework and Methodologies, UN, 1996.

Regional
3. Caribbean Environmental Outlook, UNEP, 1999.
4. Report of the Caribbean Regional Workshop on Sustainable Development Indicators, Caribbean Development Bank, 1998.
5. A Proposed Set of Sustainable Development Indicators for the Caribbean, Caribbean Development Bank, 1998.

National
6. Environmental Indicators for Barbados: a pilot study for 1996, Caribbean Development Bank, 1997.
7. Belize – National Environmental Action Plan, The Government of Belize, 1996.
8. Environmental Statistics for Belize, Central Statistical Office, 1999.
9. Guyana – Draft Coastal Resource Data by Institution, EPA, 1999.
10. State of the Environment – The 1997 Report, Ministry of Environment & Housing, Jamaica, 1998.

COASTAL ZONES
Protected marine area as a percent of total marine area.
Loss of coral reefs, sea-grass beds and mangroves.
Landings or catch (by species) per unit of fishing effort (e.g. boats, trips, people).
Maximum sustained yield for fisheries.
Total length of beaches eroding, by type of location.
Beach encroachment, % area/width.
Population growth in coastal areas.

LAND/SOIL
Protected area as a percent of total land area.
Land use change.
Land degradation (area affected by soil erosion).
Use of fertilizers (N, P, K).
Use of pesticides (tonnes of active ingredient, fungicide and herbicide or imports, sales or manufacture).

FOREST

Forest area change.

Protected forest area as a percent of total forest area.

Net rate of reforestation.

BIODIVERSITY

Threatened species (total no. or as a percent of total native species).

Extent of loss of or damage to various habitat types; cause of loss (e.g. conversion, natural disaster).

FRESHWATER

Annual withdrawals of ground and surface water as of a percent of available water.

Domestic consumption of water per capita.

Quantities generated/discharged by source, per capita.

Wastewater treatment coverage.

Water quality e.g. BOD etc.

Measured levels of pollution at monitoring sites e.g. algae production.

Prevalence of water-borne diseases.

WASTE

Disposal: extent, type and quantities going through each type of disposal facility; e.g. landfill, incineration, composting, recycling.

Generation: quantity, type and source/sector.

Toxic/hazardous materials – quantities manufactured, imported and exported.

AIR/CLIMATE

Ambient concentrations of pollutants (e.g. CO, SO_2, NO_X, O_3 and TSP).

Emissions of pollutants (e.g. CO_2, SO_2 and NO_X).

Consumption of ozone depleting substances.

NATURAL DISASTERS

Frequency of, and economic and human loss due to natural disasters.

ENERGY

Consumption of energy & renewable energy (import/export).

TOURISM

Tourist intensity/growth.

Category	Environmental Indicator	UNSD	CSD	CEO UNEP	CDB Report[A]	CDB Proposed Set[B]	Barbados	Belize Act	Belize Stat	Guyana	Jamaica
Coastal Zones	Loss of coral reefs, sea-grass beds and mangroves (no. of sites and area)			x	x	x	x	x		x	x
	Landings or catch (by species) per unit of fishing effort (e.g. boats, trips, people)	x		x	x	x	x	x		x	x
Land	Protected area as a percent of total land area	x	x					x	x		
	Land use change	x	x	x	x	x			x		
	Land degradation (area affected by soil erosion)	x	x		x	x	x				x
	Use of fertilizers (N, P, K)	x	x		x	x	x		x		x
	Use of pesticides (tonnes of active ingredient, fungicide and herbicide or imports, sales or manufacture	x	x		x	x	x		x		x
Forest	Forest area change	x	x	x	x	x		x	x		x
	Protected forest area as a percent of total forest area	x	x						x		x
Biodiversity	Threatened species (as a total no. or as percent of total native species)	x	x	x	x	x	x		x	x	x
Freshwater	Annual withdrawals of ground and surface water as a percent of available water	x	x		x	x	x		x		x
	Domestic consumption of water per capita	x	x		x	x	x		x		x
	Wastewater treatment coverage	x	x		x	x	x			x	x
	Water quality e.g. BOD etc.	x	x		x	x	x		x	x	
	Measured levels of pollution at monitoring sites e.g. algae production	x			x	x					x
Waste	Disposal: extent, type and quantities going through each type of disposal facility; e.g. landfill, incineration, composting, recycling	x	x	x	x	x	x	x			x
	Generation: quantity, type and source/sector	x	x	x	x	x		x	x		x
Air/ Climate	Emissions of pollutants (e.g. CO_2, SO_2, NO_x)	x	x	x	x	x					x
	Consumption of ozone depleting substances	x	x		x	x					
Natural Disasters	Frequency of, and economic and human loss due to natural disasters	x	x	x	x						x
Energy	Use of energy & renewable energy (import/export)	x	x	x			x				x
Tourism	Tourism intensity/growth			x			x	x	x		x

