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ECONOMIC COMMISSION FOR LATIN AMERICA
Office for the Caribbean
CARIBBEAN DEVELOPMENT AND CO-OPERATION COMMITTEE
UNITED NATIONS STATISTICAL OFFICE
JOINT ECLA/UNEP CARIBBEAN ENVIRONMENT PROJECT

REPORT OF THE
CARIBBEAN WORKSHOP ON ENVIRONMENT STATISTICS
(7-11 January 1980, Port of Spain, Trinidad)

2 JUL 1980



UNITED NATIONS

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I

ORGANIZATION

1. The Economic Commission for Latin America, the United Nations Statistical Office (UNSO) and the Joint Economic Commission for Latin America/United Nations Environment Programme, Caribbean Environment Project (ECLA/UNEP CEP) sponsored this Workshop which was held in Port of Spain, Trinidad and Tobago from 7-11 January 1980.

Attendance ^{1/}

2. Participants from the following countries attended the sessions: Barbados, the British Virgin Islands, the Dominican Republic, Grenada, Jamaica, Suriname and Trinidad and Tobago.

In addition, representatives from the CARICOM Secretariat, the University of the West Indies (Institute of Social and Economic Research, Cave Hill Campus, Barbados), the Caribbean Conservation Association, The Eastern Caribbean Natural Area Management Programme, and the United States of America Council on Environmental Quality attended.

3. The following United Nations bodies were represented at the Workshop: United Nations Statistical Office, CEPAL (Santiago and Port of Spain) and the Joint ECLA/UNEP Caribbean Environment Project.

Election of Officers

4. The Workshop elected by acclamation, the following officers:

Chairman:	Mr. Wilfred Whittingham Economic Affairs Officer CEPAL Port of Spain
Rapporteur:	Mr. Michael Howard Research Fellow Institute of Social and Economic Affairs and Representative of the Caribbean Conservation Association, Barbados.

^{1/} The full list of participants appears in Annex I.

Adoption of Agenda

5. The Workshop adopted the following agenda:
 1. Opening Session
 2. Election of Officers - Chairman and Rapporteur
 3. Adoption of Agenda and Programme of Work
 4. National Reviews of State of Environment and Statistics
 5. Guidelines on Environment Statistics
 - a) Human Settlements
 - b) Land
 - c) Energy
 - d) Natural Resources
 - e) Pollution
 6. Regional Priorities for State of Environment Assessment
 7. United Nations Statistical Office's Activities in Environment Statistics
 8. Discussion and Adoption of the Report.

Opening Speeches

6. The opening ceremony was honoured by the presence of the Honourable Patrick Manning, Minister in the Ministry of Finance, Trinidad and Tobago. Addresses were delivered by Mr. Giovanni Carissimo, Representative of the United Nations Statistical Office; Mr. Trevor Boothe, Co-ordinator Joint ECLA/UNEP Caribbean Environment Project; Mr. S. St. A. Clarke, Director ECLA Office for the Caribbean and the Honourable Patrick Manning who formally declared open the Workshop.

7. In his statement, Mr. Carissimo said that the increasing concern for environmental conditions has resulted in an increasing demand for information and data which are necessary for policy makers, national agencies and international organizations required to undertake decisions

on environmental matters. He stated the main objectives of the Workshop as follows:

1. To discuss the state of environmental conditions in the Caribbean region
2. To specify national requirements for environmental statistics
3. To identify gaps in the existing data
4. To discuss the organization of the data
5. To review and comment on the UNSO's draft Guidelines on Environmental Statistics

II

SUMMARY OF RECOMMENDATIONS

8. The Meeting identified the following main areas for investigation: pollution from vehicle emissions; the degree of coastal erosion; air pollution; environmental health and food safety and the effects on the environment of the use of pesticides.

9. After review of the technical reports on Human Settlements, Land, Energy, Natural Resources and Pollution, the Meeting identified the following areas of concern:

Human Settlements

- a) Urbanization
- b) Marginal settlements
- c) Infrastructure and services
- d) Rural settlements
- e) Human settlements technology
- f) Coastal tourism
- g) Historical and cultural heritage

Land

- a) Soil degradation
- b) Alkalinization
- c) Chemical degradation
- d) The growth of deserts
- e) The identification of natural risk areas.

It was recommended that a separate technical report for Ecosystems be prepared.

Energy

- a) Availability of energy for various applications
- b) Cost of energy

- c) Energy end-use by sectors
- d) Relative inefficiency in energy use
- e) Multiple use of resources e.g., water in dams for farming and household use as well as for generating energy
- f) Environmental effects of the use of energy resources
- g) Development of non-conventional energy
- h) General lack of global energy information in the Caribbean
- i) Control over information existing nationally but unavailable to policy makers
- j) Air-monitoring systems for dust from excavations at mining and construction sites, industrial plants, etc. and thermal heat, sulphur and other emissions.

Natural Resources

- a) Soil erosion
- b) Lack of appropriate classification of soils for Caribbean countries
- c) Genetic depletion of crops
- d) Disappearance of indigenous plant and animal life
- e) Marine pollutants
- f) Nutritional value of sea food
- g) Lack of assessment of the suitability of species and techniques which might be suitable for commercial aqua-culture
- h) Deforestation
- i) Erosion affecting forest areas
- j) Incidence of floods and droughts
- k) Rate of evapo-transpiration

- l) Recycling of water as a conservation measure
- m) Identification of sources of minor minerals including aggregates for construction
- n) Accumulation of mining wastes.

On the question of the classification of structure of natural resources, it was recommended that category 'E' of the suggested format - "Other resources" should be expanded to cover Coastal Zone and Wildlife, and that (h) - "Other" should include water provided through desalinization.

Pollution

- a) Noise pollution
- b) Pesticides pollution
- c) Trace metal pollution
- d) Solid wastes and toxic chemicals

It was recommended that studies and investigations be made into the levels of air pollution, after which standards and guidelines could be accepted.

III

NATIONAL REVIEW OF THE STATE OF THE
ENVIRONMENT AND ENVIRONMENT STATISTICS

10. The representative of the United Nations Statistical Office made a statement on concepts, definitions and classifications in the field of environment statistics. He further stated that a number of countries had initiated regular publications of these statistics but that the data assembled tended to have little or no connection between the component parts; the main reasons for this were that:

- a) a coherent conceptual framework is lacking and would continue to be lacking for a considerable time in the future given the nature of the field of environment
- b) the existing concepts and classifications may need to be revised or extended to take into account more comprehensively the uses of the data for environment assessment and management
- c) data which could link related statistical series in different fields may not be easily defined and collected.

