

**Priority Training and Capacity-Building Needs in the Generation
& Use of Information for CARICOM Small Island Developing
States (SIDS) Sustainable Development Decision-Making**



**A Preliminary Draft Report For The
“Information for Decision-making on Sustainable Development (IDSD) Project”**

**by
K. Mustafa Touré, Priority Training Needs Consultant**

for the
Unit for Sustainable Development and Environment
Organization of American States

May 2003

TABLE OF CONTENTS

1.	The IDSD Project	1
1.1	Project Overview	1
1.2	Consultant's Terms of Reference	1
2.	Assessment of Regional Sustainable Development Information Management Infrastructure	2
2.1	Information Management Conceptual Overview	2
➤	Information/Statistics/Indicators	2
➤	Information Management Systems	2
➤	New IT Tools	2
➤	Sustainable Development Decision-Making	3
2.2	Information Infrastructure Conceptual Overview	3
➤	National Information Infrastructure (NII) & Global Information Infrastructure (GII)	4
➤	'Informatisation'	4
➤	The INEXSK Technique of Measuring IT Use for Economic Development	4
2.3	Recent Global Sustainable Development Information Management Mechanisms	5
➤	Agenda 21/Sustainable Development Networking Programme (SDNP)	5
➤	SIDS-POA/Small Island Developing States' Network (SIDSNET)	6
2.4	Review of Regional Sustainable Development Information Management Mechanisms	6
➤	UNEP/CAR-RCU CEPNET	6
➤	CARICOM/UNSD Statistics & Indicators Capacity-Building Project	6
➤	UNECLAC Caribbean Ministerial Meeting on Implementation of the Barbados SIDS-POA	6
➤	REIN - CREP Regional Environmental Information Network	6
➤	CARINFO - Caribbean Information Network	6
2.5.	Availability/Use of Information for Regional Sustainable Development Decision-Making and Public Awareness	7
➤	Example of the Meso-american Barrier Reef System (MBRS) Programme	7
3.0	Recommendations on Priority Regional Training and Capacity-Building	8
3.1	IM/IT Training and Capacity-Building Conceptual Review	8
➤	Education, Lifelong Learning and Institutional Change	8
➤	Enhancing the Skills Base for Participation, Facilitation and Control	8
3.2	May 2003 IDSD Jamaica & Belize Mission Findings	8
3.3	Priority Caribbean Sustainable Development Information Management Training and Capacity-Building Needs	9
➤	Perceived IM/IT Education-Technical Training Needs, Constraints & New Tools	9
➤	National and Regional Information Infrastructure Capacity-Building Needs	10
	References and Documents Reviewed	11

1. The IDSD Project

1.1 Project Overview

1. The Caribbean Community (CARICOM) and its member states require support in creating mechanisms for the long-term management of sustainable development and environment information and particularly in defining ways to harness this information for decision-making purposes. In order to assist in meeting this demand, the Organisation of American States (OAS) has teamed up with the United Nations Division on Social and Economic Affairs (UNDESA) to implement a small regional project entitled "**Capacity-Building in Creating Information Management Systems to Improve Decision-making for Sustainable Development for Small Island Developing States (SIDS)**". The OAS has been given the task of managing this important initiative, which is better known as the **Information for Decision-making for Sustainable Development (IDSD) Project**.¹

2. The IDSD project aims to: (i) identify and assess regional and country needs in information management systems for sustainable development; (ii) develop a training manual and materials for training of personnel at the national and regional level; and (iii) create a regional electronic site for accessing information on information management systems and techniques. The project will be executed from November 2002 - October 2003.

It is envisioned that the following outputs will be achieved:

- A pilot network of national, regional, and possibly local institutions involved in information management in the Caribbean region;
- Resource persons trained as information managers within the region that will have the capacity to train information managers themselves at the regional and national levels;
- Training materials on information management systems for training of human resources accessible through SIDSNET connected to regional networks and UN-system sites;
- A forum of exchange for experiences among regional and national information systems' managers; &
- A final report on implementation, including an assessment and evaluation of the projects.