[A]   Appendix 3 'Revised Set of Indicators' – Table 3 in ***Report of the Caribbean Regional Workshop on Sustainable Development Indicators***, Caribbean Development Bank, 1998.

[B]   'Proposed Environmental Indicators' – Table 4 in 'A proposed set of sustainable development indicators for the Caribbean'.

REVIEW OF DATA AVAILABILITY BASED ON COUNTRY PAPERS

Category	Environmental Indicator	Antigua & Barbuda	Bahamas	Barbados	Belize	Dominica	Grenada	Guyana	Haiti	Jamaica
Coastal Zones	Loss of coral reefs, sea-grass beds and mangroves (no. of sites and area)	x^2	x	x	x^1					
	Landings or catch (by species) per unit of fishing effort (e.g. boats, trips, people)	x	x	x	x	x	x	x	x	x
Land	Protected area as a percent of total land area		x	x	x			x		
	Land use change			x	x	x		x	x	
	Land degradation (area affected by soil erosion)			x			x		x	
	Use of fertilizers (N, P, K)	x	x^2	x	x	x	x			
	Use of pesticides (tonnes of active ingredient, fungicide and herbicide or imports, sales or manufacture	x	x	x	x	x	x			
Forest	Forest area change	x		x	x				x	x
	Protected forest area as a percent of total forest area	x	x	x	x	x		x	x	
Biodiversity	Threatened species (as a total no. or as percent of total native species)			x	x			x	x	
Freshwater	Annual withdrawals of ground and surface water as a percent of available water	x^2		x	x^2					x
	Domestic consumption of water per capita	x	x	x	x^2		x	x	x	x
	Wastewater treatment coverage	x		x	x^1		x			x
	Water quality e.g. BOD etc.	x^1	x	x	x^1	x				x
	Measured levels of pollution at monitoring sites e.g. algae production			x	x^1					
Waste	Disposal: extent, type and quantities going through each type of disposal facility; e.g. landfill, incineration, composting, recycling	x	x	x	x^2	x	x			
	Generation: quantity, type and source/sector		x	x			x^2		x	x
Air/ Climate	Emissions of pollutants (e.g. CO_2, SO_2, NO_x)	x		x	x			x		
	Consumption of ozone depleting substances			x						
Natural Disasters	Frequency of, and economic and human loss due to natural disasters	x		x						
Energy	Use of energy & renewable energy (import/export)	x		x	x	x^2	x^2		x^2	x
Tourism	Tourism intensity/growth	x	x	x	x	x	x	x		x

REVIEW OF DATA AVAILABILITY BASED ON COUNTRY PAPERS (continued)