11. The representative of the United States of America's Council on Environmental Quality stated that the United States was encountering as much difficulty as any other country in arriving at a definition of environmental statistics. He described three major documents prepared by the Council which made use of environmental data:

- a) Environmental Quality - The Annual Report of the Committee on Environmental Quality
- b) Environmental Statistics, 1978 - The first of a proposed bi-annual publication of statistical tables
- c) Environmental Conditions and Trends - A graphic presentation of environmental quality indicators.

12. The study of the environment was approached from the following sub-divisions:

- a) Land - This included population; critical areas (including wetlands, national parks, wilderness,

national wild and scenic rivers, historical sites and risk zones); human settlements; transportation; material use and solid wastes; toxics; crop land; forests, range land; energy and wildlife

- b) Water - This section includes statistics on water resources (groundwater, surface water); quality (rivers streams, lakes and impoundments and oceans)
- c) Air - This section includes statistics on various aspects of air quality, particularly air quality in urban areas
- d) Biosphere - This section includes global statistics on population, land use, energy, pollution, wildlife and the atmosphere.

13. The representative elucidated on the areas of concern and types of statistics under each of the four categories. He indicated that the Council on Environmental Quality did not possess national data on the quality of drinking water since this was primarily viewed as a local problem. It was observed that in Latin America, the main problem was one of supply of potable water to the majority of the population. Some participants expressed the view that policy makers when considering socio-economic development should make greater use of existing research with information systems and data banks.

14. Several participants felt that the region did not lack the scientific expertise necessary for the assessment of changes in the environment, what was necessary was for policy makers to recognize the environment as a priority area.

15. The representative of the Joint ECLA/UNEP Caribbean Environment Project presented the project's document "Development and Environment in the Wider Caribbean Region: A Synthesis (CDCC/ES 80/2)". This document was prepared as a general statement on the state of environment in the wider Caribbean, this being wider in scope than the CDCC countries. The representative of UNEP made available several sectoral documents on the environment as prepared for the ECLA/UNEP Caribbean Environment Project.

16. He suggested that most of the environmental problems in the Caribbean area have not stemmed from industrialization. On the contrary, most of the problems stemmed from under-development. Inadequate housing conditions, illiteracy and insanitary practices were some of the determinants of the mis-use of the environment. In compiling the document, UNEP found that in a way, too much information yet too little hard data were produced because of the heterogenous data collected and different methodologies employed. He warned that great care should be exercised in designing and maintaining data collection systems since large data systems founded on the uncritical collection of irrelevant information were very costly; did not necessarily lead to a better understanding of environmental characteristics, processes and problems; and did not necessarily help the decision-making process. The report identified six key resources as components of the eco-systems of the region: fresh water, agricultural, marine and fisheries, wild-life and genetic, energy and mineral resources. Three important developmental activities that made significant demands on the region's resources and environment were - human settlements, tourism and transport.

17. Fresh water resources were stated to be unevenly distributed within the region. Even in those states and territories where overall resources were sufficient, there were problems of seasonal and spatial distribution. The destruction of forest cover in the watershed areas intensified the problem of water supply in many parts of the region, since many streams and small rivers which used to maintain satisfactory year-round flows now virtually dry up in the dry season.

18. Drinking water - The goal of supplying adequate drinking water to urban areas appeared to be attainable in the majority of the countries. However, the process of rapid urbanization would continue to make urban water supply a major problem in the region.

19. Water related diseases - Gastro-intestinal diseases predominate in the region, and are associated with inadequate disposal of human and animal wastes.

20. Agricultural resources - The most serious problem affecting the soil of the region is erosion due to specific soil characteristics, type of vegetation cover, intensity of rainfall, winds, topography and

inappropriate agricultural practices. Other problems relating to agriculture included salinization, water-logging and chemical degradation. In the island-states, the immediate problem is the availability of arable land, attributed to their small size and topography and high population density with consequent intense competition for the scarce resource.

21. Marine and fisheries resources - The use of the Caribbean sea to explore, produce and transport petroleum increases the risk of hydrocarbon contamination of the delicate Caribbean marine eco-systems. In terms of extraction of fish from the sea, there exists limited information on numbers and types of fish in the region, and their location. However, as the region will increase its consumption of fish, it is essential that much more data be compiled on numbers of fish, life cycles and sustainable exploitability of fish by species.

22. Energy - The energy resources of the region are unevenly distributed. At present, only four CDCC countries are producers of crude petroleum. Most of the territories of the region have been forced to seek alternative sources of energy such as agricultural wastes and forest resources. The importance of considering the environment when developing alternative energy schemes was stressed since serious problems could emerge in the short to long term if proper care is not taken.

23. Human settlements - The unsuitability of the former United Nations definition of urban regions (which established a minimum cut off point - 20,000 inhabitants) to the Caribbean situation was noted. It was suggested that more appropriate statistics should be collected to facilitate comparisons and to arrive at value judgements without having to examine each country individually.

24. Tourism - Tourism being the mainstay of several island economies in the Caribbean in some of which tourist arrivals far exceeded the population of the country, problems of accommodation and use of resources must be studied in depth. Preliminary studies had indicated that the intensity of tourist use of resources was far higher than that of the local population and their environmental impact greater.

25. Several participants were of the view that the most serious environmental problems facing the region were those of erosion, both coastal and inland, oil and water pollution, disposal of solid, liquid

and industrial wastes, the use of pesticides and the effects of these problems on health and the general quality of life. Although various agencies in the region were involved with specific aspects of environmental management, there was still no systematic formulation of areas of environmental concern. One participant pointed out that this was largely due to the relatively recent emphasis on environmental statistics. This was not to suggest however, that there were no available inputs into the construction of usable indicators to measure areas of environmental concern, provided such concerns could be articulated and given priority weight.

26. Erosion - Appropriate legislation was important in arresting the problem which was in part due to existing farming practices. Although technical knowledge and legislation on inland erosion existed, there was the related problem of enforcing the legislation and applying such knowledge. However, other efforts made to arrest erosion included re-afforestation and land reclamation although farming practices needed to be rationalized.

