

Promoting use of the Internet in the Disaster Management Community: The Caribbean Experience

1.0 Introduction

This paper discusses the use of Internet for disaster management from the perspective of the Caribbean Disaster Emergency Response Agency (CDERA) and the National Disaster Organisations (NDOs) of its Participating States. In doing so it chronicles efforts to establish a regional electronic information network to facilitate increased access to information and greater sharing of information and experiences.

The main purpose of the document is to highlight the Caribbean's experience for the benefit of those who wish to devise strategies for promoting Internet use as a mean for improving disaster management capability. It also identifies some of the challenges currently faced, issues that have arisen and ways in which some of these might be addressed.

1.1 Structure of document

Section 2 provides a brief overview of CDERA and its role in disaster management in the region. **Section 3** highlights some key events leading up to the introduction of Internet to the region and CDERA's efforts to introduce an electronic network for disaster management. **Section 4** provides an indication of the current cost and availability of Internet services in the region.

Section 5 outlines the current Regional Information Network which is based on the use of the Internet. **Section 6** discusses some of the key determinants of the network initiative while **Section 7** summarises the experience to date. **Section 8** address two areas requiring special consideration: use of Internet for Emergency Communications and use of Internet for Public Information and Education. Finally **Section 9** provides conclusions and recommendations on the way forward.

2.0 Background: What is CDERA

CDERA is a regional inter-governmental organisation established in September 1991 by Agreement among the CARICOM (Caribbean Community) Heads of Government. Following the disaster experiences of the past few decades and the conclusion of the Pan Caribbean Disaster Preparedness and Prevention Project (PCDPPP) in 1991, governments in the region decided that there was need for a permanent mechanism among Caribbean States to facilitate immediate and coordinated assistance in the event of a disaster.

2.1 Objectives of the Agency

The main objectives of CDERA, as stated in the Agreement establishing the Agency, are as follows:

- (a) To make an immediate and coordinated response by means of emergency disaster relief to an affected Participating State:

- (b) To secure, coordinate, and channel to interested inter-governmental and non-governmental organizations reliable and comprehensive information on disasters affecting Participating States;
- (c) To mobilize and coordinate disaster relief from governmental and non-governmental organizations for affected Participating States;
- (d) To mitigate or eliminate, as far as practicable, the immediate consequences of natural disasters in Participating States;
- (e) To establish, enhance and maintain on a sustainable basis adequate disaster response capabilities among the Members of the Agency.

2.3 Organs of the Agency

The Agency has three (3) principal organs:

- a. The **Council** is the supreme policy making body and is comprised of the Heads of Government of Participating States or their designated representatives. The Council meets annually to review the work of the Agency, approve its Work Programme and Administrative Budget and to make any other major policy decisions required.
- b. The **Board of Directors** is made up of the National Disaster Coordinators (NDCs) of Participating States, with the Coordinator (see below) as Chairman. The Board serves in a technical advisory capacity and makes recommendations to Council on matters such as those mentioned above.
- c. The **Coordinating Unit** is the Administrative headquarters of the Agency, and is headed by the Coordinator. It is located in Barbados. Conducting the day-to-day business of the Agency is the responsibility of the Coordinating Unit.

2.4 Membership

The current membership of CDERA is as follows:

- | | |
|-------------------------------|---------------------------------|
| - Anguilla* | - Republic of Guyana |
| - Antigua and Barbuda | - Jamaica |
| - Commonwealth of the Bahamas | - Montserrat* |
| - Barbados | - St Kitts and Nevis |
| - Belize | - Saint Lucia |
| - British Virgin Islands* | - St Vincent and the Grenadines |
| - Commonwealth of Dominica | Republic of Trinidad and Tobago |
| - Grenada | Turks and Caicos Islands* |

*British Dependent Territories

While all present members are English-speaking, the Agreement establishing CDERA makes provision for any interested Caribbean state to apply for membership. To date two (2) non-English-speaking states have expressed strong interest in membership.

2.5 Activities of the Agency

While the present focus of the Agency is on Disaster Preparedness and Response, its current activities address issues relevant to all phases of the disaster cycle that is: Prevention, Mitigation, Preparedness, Response, Recovery and Reconstruction. Current activities include:

- Training for Disaster Management Personnel
- Improving Emergency Telecommunications and Warning Systems
- Development of Disaster Information and Communication Systems
- Education and Public Awareness
- Contingency Planning

2.6 National Disaster Organisations (NDOs)

The CDERA Agreement stipulates a number of undertakings for Participating States. Among these is the requirement that each state establish and maintain a National Disaster Organisation (NDO). Each state is also required to designate a **National Disaster Coordinator (NDC)**. The NDO is responsible for coordinating the respective country's disaster-activities including disaster preparedness and response and is CDERA's focal point for contact at the national level.