3. IDSD builds on previous work carried out by the United Nations Statistics Division (UNSD) in collaboration with the CARICOM Secretariat/Member States on "*Strengthening Capacity in the Compilation and Dissemination of Statistics and Indicators for Conference Follow-up in the Caribbean region*" and work by the United Nations Environment Programme (UNEP) in the field of environmental information management. The work programme envisions

- A regional experts meeting to assess and agree on priority training needs,
- The identification of best practices and appropriate information management tools,
- The implementation of a training course, and
- The establishment of a website to address information management for sustainable development.

Four pilot countries (Barbados, Belize, Jamaica & St. Lucia) have been selected for the first phase of the project, which is to focus on four thematic areas: Sustainable Tourism, Land use planning, Coastal Zone Management and Disaster Management including Climate Change.

1.2 Consultant's Terms of Reference

4. A short-term Priority Training Needs consultant has been contracted to assist the OAS in identifying priority training and capacity-building needs for the region in generating and using information for sustainable development, particularly in promoting the use and management of this information for enhanced decision-making. The outputs from this assignment will inform the development of training materials and the design of a training course to be held in September 2003.

2. Assessment of Regional Sustainable Development Information Management Infrastructure

The assessment of information management training and capacity-building needs in the region begins with a conceptual review of both the use of Information & Communication Technology (ICT or IT, I use both interchangeably) for Sustainable Development or Information Management; and the notion of capacity for effective IT utilization or Information Infrastructure.

2.1 Information Management Conceptual Overview

5. In preparing for the IDSD project, a comprehensive assessment report² on Information Management (IM) included background on the concepts Information, IM Systems, New IT Tools and Sustainable Development Decision-Making (quoted in italics below):

➤ Information/Statistics/Indicators

6. *"Information is commonly defined as either knowledge about something, or as a collection of facts and data. Data are usually described by statistics, numbers that summarize the characteristics of the data collected. Statistical aggregates of processed and raw data can be used as indicators. Indicators try to capture in a simple fashion complex events. The search for indicators for sustainable development has gained in importance, as such indicators are seen as an effective input in the decision making process".*

➤ Information Management Systems

7. *"The practice of collecting, organizing, and communicating knowledge so that it can be used in the most effective way possible by as many users as possible is known as information management. A collection of tools and techniques that facilitate information management is known as an information management system. Traditional information management systems have included paper files and documents, but more recently the advent of computer networks have introduced the use of electronic systems".*

➤ New IT Tools

8. The current 21st Century paradigm in information management systems has, however, gone 'digital' in the words of Nicholas Negroponte³ by spawning a vast array of new IT tools or applications, constantly evolving⁴ according to the laws of Moore and Metcalfe¹...*such as interlinked websites forming an information network, digital clearinghouses of information, electronic databases, search engines, etc. The power and versatility of these tools have enabled users to access and analyze ever-increasing amounts of information in much shorter time frames than has been the case in the past. The Internet has become the favored tool of use for instant access to and dissemination of information, and once the infrastructure for a network has been put into place, it also represents a relatively low-cost medium for communicating information. Websites, with their potential for both displaying information and providing links to related topics of interest, can serve both as portals and communication forums for sustainable development issues. Other useful electronic tools include e-groups and distribution lists (List-servs), which provide users with periodic postings and updates of events and news in an area of specialty.*