27. Water pollution - The incidence of water-borne diseases could increase as a result of the modification of the environment through engineering works. One participant indicated the possible effects of man-made lakes on human health. For instance, man-made lakes could lead to the depletion of fishery resources and the creation of breeding sites for mosquitoes. The destruction of estuarine eco-systems also affect fisheries development.

28. Shifting cultivation as well as clearing of large forested areas for charcoal projects could destroy the properties of the soil. It was acknowledged that, despite the beneficial impact of such projects, such as hydro-electricity, planners should be acutely aware of the destructive impact of such projects on eco-systems.

29. Participants identified sources of environment data available as well as gaps in the existing data. This was necessary to provide a rational and meaningful framework for a system of environment statistics. In Trinidad and Tobago, data existed on human settlements including mortality and morbidity statistics, internal migration and housing.

Data on land use, land erosion, flood damage and meteorological and seismic data were available. Unpublished data on pollution problems were available as well as information on natural resources and energy. In Grenada, there were marked deficiencies in environmental monitoring and most statistics related to non-environmental phenomena. It was reported that the data base on Barbados was reasonably good especially in the area of water resources and water quality of beaches.

30. The main areas identified for investigation included pollution from vehicle emissions, the degree of coastal erosion, air pollution, environmental health and food safety and the effects on the environment of the use of pesticides. One participant indicated that his country was in need of statistical data on rainfall, extent of run-off and wild life. The meeting was informed that the creation of an Institute of Environmental Health would provide advisory services on the state of environmental health as well as provide information on project evaluation services.

31. It was stressed that the immediate task was first to establish areas of consensus at the national level and secondly to indicate areas of priority to provide a rationale for a statistical system. The next task was to conduct an information search for suitable concepts and arrive at meaningful indicators.

IV

GUIDELINES ON ENVIRONMENT STATISTICS

32. The representative of the United Nations Statistical Office introduced the Guidelines and outlined the problems faced in the realization of this task. The Guidelines were an examination of the principal issues for statistical treatment in each core area of environmental concern: human settlements, land, energy, natural resources and pollution. Five technical reports had been issued for each of the above mentioned core areas. They are primarily intended to stimulate discussions of experts in these fields and their refinement and extension will be carried out on the basis of those discussions. An attempt has been made to present the five technical reports under a similar format:

- i) introduction to the topic
- ii) possible approaches to the classification of the environmental dimensions of the topic
- iii) review of problems of measurement and
- iv) existing sources of statistics gaps and a possible format for environmental statistics concerning the topic.

In the technical report on pollution a slightly different approach has been taken compared with the other technical reports, mainly by virtue of the problems themselves which accrue to pollution.

33. A number of problems were faced in the preparation of the Guidelines and Technical Reports:

- i) some countries had initiated the regular publication of environment statistics, but the data assembled have little if any connection between the points
- ii) in several countries the splintering of collection activities across various national agencies and their regional or even local branches poses a major problem
- iii) areas identified for the collection and use of environment statistics might not correspond to administrative areas.

The representative of the UN Statistical Office concluded his presentation requesting participants' comments and observations on the content of the five technical reports as well as on their applicability to the Caribbean region since they were global in perspective.

34. The UNSO representative clarified that the technical reports should not be confused with the framework for environment statistics, which is a separate project at present being undertaken by the Statistical Office, the discussion of which was not the purpose of the present Workshop. The five technical reports represent five areas of concern in the field of environment which have been grouped under five headings merely as a matter of convenience but that they did not represent a framework under which environment statistics should be organized.

35. In commenting on the Guidelines, the CEPAL Santiago representative cautioned that one must have a clear idea of what one was looking for. He stated that generally, human settlements problems were monitored statistically. Environmental considerations presented a different viewpoint of the same statistics that had been traditionally collected. He traced the interrelationship between Nature and Human activities graphically. The diagram appears at Annex II.

36. The Regional Economic Adviser in the ECLA Office for the Caribbean presented document CDCC/ES/80/3 and outlined three areas to focus attention to the building of environmental concern into the traditional Government managerial structures:

a) Manpower Policy - The importance of education at the primary, secondary and post-secondary levels, to devise training for increasing the supply of professionals in various fields was stressed. Appreciation for the physical environment must be inculcated at an early age, in the home and at school.

b) Statistical Data and Social Indicators - The failure of present-day economists to control inflation and other economic phenomena, and on their resulting frustrations was noted. The field of economics had begun to ask questions on the data being used to assess human welfare. Social scientists and sociologists had tried to develop welfare indicators, work on which had not advanced very far. More research in the socio-economic field ought to be undertaken in the Caribbean in order to learn about attitudes in the society.

c) Accommodation of Environmental Assessments into Administrative Systems - The need to assess the data collected was stressed. The Caribbean had failed to effectively determine what had to be done and to implement what had been determined. An administrative framework which would permit the implementation of decisions when made was lacking; the result was compartmentalization, and a weakening of coordinating machinery. There was need to de-emphasize financial and fiscal considerations and emphasize planning and development functions in which matters of environment must be involved.

37. One participant observed that Project Planning which focussed narrowly on the economic and financial viability of projects was being practiced and fostered by the international funding agencies to the detriment of comprehensive planning.

38. The meeting strongly urged the incorporation of environmental assessments in policy planning as an urgent priority bearing in mind the impact of development activities on the environment. There was general agreement that potential environmental impact should be considered as an integral factor in all economic evaluations. It was pointed out that the trend away from comprehensive planning tended to minimize environmental considerations.

Development of a programme of environment statistics should justify a priority status for including environment considerations in development planning.

39. The Meeting noted the limited resources of Governments in the Caribbean, and recorded as a priority, the need of the various Caribbean territories to acquire machinery and laboratories for conducting the experiments and tests that must be done in the process of management and assessment of the environment.