Category	Environmental Indicator	Montserrat	St. Kitts & Nevis	St. Lucia	St. Vincent & Grenadines	Suriname	Trinidad & Tobago				
Coastal Zones	Loss of coral reefs, sea-grass beds and mangroves (no. of sites and area)			X							
	Landings or catch (by species) per unit of fishing effort (e.g. boats, trips, people)		x	X	x						
Land	Protected area as a percent of total land area			X		x					
	Land use change			x		x					
	Land degradation (area affected by soil erosion)			x							
	Use of fertilizers (N, P, K)			x	x[1]						
	Use of pesticides (tonnes of active ingredient, fungicide and herbicide or imports, sales or manufacture			x	x[1]	x					
Forest	Forest area change			X	x		x				
	Protected forest area as a percent of total forest area	x		x	x	x	x				
Biodiversity	Threatened species (as a total no. or as percent of total native species)	x		X	x	x					
Freshwater	Annual withdrawals of ground and surface water as a percent of available water			X	x						
	Domestic consumption of water per capita	x		x	x	x	x				
	Wastewater treatment coverage			x	x						
	Water quality e.g. BOD etc.			x		x					
	Measured levels of pollution at monitoring sites e.g. algae production			x							
Waste	Disposal: extent, type and quantities going through each type of disposal facility; e.g. landfill, incineration, composting, recycling	x[2]		X		x					
	Generation: quantity, type and source/sector			x	x[2]	x					
Air/ Climate	Emissions of pollutants (e.g. CO_2, SO_2, NO_x)			X							
	Consumption of ozone depleting substances		x	x	x		x				
Natural Disasters	Frequency of, and economic and human loss due to natural disasters		x	X							
Energy	Use of energy & renewable energy (import/export)		x[2]	x[1]	x[2]	x					
Tourism	Tourism intensity/growth		x	x[1]	x	x					

Notes: **'x'** : Data available.   **blank space**: indicates that it is not clear from the country papers whether data is available or not

1   Figures are not quoted, but claimed to have been collected
2   Partial information is provided/collected

Annex 6

Results of the First Working Group Session

Key issues	Group I	Group II	Group III	Group IV
What are the priority environmental issues and/or the statistical topics in your country?	a) solid waste management b) deforestation c) coastal zone management d) water resources management e) sand-mining f) water quality g) biodiversity	a) impacts of tourism b) sand-mining c) destruction of mangroves d) beach erosion e) small-scale mining f) solid waste management g) biodiversity	a) solid waste management b) land use change c) soil erosion d) loss of soil quality e) protected land area	a) water quality b) land and forests c) sewage and waste management d) loss of biodiversity e) degradation of watersheds f) coastal and marine pollution g) air pollution h) natural disasters
What are some of the statistical variables/indicators that reflect each of these issues/topics?	a.1) volume of waste generated by type and sector a.2) volume of waste disposed by method b.1) forest area change b.2) protected forest area as % of total forest area b.3) rate of reforestation b.4) rate of deforestation c.1) population growth in coastal areas c.2) protected marine area as a % of total marine area c.3) loss of coral reefs, sea grass beds, mangroves c.4) beach encroachment c.5) total fish catches c.6) maximum sustainable yield d.1) domestic consumption per capita d.2) volume of waste water treated e.1) volume of sand mined f.1) prevalence of water-borne diseases f.2) levels of pollution such as of BOD, COD, coliform etc. g.1) total number of threatened species g.2) protected area as % of total land area	a.1) number of tourist arrivals a.2) number of hotel nights b.1) volume of sand mined c.1) area of mangroves d.1) area of beach eroded e.1) concentration of heavy metals in waters e.2) incidence of diseases due to mercury poisoning e.3) depletion of mineral reserves f.1) number of illegal dumping sites f.2) prevalence of vector-borne diseases g.1) loss of habitats g.2) number of threatened species	a.1) volume of waste generated by type and sector a.2) cost of waste disposal a.3) methods of waste disposal b.1) land use by type d.1) use of pesticides e.1) protected area as % of total land area	b.1) rate of soil erosion b.2) rate of deforestation f.1) annual rate of beach erosion f.2) loss of coral reefs, seagrass beds f.3) changes in fish catch h.1) economic and human loss due to natural disasters h.2) loss of natural resources, ecosystems, habitats