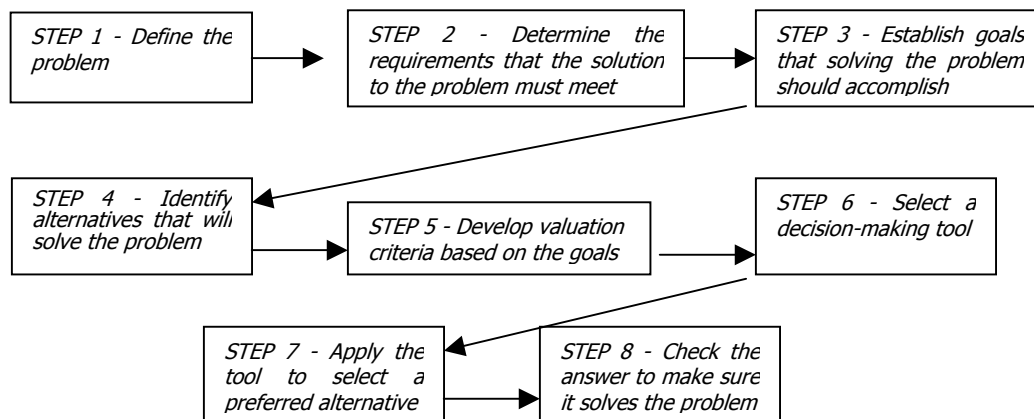
¹ Moore's Law: A prediction by Intel founder Gordon Moore that every eighteen months, for the foreseeable future, [micro] chip density (and hence computing power) would double while cost remained constant, creating ever more powerful computing devices without raising their price...The bottom line is simple but potent: *faster, cheaper, smaller.*

Metcalfe's Law: The observation made by Robert Metcalfe, founder of 3Com Corporation, that networks (whether of telephones, computers or people) dramatically increase in value with each additional node or user. Metcalfe's Law values the utility of a network as the square of the number of users, and can be easily appreciated by considering the impact of standard railroad gauges, Morse code and standardized electrical outlets in the last century and telephones, fax machines, and the Ethernet & Internet protocols today. Once a standard has achieved critical mass, its value to everyone multiplies exponentially.

➤ **Sustainable Development Decision-Making**

9. "Efficient decision-making involves a series of steps that require the input of information at different stages of the process, as well as a process for feedback (see Figure 1). In the case of decision-making for sustainable development, step 1, the definition of the problem, and step 2, determining the requirements that the solution must meet, require baseline information on the needs of the stakeholders. Evidently, this requires either input from the stakeholders themselves (ideally) or from their representatives. Step 3, establishing goals that the problem should accomplish, and step 4, identifying alternative solutions to the problem; require information on not only the ideal outcomes to the problem, but also information on the capacity of the region to respond. This means that in many cases, the solution will not necessarily be ideal, but will need to be adapted to the region's realities. For this, priorities need to be established, and this involves step 5, developing valuation criteria for the goals. Once the approach has been established, the decision-making tools appropriate to the approach have to be decided upon, step 6. Having information on the availability and characteristics of different decision-making tools is critical at this stage. Step 7 involves possessing the knowledge of how to use the decision-making tool in applying it to the problem; here, information on past experiences using the tool comes in very handy. Finally, step 8, checking the answer to make sure it fits the problem, may involve consultation with other agencies or individuals who have worked on similar problems and approaches, in order to confirm the expected results. At each step, the quality and availability of information is in direct correlation with the effectiveness of the approach".

Figure 1. The Decision-Making Process



2.2 Information Infrastructure Conceptual Overview

10. A useful 'source book' that has an overview of the conceptual basis of 'Information Infrastructure' is the seminal, much-referenced 1997 report (*Knowledge Societies²: Information Technology for Sustainable Development*) to the United Nations Commission on Science & Technology for Development-UNCSTD by its Working Group on IT and Development, edited by Robin Mansell & Uta When (quoted in italics below):

² 'Knowledge Society' is a recently coined term that reflects a shift in the perceived role of ICTs/IT, in terms of the major social & economic transformations attributed to them, from '**drivers**' of change to a perspective where these technologies are regarded as tools that may provide a new industrial paradigm by combining computerized information systems with the creative potential and knowledge that resides in human beings. These technologies do not create transformations in society by themselves; they are designed and implemented by people in their [respective] social, economic and technological contexts. Some observers mark the production in 1969 of the first 'computer on a chip' and the declining cost of semiconductor technologies & microelectronic as the beginning of the IT 'revolution'.