REGIONAL PRIORITIES FOR STATE OF ENVIRONMENT ASSESSMENT

(Item 6 of the Agenda)

Human Settlements

40. UNSO had identified five areas of concern in Human Settlements:

- a) Urbanization
- b) Marginal settlements
- c) Infrastructure and services
- d) Rural degradation
- e) Architectural dullness

The Committee felt that Caribbean environmental concerns were not fully represented and suggested the addition of two concerns and the modification of two others. Rural degradation should be modified to read "Rural Settlements". Architectural dullness should read "Human Settlements Technology". This referred to architectural design vis a vis the physical environment in which the building was placed, its function, and the aesthetics of it. It was also concerned with construction materials and their relation with the natural environment and the energy inputs into these materials.

41. Two additional areas of concern were:

- a) Coastal tourism
- b) Historical and cultural heritage

Historical and cultural heritage would include building sites and districts of historical or cultural importance. Data could be collected in map form and/or in the form of time series. The suggested format of Human Settlements should be expanded to include the two additional areas.

42. In Level I - The Household and its dwelling, the Meeting was sceptical about the validity of the data to be collected on housing costs as against income or consumption.

43. In Level II - The immediate environmental community, the clarification was made that Renovation (waste and pollution) referred more correctly to Re-cycling.

44. In reviewing the existing data, the Meeting identified two areas in which the information collected would be of doubtful validity.

- a) Community - Statistics on garbage waste and disposal of households were likely to be inaccurate
- b) School facilities - Statistics on proximity of schools might conceal the fact that schools in a given area do not necessarily serve the children of that area.

45. Generally, on Information gaps, it was observed that the problem was not so much one of availability as of periodicity. Only three Caribbean countries had a continued household survey capability.

46. On the subject of Land, Meteorological and Geological hazards should be included. The number and location of shelters should be collected. Building standards should be introduced.

Land

47. The major areas of concern to the Caribbean were outlined as follows:

- 1) Soil degradation
- 2) Alkalinization
- 3) Chemical degradation
- 4) Growth of deserts
- 5) The identification of natural risk areas

Major Gaps in the Land Data

48. Discussion led to the observation that while there exist data on agricultural land in most countries, statistical coverage differed from country to country. Other major gaps in land data were identified as:

- 1) Statistics on built-up areas
- 2) Data on competing uses for land in urban areas

3) Data on agro-ecological land surfaces

49. There was recognition expressed for the need to prepare a separate technical report for Eco-systems, and that related statistics should be collected. The main eco-systems were:

- a) Estuarine and swampland
- b) Savannahs
- c) Tropical rain forest
- d) Mountains
- e) Coral reefs

A Possible Format for Land Statistics

50. The possible format as suggested in the draft technical report on Land was accepted with minor modifications. The suggested possible format is as follows:

Subject of Environmental Concern	Topics to be Investigated
<hr/>	
A. <u>Land Characteristics and Physical Conditions</u>	1. Availability 2. Location 3. Broad category of quality 4. Topography 5. Soils 6. Vegetation 7. Hydrology
<hr/>	
B. <u>Land Use</u>	1. <u>Agricultural</u> a) by type of crop/livestock b) by type of potential/ ecological areas c) irrigated croplands

Subject of Environmental Concern	Topics to be Investigated
B. <u>Land Use (Cont'd)</u>	<p>7. <u>Water bodies</u></p> <ul style="list-style-type: none">a) riversb) lakesc) canals <p>8. <u>Surface mining and quarrying</u></p> <ul style="list-style-type: none">a) surface miningb) quarrying
C. <u>Special Problems</u>	<p>1. <u>Degradation of soil</u></p> <ul style="list-style-type: none">a) erosionb) salinizationc) chemical degradation <p>2. <u>Desertification</u></p> <ul style="list-style-type: none">a) soilb) water/climatec) vegetationd) human use <p>3. <u>Loss of agricultural land to alternative uses</u></p> <p>Sub-divide by old/new uses</p> <p>4. <u>Disposal of wastes and toxics</u></p> <p>Sub-divide by type</p> <p>5. <u>Protection of critical areas</u></p> <ul style="list-style-type: none">a) wetlandsb) wildlife refuges

Subject of Environmental Concern	Topics to be Investigated
C. <u>Special Problems</u> (Cont'd)	c) wilderness
	d) cultural sites
	6. <u>Mining and quarrying</u>
	a) surface mining
	b) quarrying

Energy

51. The Meeting noted that since energy was such a current topic, much investigation was going on world-wide, and Caribbean countries should not duplicate the exercise. The problem of inadequate finance and the sophisticated, complex and expensive equipment required in areas such as drilling for crude petroleum or for geothermal energy was also noted.

The major areas of concern to the Caribbean were outlined as follows:

1. Availability of energy for various applications
2. Cost of energy
3. Energy end-use by sectors
4. Relative inefficiency in energy use
5. Multiple use of resources, e.g., water in dams for farming and household use as well as for generating energy
6. Environmental effects of the use of energy resources
7. Development of non-conventional energy
8. General lack of global energy information
9. Control over information existing nationally but unavailable to policy makers

10. Air-monitoring systems for dust from excavations at mining and construction sites, industrial plants etc., and thermal heat, sulphur and other emissions.

Major Gaps in the Energy Data

52. These were identified as follows:

1. Adequate information on actual resources including reserves of fossil fuels
2. Actual sources of imports and destination of exports by type of energy products
3. Certain detailed data in the hands of producers (mainly transnationals) including items of costs and prices
4. Levels of stocks
5. Details on projections of energy - reserves, production and consumption
6. Data on production and consumption of fuelwood, charcoal, bagasse, vegetal wastes, municipal wastes and other non-commercial energy resources
7. Baseline data including actual measurements to determine potential of the biomass and other non-conventional sources
8. Riverflow and other hydrological data on a continuous basis
9. Data on environmental impact of energy production and consumption, e.g.:
 - Oil-spill reports
 - Energy pollutants detected in water samples
 - "Acid-leaching" revealed in soil samples.
10. Data on research and experiments including those being conducted currently in the Caribbean, in other countries at a similar stage of development, and with the same basic ecological characteristics and world-wide.

53. A Possible Format of National Statistics
on Energy Aspects of Environment

A. The Resource Base

1. Commercial energy: fossil fuels

Items: coal, lignites, peat, crude petroleum, natural gas liquids, oil shales, bituminous sands, natural gas

Coverage: latest year available by total resources, o/w known reserves, o/w economically recoverable

Units: toe/tce/MJ .