Which indicators exist in your country?	All except b.3), b.4), c.3)	1), 2)	a), b), c)	
Are the data readily available for the selected indicators?	Yes		Yes	Not always
Who are the main data users for the selected indicators?	Government, students, NGO's and international organizations	Ministry of planning Ministry of local government Ministry of tourism Private sector Investors	Monitoring agencies Policy makers Students Donors Investors	
Does the proposed list of environmental indicators fully reflect these priority issues?	Yes	Yes/no	Yes	Not always
Are there priority indicators for your country which are not included in the list? If yes, please specify.	Sand-mining in Antigua	Mining	Social impacts of urbanization Population density Carrying capacity for sustainable tourism	

SECOND WORKING GROUP SESSION ON INDICATOR COMPILATION

Category	Name of Indicator	Unit of measurement	Availability of data	Source of data	Method of data collection	Coverage of data	Periodicity of data collection	Quality of data	Relevance of indicator to environmental policy	If data not available, cost-effective
1	2	3	4	5	6	7	8	9	10	11
Coastal Zones	**Protected marine area as % total marine area**	1	1	1,2,3	1,2	1	6	1	1	n.a.
	Loss of coral reefs, sea-grass beds and mangroves	1	2	1,4,5,6	1,3,4	1,5	1,2	3	2	2
	Landings or catch per unit of fishing effort	2,3	2	1,7	1,3,5	1,2	1,3,5	3	1	4
	Max. sustained yield for fisheries	2	2	1,7	1,3,5	1,5	7	2	1	1
	Total length of beaches eroding	5	1	1,2,3,8	3	1,5	2,7	1	1	1
	Beach encroachment, % area/width	1,6,7	2	2,9	all codes	1	6	3	1	1
	Population growth in coastal area	8	1	11	all codes	1	8	1	1	1

1	2	3	4	5	6	7	8	9	10	11
Land/Soil	Protected area as % of total area	6,1	1	12	5	1	1	3	1,2	2
	Land use change	1	2	12	5,6	1	11	1	1	4
	Land degradation (soil erosion)	6	2,3	12,13	3	6	9	1	1	3
	Use of fertilizers (N, P, K)	2	1	12,11	5,6	1	1	1	2	n.a.
	Use of pesticides	2	1	12,11	5	1	1,10	1	2	
Forest	Forest area change	6	2	12,14	5,6	1	11	1	1	1
	Protected forest area as % total	1,6	2	12	1,3	1	11	1	2	1
	Net area of reforestation	1	1	12	5,3	1	1	1	2	4
Biodiversity	Threatened species (% of native)	1	1,2	12,13,16	5,6,7,3	1	9,7	1,3	2	2
	Extent of loss / damage to habitat	6,14	2	12,13,14	6,3,7	1,2	6	3	1	1
Fresh water	Annual withdrawals of ground and surface water as % of avail. Water	5	2,3	12	5,1,3	1	3,8	1,3	1,2	1
	Domestic consumption of water per cap.	13	1	12,11,8	5	1	3,1	1,3,2	1,2	1
	Quantities generated /discharge by source per capita									
	Wastewater treatment coverage	5,1	2	12	5	2	3	3	1,2	1
	Water quality e.g. BOD etc.	9	2	13,12	3	2	5,12	1,3	1,2	1
	Measured levels of pollution at monitoring sites e.g. algae prod.	10	1	14	3	1,2	5	1	1,2	1
	Prevalence of water-borne diseases	11	1	12	5	1	4,3	1	2	1

1	2	3	4	5	6	7	8	9	10	11
Waste	**Disposal: extent, type and quantity going thro. Each type of disposal facility; eg. Landfill, incineration etc**	2	2	12,15	5	2,3	1	3	1	1
	Generation: quantity, type and source / sector	2,15	1,2	12,15	5	2,3	5	3	1	1
	Toxic/hazardous material- quantity manufactured, imported / exported	4,3	2,3	12,15	1,5	1	1	3	2	1
Air/ Climate	**Ambient concentration of pollutants eg. CO, SO$_2$, NOx, O$_3$, TSP)**	16	2	12	3	1,3	6	3	2	1
	Emissions of pollutants (CO$_2$, SO$_2$ NOx)	16	2	12	1,3,5	1,3	6	3	2	1
	Consumption of ozone depleting substances	2	1,2	12,15	5,1	1	1,3	3	4	1
Natural Disasters	**Frequency of, and economic and human loss due to natural disasters**	14	1	10	5	1,5	9	1	1	1
Energy	**Consumption of energy & renewable energy (import/export)**	12,5	1	12	5	1	3,8	1	2	1
Tourism	**Tourist intensity / growth**	14	1	12,11	5,1	1,2	1,3	1	1	