➤ **National Information Infrastructure (NII) & Global Information Infrastructure (GII)**

11. "The technologies, organisations and capabilities within a country that facilitate production and use of IT are called National Information Infrastructure (NII); the combination of these factors worldwide is called the Global Information Infrastructure (GII). Before the arrival of microelectronics and digital technologies, ICTs were accounted for statistically as separate industries – computer hardware & software, microelectronics, telecommunications, broadcasting, etc. Today, convergence³, real or forecast, characterises all aspects of IT Infrastructure at least at the technical level⁶."

➤ **'Informatisation'**

12. "Another distinctive feature of ICTs is that they are centrally about "Informatisation" – the progressive application of IT to the input, storage, processing, distribution and presentation of information. This term was used as early as the 1960s by the Japanese and it refers to a social as well as technological process. It requires changes in management processes, organisation, and skills as well as in the tools used in the production of goods and services. This idea links technical, organisational, managerial and institutional aspects of IT. All these aspects must be considered if the social and economic implications of ICTs are to be understood. An 'informatisation' approach is consistent with an emphasis on the importance of technological knowledge and social capabilities as well as on the hardware and software itself. **The scientific, technological and engineering disciplines and the management techniques used in information handling and processing are as important as the applications, hardware & software and their interaction with people and machines in social, economic and cultural relationships** (my emphasis). The recombination of these components (input, storage, processing, distribution and presentation of information) is giving meaning to the NII and GII concepts. The time dimension is important in terms of assessing the implications of further technological innovations for all the segments of the ICT industry. In addition, the process of 'informatisation' is resulting in changes in industry boundaries and providing opportunities for new entry by firms from within, and outside, the traditional ICT industry. This is creating turbulence in the competitive environment. Market instability has major implications for developing countries as uncertainty increases about which countries can develop the capabilities to produce the components of different segments of the industry."

➤ **The INEXSK Technique of Measuring IT Use for Economic Development**

13. "Analysing the possibilities for ICTs to contribute to knowledge-based social and economic development requires a systematic method for graphing indicators and making international comparisons. The task of assembling the appropriate indicators is hindered by the enormous variety of IT applications. These range from expensive capital goods such as machine tools to the simplest portable calculators and watches. Similar problems exist in attempting to assess the comparative development of IT-based services. Existing data for the industrialized countries do not provide a complete picture of the full size and nature of the ICT use. Data for the developing countries provide an even less complete picture. For many of the least developed countries, useful indicators are virtually non-existent. The absence of adequate statistics is particularly troublesome because of the impacts of these new technologies on investment demands, application opportunities and production possibilities. One approach to these data problems is to use some of the available indicators to create a coherent conceptual framework. If it is properly constructed, such a framework will suggest some of the key features by which ICTs; combined with the requisite human skills and organisational changes, may make significant contributions to economic development." The INEXSK (INfrastructure, EXperience, S_kills, and K_nowledge) approach, as a measurement technique, aims to provide insight into the roles that infrastructure, experience and skill play in contributing to knowledge-based economic growth & development:

- "For Infrastructure, the traditional measure is the size and growth of the telecommunication network. Telephone networks provide a broad base for building other types of infrastructure, such as data communication networks, but cannot serve as the only indicator of development. Unfortunately, few other indicators are as comprehensive as those associated with telecommunications. Where more

³ Technological convergence means that there are few clear boundaries between the supply-side sub-sectors: ICTs are used, and often produced or modified in the case of software, in virtually every segment of the manufacturing, services and natural resources industries.

detailed information is available, telecommunication indicators can be shown to be reasonably good proxies for other variables. For example, where it can be examined, the extent of data networking appears to be consistent with high levels of telephone access. More research is needed to explain variances in the rate and direction of other forms of infrastructure development with the telecommunication indicators.

- To understand the contribution of *Experience*, electronics industry production and demand can be examined. These (levels and trends in production, consumption and trade in electronic products) are indicators of the production capacities of various countries, and the domestic use and export or import of electronic products. Although production and use of electronic products are only partial measures of the ICT revolution, they do provide insight into the vigour of the social and economic changes that are associated with the process of moving toward greater knowledge use in societies throughout the world.
- In examining *Skills*, it is vital to develop measures that indicate the state of readiness to enlarge the use of information to develop knowledge. A principal indicator of such readiness is the literacy level. It is also important to develop measures of the skills that may be harnessed in producing or adapting ICTs. The stock of graduates with technical degrees in engineering, mathematics and computer science is relevant here.