2. Commercial energy: primary electricity

Items: hydro, geothermal, nuclear

Coverage: latest year available, by installed capacity under construction, planned

Units: MW/MJe .

3. Non-commercial energy

Items: fuelwood, charcoal, bagasse, pulp and paper, industry wastes, dung, vegetal wastes, municipal wastes, animal

Coverage: latest year available, estimates of availability (by total harvested/used by type)

Units: toe/tce/MJ .

4. Non-conventional energy sources

Items: solar, tidal, wind, ocean gradients, fuel cells, photo-voltaics, gobar gas, magnetohydrodynamics

Coverage: latest year available, estimates of availability (total output by type, installed capacity by type) research and development expenditures by type

Units: toe/tce/MJ and MW/MJe and local currency.

B. Energy Extraction/Conversion/Trade/Consumption

1. Solid fuels

Items: primary - coal, lignites, peat; secondary - hard coal briquettes, brown coal/lignite briquettes, coke oven/gas cokes

Coverage: latest year available, total production, net trade, stock changes, conversion input or output and gross availability, by item

Units: toe/tce/MJ.

2. Liquid fuels

Items: primary - crude petroleum, NGL's; secondary - gasolines, kerosens, jet fuels, white/industrial spirit, naphthas, distillate fuel oils, residual fuel oils, bitumen. lubricants, petroleum waxes, petroleum coke, petrochemical feedstocks, other products

Coverage: latest year available, total production, net trade, stock changes, conversion input or output and gross availability by item

Units: toe/tce/MJ.

3. Gaseous fuels

Items: primary - natural gas, methane; secondary - liquified petroleum gases, refinery gas, ethane, gasworks gas, coke oven gas, blast furnace gas

Coverage: latest year available, total production, net trade, stock changes, conversion input or output and gross availability by item

Units: toe/tce/MJ.

4. Electricity

Items: primary - hydro, nuclear, geothermal; secondary - coal fired, oil fired, gas fired, other fired

Coverage: latest year available, total production by type, net trade, fuels consumed, output by secondary type, gross availability

Units: kWh/MJe and toe/tce/MJ and fossil fuel replacement value.

5. Steam and hot water

Item: steam and hot water

Coverage: latest year available, total production

Units: tcal/MJ_{th}

6. Non-commercial fuels

Items: fuel wood, charcoal, bagasse, dung, tar wood wastes
vegetal wastes, pulp and paper industry wastes,
municipal and other wastes

Coverage: base and/or time series, totals for production/
consumption by type/gathering time, distance from
point of use

Units: original weight/volume and ton replacement fuel value

C. Energy and the Environment

1. Atmosphere

a) Pollutants

Items: CO₂, SO₂, CO, HC, dust and smoke, particulates
(i.e., "Criteria" pollutants), acid rain (S → H₂SO₄ → rain)

Coverage: latest year available, data on atmosphere pollutant
loads

Units: g/day or t/y

A section could be included here on the basic constituents of
the atmospheric system, its characteristics and function e.g.,
gaseous composition, wind systems, layers according to various
characteristics/possible other items are better covered under
the section of the Guidelines dealing with pollution (Air)7

b) Energy sources of pollutants

Items: emission factors by energy activity (e.g. coke oven,
catalytic cracker, gas works); also quality measures
of fuels e.g. sulphur content, nickel vanadium in
oil etc.

Coverage: a base year or/and time series; consumption by
commodity with an emission factor for those categories
of consumption chosen (e.g., iron and steel)

Units: g/day, t/y

2. Hydrosphere

Items: (pollutants and sources) heat, acid leaching, refinery leakage, ocean spillage, coastal spillage (rigs and tankers)

Coverage: base year or/and time series, regions, totals for these problem categories e.g., t/y oil spilled at sea from IMCO, heat emission factor according to thermal electricity generation

Units: various.

3. Lithosphere

a) Pollutants/sources

Items: solid fuels- waste liquid fuels - spent catalysts, spent clays

Coverage: base year or/and time series, totals for these problem categories, overburden removed

Units: various e.g. t/y.

b) Recycling of wastes

Items: municipal, industrial, agricultural, other

Coverage: base year and/or time series, research and development expenditure, total of volume available used for energy production/capacities of plants by type

Units: t/y

4. Environmental effects of non-commercial fuels

Items: fuelwood, charcoal, bagasse, dung, tar, wood, wastes vegetal wastes, pulp and paper industry wastes, municipal and other wastes

Coverage: impact by type of fuel on air/water/land in terms of both pollution emission and alternative uses (e.g. fertilizer)

Units: t/y, equivalents.

D. Miscellaneous Energy Statistics

1. GNP/energy consumption ratios

Items: energy, electricity, consumption

Coverage: base year and/or annual time series, GNP by energy consumption, by electricity consumption

Units: toe/tce/MJ and national currency.

2. Fuel mix/import dependence

Items: fuel types/origins

Coverage: base year and five-year intervals, inputs to energy economy by fuel type and origin indigenous/imported

Units: toe/tce/MJ and %

3. Inputs by sector of end-use

Items: industrial/transport/household sectors

Coverage: base year and five-year intervals, total end-use consumption, o/w by sector

Units: quantity and value

This list represents a blueprint ("shopping list") outline for countries rather than an initial collection of statistics. In addition to the elements in "D", micro data can be added (e.g., energy inputs by industrial end-use sector can be supplemented by a list of major industrial plants and their relative contribution).

The contents can be supplemented further by the experience gathered in the national pilot study in the Caribbean.

Natural Resources

54. General discussions at the outset of consideration of this item centered around the following areas: erosion, salinization and urban spread (defined as indiscriminate conversion of agricultural land to other uses). It was observed that these topics were covered in the Technical Report on Land. Another problem was depletion and/or addition to resources owing to hurricanes, earth-quakes, volcanoes, etc. It was felt that these areas should be stressed.

55. The major areas of concern were underlined as follows:

1. Soil erosion
2. Lack of an appropriate classification of soils for Caribbean countries
3. Genetic depletion of crops
4. Disappearance of indigenous plant and animal life
5. Marine pollutants
6. Nutritional value of sea food
7. Lack of assessment of the suitability of species and techniques which might be suitable for commercial aqua-culture
8. Deforestation
9. Erosion affecting forest areas
10. Incidence of floods and droughts
11. Rate of evapo-transpiration
12. Recycling of water as a conservation measure
13. Identification of sources of minor minerals including aggregates for construction
14. Accumulation of mining wastes.