Codes :

Column : 3
Q. 2. : Unit of measurement
1 - percentage
2 - tonnes
3 - unit catch by fuel consump.
4 - litre
5 - m^3
6 - ha
7 - m
8 - No. of persons/km^2
9 - mg O_2 per liter
10 - No. of parts per unit
11 - No. of people infected
12 - kW/Hour
13 - m^3 per person
14 - frequency
15 - kg per capita
16 - mg/m^3

Column : 4
Q. 3 : Data availability
1 - Available
2 - Partially available
3 - Not available

Column : 5
Q. 4 : Source of data
1 - Fisheries Dept.
2 - Coastal Zone Dept.
3 - Lands & Surveys
4 - Forestry Dept.
5 - CARICOMP
6 - UWICED
7 - CFRAMP
8 - Min. of Agriculture
9 - Planning Dept.
10 - National Disaster office
11 - Statistical office
12 - Appropriate Min./Agency
13 - Research Institute
14 - Monitoring stations
15 - Private
16 - N.G.O.

Column : 6
Q. 5 : Method of data collection
1 - Surveys/census
2 - GIS
3 - Monitoring
4 - Remote sensing
5 - Admin. Records
6 - Ad-hoc surveys
7 - Research papers

Column : 7
Q. 6 : Data Coverage
1 - National
2 - Sub-national
3 - Urban
4 - Rural
5 - Regional
6 - Other

Column : 8
Q. 7 : Periodicity
1 - Annual
2 - Biannual
3 - Monthly
4 - Weekly
5 - Daily
6 - Ad-hoc/one time
7 - Seasonally
8 - (5-10) year period
9 - varies
10 - Quarterly
11 - Periodically
12 - Hourly

Column : 9
Q. 8 :Quality
1 - Good
2 - Poor
3 - Varies

Column : 10
Q. 9. : Relevancy
1 - Crucial
2 - Important
3 - Potentially important
4 - Marginally important

Column : 11
Q.10 If data not available,
1- Feasible and cost-
 effective
2 - Feasible and not cost
effective
3 - Varies
4-Feasible

CARICOMP: Caribbean Coastal Marine Productivity Program
UWICED: University of West Indies Centre for Environment and Development
CFRAMP: CARICOM Fisheries Resource Assessment and Management

THIRD WORKING GROUP SESSION ON INDICATORS

Category	Name of Indicator	Antigua & Barbuda	Bahamas	Barbados	Belize	Dominica	Grenada	Guyana	Haiti	Jamaica	Montserrat	St. Kitts & Nevis	St. Lucia	St. Vincent & the Grenadines	Suriname	Trinidad & Tobago
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Coastal Zones	**Protected marine area as % total marine area**	1	6	1	1	1	2	6	6	1	1	1	1	3	1	1
	Loss of coral reefs, sea-grass beds and mangroves	2	4	1	3	4	6	3	1	3	3	1	2	3	2	4
	Landings or catch per unit of fishing effort	1	1	1	2	1	1	4	1	2	1	1	2	1	2	2
	Changes in composition of fish landings and average size by species	6	6	6	6	4	6	6	6	6	6	6	6	6	6	6
	Max. sustained yield for fisheries	6	4	6	4	1	3	6	6	4	1	4	3	3	2	4
	Total length of beaches eroding	4	4	1	5	3	1	6	6	5	1	5	4	3	1	6
	Beach encroachment, % area/width	6	4	6	3	3	3	6	6	5	1	5	3	3	3	1
	Pop. Growth in coastal area	6	2	6	3	4	3	1	6	1	1	1	3	1	3	1
	Marine water quality	1	4	1	1	3	6	6	6	2	3	4	2	3	3	4