2.3 Recent Global Sustainable Development Information Management Mechanisms

14. Internationally, the United Nations System has spawned two key Global information management policies that have been endorsed by the world community. Beginning with the 1992 UN Conference on Environment and Development-UNCED in Brazil, Agenda 21 contains two chapters (35, Science for Sustainable Development and 40, Information for Decision-Making) with relevance to Sustainable Development Information Management. Next, the 1994 UN Conference on the Sustainable Development of Small Island Developing States-SIDS in Barbados produced a fifteen point Programme of Action (SIDS-POA). Using text from relevant UN Sustainable Development websites (www.un.org/esa/sustdev/documents/agenda21 & www.un.org/esa/sustdev/sids), the following section summarises the global consensus that underlies both the Sustainable Development Networking Programme-SDNP and the Small Island Developing States' Network-SIDSNET; there are currently SDNPs in Guyana & Jamaica.

➤ Agenda 21/Sustainable Development Networking Programme (SDNP)

15. Agenda 21, Chapter 35-Science for Sustainable Development:

*Science for sustainable development is the focus of [Chapter 35](#) of Agenda 21. It calls for: a) strengthening the scientific basis for sustainable management; b) enhancing scientific understanding; c) improving long-term scientific assessment; and d) building up scientific capacity and capability. Decisions relating to science have subsequently been taken by the Commission on Sustainable Development at its [third \(1995\)](#), [fifth \(1997\)](#) and [sixth \(1998\)](#) sessions, by the United Nations General Assembly at its [Special Session to review the implementation of Agenda 21 \(1997\)](#), and the World Summit on Sustainable Development (2002). The special session of the General Assembly held in June 1997 to review progress five years after UNCED stressed the need for authoritative scientific evidence for assessing environmental conditions and changes, which would facilitate international consensus-building. Scientific cooperation was to be promoted across disciplines for that purpose, and building scientific and technological capacity in developing countries was extremely important in that regard. The Plan of Implementation adopted by WSSD underlined the importance of science-based decision-making, inter alia, by: integrating scientists' advice into decision-making bodies; partnerships between scientific, public and private institutions; improved collaboration between natural and social scientists, and establishing regular channels for requesting and receiving advice between scientists and policy makers; making greater use of integrated scientific assessments, risk assessments and interdisciplinary and intersectoral approaches; increasing the beneficial use of local and indigenous knowledge. Strengthening and creating centers for sustainable development in developing countries were encouraged, as well as networking with and between centers of scientific excellence and between science and education for sustainable development. **Tools for science-based decision-making and sharing of knowledge and experiences to be promoted include: information and communication technologies, ground-based observations, satellite technologies, and national statistical services capable of providing sound data, assessment models, accurate databases and integrated information systems** (my emphasis). The Plan also urged support for*

publicly funded research and development entities to engage in strategic alliances for the purpose of enhancing research and development.

16. Agenda 21, Chapter 40-Information for Decision-Making:

PROGRAMME A-BRIDGING THE DATA GAP/Means of Implementation

- C. Scientific & technological means 40.14. Regarding transfer of technology, with the rapid evolution of data-collection and information technologies it is necessary to develop guidelines and mechanisms for the rapid and continuous transfer of those technologies, particularly to developing countries, in conformity with chapter 34 (Transfer of environmentally sound technology, cooperation and capacity-building), and for the training of personnel in their utilization.
- D) Human resource development 40.15. International cooperation for training in all areas and at all levels will be required, particularly in developing countries. That training will have to include technical training of those involved in data collection, assessment and transformation, as well as assistance to decision makers concerning how to use such information.
- E) Capacity-building 40.16. All countries, particularly developing countries, with the support of international cooperation, should strengthen their capacity to collect, store, organize, assess and use data in decision-making more effectively.