56. The statistics considered of major importance and many of which constitute gaps in terms of availability in Caribbean countries were listed as follows:

1. Rates of erosion
2. Soil resource
3. Potential of soils
4. Data on carry-over of chemicals into the tissue of crops
5. Application of fertilizers, pesticides, herbicides
6. Nutritional value of foodcrops
7. Quantity, type, etc. of indigenous non-commercial flora and fauna
8. Data on carry-over of chemicals into sea food

9. Data on equipment related to economic water-based activities and their impact
 10. Data on nutritional value of sea food
 11. Collection and collation of data on current aqua-culture projects including yields
 12. Extent of forest resources and their use
 13. Data on species in afforestation both on commercial and non-commercial units
 14. Volume of water recycled and feasible for recycling
 15. Availability of minor minerals including construction aggregates by type, location, including estimates of reserves
 16. Data on pollution from mining and extraction wastes
 17. Data on health in mining and quarrying areas, e.g., occurrence of respiratory infection
 18. Degree of processing by main mineral resources.
57. On the question of the classification structure of natural resources (see the UNSO Technical Report, page 36 ^{2/}) it was decided to add a category - (h) "Other" to include water provided through desalinization. It was also decided to insert under "E - Other Resources" two sub-categories - "Coastal Zone" and "Wildlife".

The Coastal Zone is the interface between land and water and as such is an area sensitive to man-made and natural changes. Beaches, marshland, estuaries, reefs etc., support fish and other wildlife, provide areas for recreation and attract visitors and tourists. Coastal areas are also the site of transport facilities, urban settlements, energy resource development and waste water treatment. Statistical information required to better assess and manage coastal areas includes the types and extent of the resource and current and projected uses, unique and special features, etc.

58. The committee also noted that greater attention should be given to wildlife. Traditionally, wildlife resources were used by man for food, clothing, beasts of burden and a source of building materials.

^{2/} See Annex III

Wildlife, plants and animals are now increasingly viewed as needed for recreation, education and research. In fact the long-term health of the human species may ultimately depend on how we protect the world's genetic heritage.

59. Statistics on the number and type of species, the extent and condition of habitat and the use of wildlife should be considered for further development.

Pollution

60. The UNSO representative introduced a technical report on pollution and pointed out that this report differed from the other four in that it lacked the format for collecting statistics at the end of the paper.

61. In order to guide discussion in this area, it was suggested that the diagram presented by the CEPAL representative earlier might be used as an aid in structuring thinking. It was suggested that production and consumption were activities that lead to residuals. The residuals could either be recyclable or non-recyclable. Of those that could not be recycled, some were polluting, others were non-polluting. The environmental objective would be to convert the polluting to non-polluting and to convert the non-recyclable to recyclable. If these two processes could not be done, the next approach would be to modify the processes of production and consumption themselves. The diagram is reproduced in Annex II. Additional points raised here included the suggestion that in the short run, the move to re-cycling and to converting residuals to non-polluting elements might be difficult. It was necessary to determine areas of concern to arrive at what elements of pollution should be tackled first. It was necessary to quantify some elements of pollution in order to properly manage pollution.

62. Air Pollution - The important concern here was with the monitoring of flourides, dust from industry, such as mining of bauxite, and auto emissions. One participant pointed out that occupational health in factories was also a major concern and that the extra-factory atmosphere was just as important as the intra-factory atmosphere. Standards would then have to be set up. The UNEP representative mentioned the relevance

of meteorological information in this connection, pointing out that meteorological conditions could affect the levels of emissions and dust in the extra-factory atmosphere and in point of fact, it would be necessary to monitor urban areas as a whole. Apparently, not much information is generally available on this subject in the Caribbean area. It was pointed out however, that in Trinidad and Tobago, the Ministry of Energy and Energy-based Industries monitored the environment in the area surrounding their major refinery.

63. Other points mentioned in this connection included the question of co-ordination of information on other work on this subject of air pollution. It was pointed out that cost of instrumentation was expensive and the sharing of facilities and information would be necessary. It was suggested as a recommendation that there be studies and investigations as to the levels of air pollution after which standards and guidelines could be adopted. Participants seemed to agree that the question of financing would be a major one.

64. Water Pollution - Much attention was focussed on Table 8^{3/} of this paper, "Statistical Items and Water Pollution". Four major points arose in the discussion:

- the question of pesticides in water
- the question of the number of private water tanks in many countries
- the question of water standards
- the statistics and the statistical aspects.

65. With respect to pesticides, it was pointed out that documentation on food gave more extensive treatment to pesticides, whereas pesticides in water was regarded as apparently of lesser importance. It was felt that in the normal monitoring process, the presence of pesticides would be revealed.

3/ A reproduction of Table 8 appears at Annex IV.

66. On the question of private tanks, it was pointed out that since large numbers of private tanks exist in many sections of Caribbean countries, it was important that these come under the attention of the health authorities because of the possibilities of water-borne diseases. In other words, public water supply schemes are not the only ones that should be monitored.

67. On the question of standards, it was stressed that there was a need for standards for water quality, both for drinking, irrigation and for recreation. Obviously standards would have to be set and this would depend partly on the prior collection of data and also on an assessment of the standards that exist in other countries which could be adapted in the Caribbean.

68. On the question of statistics two major points emerged. Firstly, that it was urgent that statistical investigations be carried out to determine what exists since this would be needed in trying to determine and impose standards. The second major point concerned the collection process, the administrative side of statistics. It was pointed out that the substantive divisions concerned with the technical aspects of water should be the primary collection agencies but their statistical work could be co-ordinated with the central statistical office. The Meeting took note of the summary statement in the pollution paper by the UNSO that few readily available traditional types of statistics are available in the field of pollution than generally and that for the present, statistical needs could be more closely related to analytical and assessment tasks and that new approaches - a new statistical series would be tailored to specific issues.

69. The Meeting noted the general concern in the region for water pollution. Additionally, it was agreed to omit glaciers from the UNSO table of statistical items, included under water pollution and include a sub-section named "industrial water statistics" whereby the various substantive divisions would undertake the collection and processing of related data and coordinate this with the statistical office.