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Land/Soil	**Protected area as % of total area**	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Land use change	4	1	1	2	1	6	1	1	2	1	1	2	3	4	3
	Land degradation (soil erosion)	4	3	1	3	4	1	3	1	3	3	3	3	3	3	2
	Use of fertilizers (N, P, K)	1	3	1	1	1	1	2	6	2	4	1	1	1	1	1
	Use of pesticides	1	1	1	1	1	1	1	6	2	4	1	1	2	2	1
Forest	**Forest area change**	1	1	1	1	4	6	1	1	1	1	5	1	1	2	1
	Protected forest area as % total	1	1	1	1	1	6	1	1	1	1	5	1	1	1	1
	Net area of reforestation	6	4	6	4	4	3	6	6	3	4	5	4	3	3	1
Biodiversity	**Threatened species (% of native)**	1	1	1	1	1	1	1	1	1	1	3	2	1	1	4
	Extent of loss / damage to habitat	1	1	1	3	4	6	6	6	4	4	3	4	3	3	4
Fresh water	**Annual withdrawals of ground and surface water as % of available water**	2	1	1	2	1	6	3	1	1	1	1	4	1	2	1
	Domestic consumption of water per cap.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Quantities generated /discharged by source per capita	4	4	6	2	1	1	6	3	4	1	1	1	1	1	4
	Wastewater treatment coverage	1	4	2	2	5	1	3	6	1	1	5	2	3	2	1
	Water quality e.g. BOD etc.	2	4	1	2	1	1	1	1	2	4	1	1	3	2	2
	Measured levels of pollution at monitoring sites e.g. algae prod.	1	4	1	1	1	6	3	6	1	4	6	1	3	3	4
	Prevalence of water-borne diseases	1	1	6	1	1	1	1	6	1	1	1	1	1	1	2
Minerals	**Production of minerals**	4	4	6	1	4	6	1	3	1	3	6	3	3	2	1
	Mining, sand, quarry etc.	4	1	6	4	4	2	6	6	6	6	6	2	6	6	1

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Waste	Disposal: extent, type and quantity going thro. Each type of disposal facility; eg. Landfill, incineration etc	1	1	1	2	2	1	3	6	2	1	2	1	3	2	2
	Generation: quantity, type and Source / sector	1	1	1	2	4	1	3	1	2	1	2	1	2	3	2
	Toxic/hazardous material- quantity manufactured, imported / exported	4	1	1	3	5	2	6	6	2	4	2	5	1	2	3
Air/ Climate	Ambient concentration of pollutants eg. CO, SO_2, NOx, O_3, TSP)	6	4	6	3	6	3	6	6	2	3	3	3	3	3	3
	Emissions of pollutants (CO_2, SO_2, NOx)	1	1	1	1	3	6	1	1	1	3	3	1	3	2	4
	Consumption of ozone depleting substances	1	1	1	1	3	1	1	6	1	3	1	1	1	2	1
Natural Disasters	Frequency of, and economic and human loss due to natural disasters	1	1	1	4	2	1	3	1	1	1	1	1	1	1	1
Energy	Consumption of energy & renewable energy (import/export)	1	1	1	1	2	2	1	2	1	1	2	1	1	2	1
Tourism	Tourist intensity / growth	1	1	1	1	1	1	1	3	6	6	1	1	6	6	1
	No. of tourist nights	1	1	1	1	1	1	6	6	1	1	1	1	1	1	1
	No. of cruise ship passengers arrivals	1	1	1	1	1	1	3	6	1	6	1	1	1	1	1
	Tourist penetration ratio (per 1000 inhabi)	6	1	1	1	1	1	1	6	1	1	1	1	1	1	1

Codes :
1 – Information available
2 – Partially available
3 – Not available
4 – Do not know/not sure
5 – Not applicable
6 – Not responded

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