PROGRAMME B-IMPROVING AVAILABILITY OF INFORMATION/Activities

- C. Development of documentation about information 40.24. Networking and coordinating mechanisms should be encouraged between the wide variety of other actors, including arrangements with non-governmental organizations for information sharing and donor activities for sharing information on sustainable development projects.
- D) Establishment and strengthening of electronic networking capabilities 40.25. Countries, international organizations, including organs and organizations of the United Nations system, and non-governmental organizations should exploit various initiatives for electronic links to support information sharing, to provide access to databases and other information sources, to facilitate communication for meeting broader objectives, such as the implementation of Agenda 21, to facilitate intergovernmental negotiations, to monitor conventions and efforts for sustainable development to transmit environmental alerts, and to transfer technical data. These organizations should also facilitate the linkage of different electronic networks and the use of appropriate standards and communication protocols for the transparent interchange of electronic communications. Where necessary, new technology should be developed and its use encouraged to permit participation of those not served at present by existing infrastructure and methods. Mechanisms should also be established to carry out the necessary transfer of information to and from non-electronic systems to ensure the involvement of those not able to participate in this way.

PROGRAMME B-IMPROVING AVAILABILITY OF INFORMATION/ Means of Implementation

- C) Capacity-building 40.29. Developed countries and relevant international organizations should cooperate, in particular with developing countries, to expand their capacity to receive, store and retrieve, contribute, disseminate, use and provide appropriate public access to relevant environmental and developmental information, by providing technology and training to establish local information services and by supporting partnership and cooperative arrangements between countries and on the regional or sub-regional level.
- D) Scientific and technological means 40.30. Developed countries and relevant international organizations should support research and development in hardware, software and other aspects of information technology, in particular in developing countries, appropriate to their operations, national needs and environmental contexts.

➤ **SIDS-POA/Small Island Developing States' Network (SIDSNET)**

17. See SIDS-POA SIDSNET Annex.

2.4 Review of Regional Sustainable Development Information Management Mechanisms

18. See linkages to websites for:

- **UNEP/CAR-RCU CEPNET**
- **CARICOM/UNSD Statistics & Indicators Capacity-Building Project**
- **UNECLAC Caribbean Ministerial Meeting on Implementation of the Barbados SIDS-POA**
- **REIN - CREP Regional Environmental Information Network**
- **CARINFO - Caribbean Information Network⁶**

3.0 Recommendations on Priority Regional Training and Capacity-Building

3.1 IM/IT Training and Capacity-Building Conceptual Review

19. Mansell & When's 'source book'⁷ also contains reviews of the conceptual bases for both a 'lifelong learning' approach to IT 'Training & Capacity-Building' and specific IT skills requirements; the relevant sections are quoted in italics as follows:

➤ Education, Lifelong Learning and Institutional Change

20. *"Major transformations are occurring in the formal education sector and other organisations that play a key role in enabling people to develop new capabilities. These changes are partly the result of the increasing use of ICTs as enabling technologies for education and learning. The possibility of continuous informal education and lifelong learning is growing with the increased availability of IT applications and creativity in their application to address development problems. In developing countries, the potential of the application of IT to these areas is only beginning to be realized. However, this potential can only be exploited if the formal and informal educational processes in developing countries allow people to acquire the skills that are necessary to use new technologies creatively and productively. **Major changes in formal education systems and institutions as well as the organisations that contribute to informal learning are needed to build new capabilities. The introduction of lifelong learning strategies requires that the foundations of learning be strengthened and changed.** (My emphasis) It also implies that there must be flexibility for movement between education, training & work and new roles for public and private sector institutions that contribute to the learning process."*

➤ Enhancing the Skills Base for Participation, Facilitation and Control

21. *"The use of IT to support development goals does not need to be considered only in terms of the extension of telephony networks to every household. Alternate modes of access may be preferable in some circumstances and the choice of radio, television or telephony as a means of connection of citizens to networks of information is dependent on each country's circumstances. The skills base that is built up must be compatible with the mix of ICTs available and provide a basis for continuing learning. Three specific skills are particularly important:*