70. It was the general consensus of opinion that standards for water quality for drinking, recreational and irrigation purposes were urgently needed. However, the view was expressed that one should identify what exists within the region before trying to impose standards.

71. It was suggested that the kinds of statistics needed to monitor soil pollution be identified by the experts in this field.

72. Noise pollution was considered as not being a major area of concern at present and it was suggested that noise be included as an area of concern in general.

73. Pesticides pollution was an area of major concern in the region, both in food and water. Hence, the need to monitor their levels in both media, by conducting analyses on earth and water samples, and possibly living organisms. It was felt that data on pesticides banned and those presently in use should be made available, and also the import of pesticides monitored.

74. On trace metal pollution it was recommended that in countries where heavy metals such as zinc, lead, cadmium, arsenic, chromium and mercury are used in industrial activities, systematic sampling should be promptly instituted to enable the collection of statistics on their dispersal in the biosphere, especially in air, water and living tissues.

75. Radiation was not considered a major problem. However, it was advised by a participant that radiation levels in the various media and in marine life be monitored periodically.

76. Solid wastes and toxic chemicals were also considered as being areas of major concern, and it was suggested that the quantity, composition, sources and the method of disposal of waste and whether recycling or recovery measures are implemented, be continuously monitored.

VI

UNITED NATIONS STATISTICAL OFFICE'S ACTIVITIES
IN ENVIRONMENT STATISTICS

77. The representative of the United Nations Statistical Office described the current activities and future plans of the UNSO in the field of environment statistics. The programme is designed to provide the basis for continuing international guidance and assistance to countries in developing statistics in the environment as well as reporting, compiling and publishing internationally comparable data. During its first phase of implementation, until the end of 1981, the programme focusses on the following major lines of work:

- i) Preparation of Guidelines of Environment Statistics
- ii) Exploring the feasibility of developing an overall structure or framework for the organization of environment statistics
- iii) Undertaking a survey on country practices and plans.

78. Regarding the Guidelines, the preparation of which have been discussed under the previous item, the UNSO's representative pointed out that they will be discussed again, together with the comments of this meeting, in a series of regional workshops which the Statistical Office is organizing around the world. The next workshop will be held in Santiago de Chile from 7-11 April 1980. The Statistical Office is also planning to undertake a series of national pilot studies to test the suitability of, and adjust the Guidelines for regional and national use. In informal discussions, Barbados has expressed the interest in conducting the pilot study and the UNSO would like to know if other Caribbean countries have similar interests.

79. The work of UNSO on the overall structure or framework for the organization of environment statistics is based on the detailed survey of the implicit or explicit "models" guiding the compilation of national environmental statistical compendia. Other experiences of international organizations and individual countries in this field are also taken into account. The focus has been in two different but related approaches: (a) structural approach; (b) analytical approach.

80. In the first approach efforts are made to structure the whole coverage of environmental statistics and thus to outline a tentative structural framework (i.e., what are the parts or items of the framework and what kind of conceptual or theoretical relationships they have). In the second approach the aim is to develop a flexible information model which could be useful in a systematic measuring of the individual items or parts in the overall framework. A preliminary draft of the report describing the first tentative solutions adopted is now under preparation. It will contain also the above-mentioned survey of "models" guiding the compilation of environmental compendia published so far.

81. Regarding the survey of country practices and plans the UNSO representative stated that a directory is in the process of being prepared. The directory is a reference tool, or an index of the "State of the art" of environment statistics country by country. It will provide a statistical referral tool to be incorporated into the IRS/Infoteria system of UNEP. It will contain the name/address of each statistical agency, all specialized agencies working in the field of environment, a summary of national legislation on environment, and a subject by subject analysis of available statistics by source, agency and/or publication. The UNSO representative concluded by inviting participants to comment on the programme as well as suggestions on its implementation.

82. The participants took note of the programme of work of the United Nations Statistical Office. They also expressed satisfaction at the ECLA/UNEP's document "Development and Environment in the Wider Caribbean Region: A Synthesis" and were eager to know of the work done by the project. They felt that the project had made a valuable contribution to the furthering of awareness of environmental concerns in the Caribbean.

VII

83. The Meeting discussed and adopted the present Report.

ANNEX I

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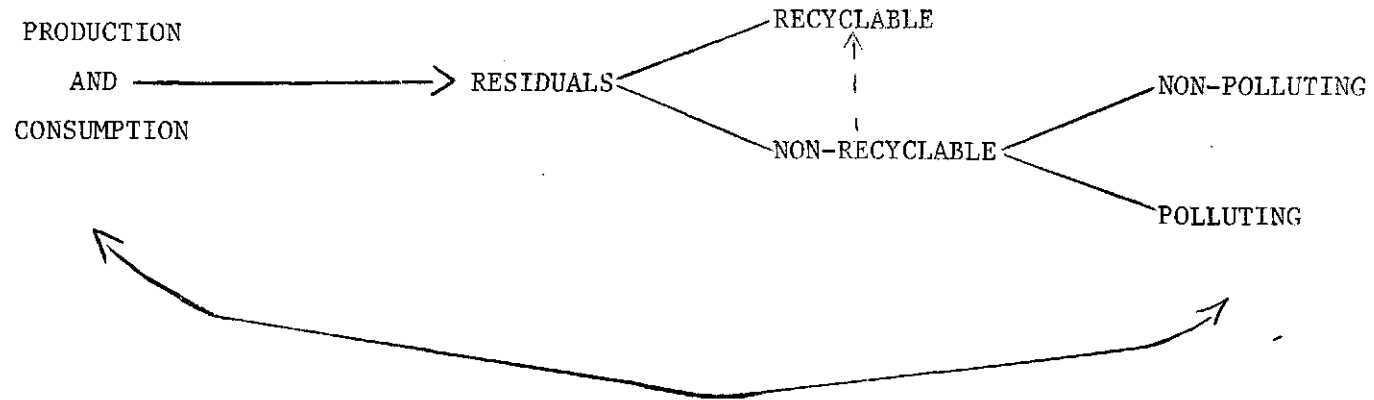
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UNSO

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ANNEX II

EXPLANATORY DIAGRAM OF THE
NATURE OF RESIDUALS FROM THE
PRODUCTION AND CONSUMPTION PROCESSES



ANNEX III

CLASSIFICATION OF STRUCTURE OF NATURAL RESOURCES

A. Food resources

1. Land-based

Resource topics and environmental dimensions

- a) Soils : area, by type, characteristic parameters e.g. formative process, depth, etc.
 - : bioclimatic regions, area, by type, % of total land, characteristics of habitats, parameters of temperature, rainfall, seasonality, vegetation
 - : vegetation regions, area, by type, characteristics of habitats, typical species
 - : categories of land use, area, by type, % of total land, typical groupings of use categories
- b) Crops and Livestock : volume by type, area planted, yields, livestock, acreage of agricultural types, application of fertilizers by type, pesticides/herbicides by type, irrigation, mechanisation, storage, processing, food contamination
- c) Livestock : number of each type, age indicators, area occupied.