- *Participatory Skills are necessary for involvement in networked communication and information-sharing. These incorporate computer literacy and fluency in the English language for the use of the Internet, databases and most software until more content is provided in local languages.*
- *Facilitating Skills for the design, implementation and maintenance of networks involve a number of essential skills for installation, user training and maintenance. In addition, software and computer systems engineering skills are desirable. Even more emphasis needs to be placed on vocational training to provide a large number of people with the ability to ensure the functionality of networks.*
- *Control Skills imply the allocation of funds for the acquisition of appropriate ICT equipment in order to manage access to networks in some countries to achieve public or private control*

3.2 May 2003 IDSD Jamaica & Belize Mission Findings

22. A summary of the findings from the early May 2003 Missions to Jamaica (UWIDLIS, UWICED, CEIS, UNEP/CAR-RCU, JSDNP & NEPA) and Belize (CRFM, MNREI & BIIT) are included as separate annexes.

3.3 Priority Caribbean Sustainable Development Information Management Training and Capacity-Building Needs

➤ Perceived IM/IT Education-Technical Training Needs, Constraints & New Tools

23. Needs:

- **IM/IT Education and Training (including Certification) in the priority areas of Networking, Web Development and Technical Operations & Maintenance**
- **Incorporation of IT training into increasingly lower levels of the national school systems**
- **Management of changing and evolving information technology infrastructure**
- **Establishment of functional IM/IT linkages between regional CARICOM and related SD agencies that are responsible for SIDS-POA, including IDSD Project, thematic areas such as the Caribbean Meteorological Organisation (CMO), the Caribbean Environmental Health Institute (CEHI), the Caribbean Energy Information System (CEIS), The Institute of Marine Affairs (IMA), the Caribbean Planning for Adaptation to Global Climate Change/ Adaptation to Climate Change in the Caribbean/Mainstreaming Adaptation to Climate Change in the Caribbean (CPACC/ACCC/MACC) Projects, the Caribbean Disaster Emergency Response Agency (CDERA), the Caribbean Development Bank (CDB), the Caribbean Tourism Organisation (CTO) and UWI**
- **Development of Caribbean regional SD-related Content Software and Linkages**
- **Enhancing IM/IT link between regional SD agencies responsible for SIDS-POA, including IDSD Project, thematic areas and UWICED**
- **UWI follow-up on IM/IT Training opportunity in Satellite networking; contacts identified as Celina Topper of the Environmental Foundation of Jamaica (EFJ) and Terry Willis of The Nature Conservancy (TNC) of Jamaica**
- **Establishment of functional IM/IT organisational linkages between regional SD agencies responsible for SIDS-POA, including IDSD Project, thematic areas and CEIS**
- **Increased emphasis on Internet and Web management capacity-building**
- **Increased financial resources**
- **More IM/IT collaborative and integrated organisational linkages between hemispheric and regional SD agencies responsible for SIDS-POA, including IDSD Project, thematic areas and UNEP-CAR/RCU**
- **More IM/IT collaborative and integrated organisational linkages between UN agencies responsible for SIDS-POA, including IDSD Project, thematic areas and UNEP-CAR/RCU**
- **IM/IT training in the Use & Application of Remote Sensing and Geographic Information Systems (GIS) in Coastal Zone Management**
- **Harmonisation of national priorities/contacts with regional priorities/contacts at CEP meetings & fora**
- **SD/SIDS-POA website content, including IDSD Project thematic areas, development**
- **Increased revenue generation for programme sustainability**
- **Provision of greater public access to relevant SD/SIDS-POA data**
- **More community reporting activities**
- **IM/IT training in software development, certified Linux open-source software development courses and courses in "e"-Commerce software development & use**
- **Continuous updating of regional SD websites' content, including IDSD Project thematic areas**
- **Streamlining of regional SD websites**
- **Provision of greater data storage & conversion services to relevant SD/SIDS-POA data nodes**
- **IM/IT training in Security/vulnerability issues**