2. Ocean-based

Resource topics and environmental dimensions

- a) nutrient supply, by ground, by type, marine pollutants, toxic chemicals by ground
- b) fishery yields, by area, type, sustainable yields, by type: fishery stocks
- c) equipment, type, by ground, impact of various types of equipment
- d) fresh-water fisheries, pollution problems

B. Forestry resources

1. Availability of forest resources

- a) stocks, by type and area
- b) rate of cutting/deforestation/soil erosion
- c) afforestation programmes, type, area

2. Uses of forest resources

- a) pulp and paper industry
- b) construction, fuel, furniture
- c) recreational uses/forest reserves

C. Water resources

1. Availability of water resources

- a) volume of rainfall evapo-transpiration runoff, underground accumulation, annual/seasonal runoff patterns, by region
- b) incidence of floods/droughts, parameters of their occurrence
- c) for major rivers/by country/regions, dependable stream flow and maximum dependable flows
- d) dams, barrages, volume impounded, canalisation, distribution networks
- e) e) aquifers, wells
- f) quality of water: colour, taste, smell, oxygen demand, temperature, dissolved salts, suspended load
- g) water standards: by use e.g. drinking, irrigation, livestock, etc.

2. Use of water resources

- a) agriculture: withdrawal, consumptive use, flow requirements - irrigation
- b) industry: by type
- c) municipal intake - domestic, commercial uses
- d) rural domestic use
- e) electricity generation - cooling

ANNEX IV

REPRODUCTION OF TABLE 8 OF
THE TECHNICAL REPORT ON POLLUTION

<u>Statistical Item</u>	<u>Unit of Measurement</u>
<u>I. Water storage and water quality</u>	
1. Water storage, total, of which	'000 m ³
a) surface run-off of rivers	'000m ³ /year
b) reservoirs	'000m ³
c) lakes and other inland waters	"
d) glaciers	"
e) underground water, total	'000m ³ /year
2. Water storage per person	m ³ /person
3. Water storage per km ² of territory	m ³ /km ²
4. Length of rivers and canals of which	km
a) pure water	km; as %
b) semi-polluted water	"
c) polluted water	"
d) heavily polluted water	"
5. Natural lakes and reservoirs (shoreline length), of which	km
a) pure water	km; as %
b) polluted river less than 20% of total length	"
c) 20% - 49.9%	"
d) 50% and more	"
6. Quality of underground water of which	
a) suitable for drinking	as % of total underground water storage
b) mineralized	"
c) polluted	"

Statistical Item	Unit of Measurement
<u>II. Water consumption</u>	
7. Water intake-total of which	'000 m ³ /year
a) by own water intake structure for surface water	"
b) by own water intake structure for underground water	"
c) from public supply	"
d) from other water resource utilization systems	"
8. Water utilized, total of which	"
a) for household needs	"
b) for irrigation of agricultural area	"
c) for livestock farming	'000 m ³ /year
d) for production needs of which	'000 m ³ /year
- drinking water	"
- untreated water	"
- re-use of water	"
- re-circulated water	"
9. Water supplied, total of which	'000 m ³ /year
- drinking water	"
- untreated water	"
- waste water	"
10. Water losses	'000 m ³ /year
11. Thermally polluted water consumed of which	'000 m ³ /year
a) for household needs	"
b) for extraction of chemical elements	"
c) for agriculture	"
d) for energy production	"
12. Mineralized water consumed	'000 m ³ /year

Statistical Item	Unit of Measurement
III. <u>Volume of water discharged, its Pollution and purification</u>	
13. Sewage water discharged, total of which	'000 m ³ /year
a) pure water, discharged of which	"
- to surface water	"
- to underground reservoirs	"
b) polluted water discharged of which	"
- to surface water	"
- to underground reservoirs	"
c) purified water discharged of which	"
- mechanical purification	"
- chemical treatment	"
- biological treatment	"
14. Characteristics of waste water	
a) temperature	°C
b) pH	scale 1-10
c) suspended matter	<u>ton</u> mg/L
d) mineralization	"
e) total biochemical oxygen demand (BOD)	<u>ton oxygen</u> mg O ₂ /L
f) active surface synthetics	<u>ton</u> mg/L
g) chlorine ions	"
h) sulphate ions	"
i) phosphorus	"
j) nitrogen	"
k) volatile phenol	"
l) oil and oil products	"
15. Sewage load in water body	<u>volume of sewage</u> volume of water body
16. number of purifiers and their capacity of which	'000 m ³ /day
a) mechanical purifiers	"
b) chemical purifiers	"
c) biological purifiers	"
17. Re-circulated water supply systems and their capacity	'000 m ³

ANNEX

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- E/CEPAL/PROY.3/L.INF.7 Collected Contributions of the IOC/FAO/UNEP Workshop on Marine Pollution in the Caribbean and Adjacent Waters, Port of Spain, Trinidad, December 1976 (UNESCO, 1977)
- E/CEPAL/PROY.3/L.INF.8 Directory of the Caribbean Marine Research Centres (IOC/UNEP, 1979)
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- E/CEPAL/PROY.3/L.INF.12 Natural Disasters in the Wider Caribbean Area: An overview (UNEP/ECLA, 1979)
- E/CEPAL/PROY.3/L.INF.13 Marine and Coastal Area Development in the Wider Caribbean Area: Overview Study (UNDIESA, 1979)
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- E/CEPAL/PROY.3/L.INF.16 A Strategy for the Conservation of Living Marine Resources and Processes in the Caribbean Region (IUCN, 1979)
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