24. Constraints:

- **Lack of 'Connectivity' and High-speed Internet Access**
- **Low levels of IT or "e" Literacy**
- **Lack of High-speed Internet Access**
- **Lack of 'Connectivity' and High-speed Internet Access**
- **Low quality and technical level of SIDSNET Website**
- **Lack of inter-sectoral collaboration**
- **Sustainability of programme services**
- **Lack of information and coordination at national (Government/NGO) level regarding hemispheric and regional Multi-lateral Environmental Agreements (MEAs)**
- **Lack of national/regional policy collaboration & coordination**
- **Lack specialist staff for collection, processing sharing of relevant SD/ SIDS-POA information**

- Lack of financial resources
- Lack of 'Connectivity' and High-speed Internet Access
- High cost of appropriate certified 'high-end' IM/IT training
- Inadequate decision-making processes by national Governments in terms of attitudes and aptitudes regarding IM/IT information development & use

25. New Tools:

- WEB-CT and VIRTUAL-U Course Tools software development & use
- SIDSNET Energy Issues List-serv
- Website "e"-Commerce software development & use
- CEPNET, SPAW, CAMPaM List-servs
- Technical indicators for SIDS-POA, including IDSD Project, thematic areas, with delegation of responsibility for update/maintenance to relevant hemispheric & regional SD agencies
- Web-based GIS database software development & use
- Linux open-source software
- Web-based Internet Video-conferencing software & technology
- Virtual Private Network (VPN) software & technology

➤ **National and Regional Information Infrastructure Capacity-Building Needs**

26. A suggested policy framework for the formulation of National Information Infrastructures (NII), which could then allow for the formation of a Caribbean Regional Information Infrastructure (RII) has been annexed.

27. Databases and Portals⁴ for Knowledge Management, an article by Soraya Abad-Mota in *Digital Libraries and Virtual Workplaces: Important Initiatives for Latin America in the Information Age*,⁸ recognizes that: "Databases and portals are two key elements of IT with the potential to provide appropriate access to the vast amounts of online data existent in an organisation today in a dynamic and organized manner. . An example of UNESCO's Communication and Information Portal is annex to this report.

⁴ A portal is an overloaded term used to describe, among other things, a bundle of services provided electronically, through the web, to a set of users.

References and Documents Reviewed

- 1 OAS 2003. Information for Decision-making for Sustainable Development (IDSD) Project Briefing Note. Unit for Sustainable Development and Environment, Organization of American States.
- 2 Alcaraz, M. and Perch, L. 2003. *Assessment and Establishment of a Baseline on Information for Decision-Making in CARICOM Small Island Developing States (SIDS)*; A Report for the "Capacity-Building in Creating Information Management Systems to Improve Decision-making for Sustainable Development for Small Island Developing States (SIDS) Project"; Unit for Sustainable Development and Environment, Organization of American States.
- 3 Negroponete, N. 1995. *Being Digital*. Vantage, New York.
- 4 Downes, L and Mui, C. 1998. *Unleashing the Killer App: Digital Strategies for Market Dominance*. Harvard Business School Press, Boston.
- 5 Mansell, R. and When, U.; Editors. 1998. *Knowledge Societies: Information Technology for Sustainable Development*. UN Commission on Science and Technology for Development, United Nations. Oxford University Press Inc. New York.
- 6 Hee Houg, M.2001. *Status Report on the Regional Information Systems* . 8th Biennial Meeting of Caribbean Information Action Group (CARINFO) Caribbean Development Bank Conference Centre, Barbados
- 7 Mansell, R. and When, U.; Editors. 1998. *Knowledge Societies: Information Technology for Sustainable Development*. UN Commission on Science and Technology for Development, United Nations. Oxford University Press Inc. New York.
- 8 Reenen, Johann van 2002. *Digital Libraries and Virtual Workplaces: Important Initiatives for Latin America in the Information Age* . Organisation of American States.