3.0 Development of an Internet-based network for Disaster Management in the Caribbean - A Brief History

3.1 Introduction of Internet Services to the Region

There has been limited use of Internet and other on-line services in the region for several years. In the past users were mainly academic and specialised institutions or businesses for whom such access was vital to their operations. Use of the Internet by other groups and the public is of more recent vintage however and for the most part goes back only as far as the early to mid-1990s.

For example, in Barbados, Barbados External Telecommunications Limited (BET), the country's monopoly provider of international telephone services, introduced Internet access for customers of its *Caribbean On-line* service in 1994. This service, which provided access to electronic mail, Telnet and Gopher through a "dial-up" shell account, was initially prohibitively expensive, with costs in excess of US \$0.75 per minute. Although the costs were subsequently reduced, the cryptic text-based interface, relatively high costs and general lack of awareness of the Internet all contributed to the service not becoming widely popular.

The current wave of interest in the Internet and its widespread use in the region began around 1995 when several service providers began offering full Internet access via local "dial-up" connections. The Internet Service Providers (ISPs), several of whom were also monopoly

telephone service providers, marketed these services heavily, targeting both business and residential customers.

As was the case in many other countries, public interest in the use of the Internet was fueled to a large extent by the appeal of the World Wide Web (WWW) and the ability to access a wide range of information sources globally, using a simple graphical interface running on a standard desktop computer. The cost of these services were also significantly lower than that associated with accessing on-line information in the past, especially since previously such access often required expensive overseas telephone calls. For many, the Internet now provided a viable alternative communications channel.

Following the introduction of full Internet access, use of these services grew rapidly, albeit at different rates in different countries. In Barbados for example, the General Manager of BET stated in January 1996, that "because of the dramatic increase in the market both locally and regionally, we are reaching our saturation point for existing bandwidth"¹. This was less than one year after the introduction of full access.

3.2 Development of a Regional Information Network

Interest in the use of electronic data communications to facilitate the work of disaster management organisations in the Caribbean pre-dates the introduction of Internet to the region. Discussions on establishing a regional electronic network for disaster management began during the era of the Pan Caribbean Disaster Preparedness and Prevention Project (PCDPPP, 1981-91) with efforts continuing in earnest following the establishment of CDERA in 1991.

During this time many proposals have been put forward by various parties from both within and outside the region. Several options for implementing such a network have been considered. Most of these were based on one or more of the following media:

- ▶ Radio communications (e.g. packet radio)
- ▶ Satellite communications (Low-earth orbiting and geostationary)
- ▶ Public telephone network

Since 1992, CDERA has actively pursued the development of such a network. This effort has benefitted from the support and technical advice of NDOs of Participating States, technical resource persons from the region and regional and international organisations interested in telecommunications development or disaster management.

In December 1992, the Agency was represented at a small Working Group meeting hosted by the UN Department of Humanitarian Affairs in Geneva to formulate plans for the creation of an International Emergency Readiness and Response Information System (IERRIS). IERRIS was envisaged as a global information system linking a number of independent databases maintained by various disaster management organisations.

¹"Changes to BET's Caribsurf", *Barbados Advocate*, January 31, 1996.

In 1993, the Agency was able to secure ITU support for fellowships for a total of six (6) persons from the region to attend selected courses held under the auspices of the United States Telecommunications Training Institute (USTTI). Most of the fellowships were awarded for courses covering technologies considered relevant to the implementation of the proposed network. Topics covered included Packet Radio, Electronic Mail and File Transfer, and Groundstation Maintenance for Low-earth Orbiting (LEO) Satellites.

Also in 1993, CDERA's Telecommunications Advisory Committee (TAC) and its Information Systems and Technology (ISTAC) began detailed consideration of the technical issues relevant to the establishment of appropriate regional communications systems for disaster management. At its meeting in September 1993, the ISTAC considered submissions made by CDERA on the requirements of a regional data communications network and options for implementing such a network.

After reviewing the options, the Committee concluded that provided it could be made cost-effective, a telephone-based network was the best option for routine data communications, mainly because of its wide accessibility. The Committee noted that there would however be a role for the other media for emergency communications and for backup purposes. The recommendation was accepted by CDERA.

Figure 1 shows the requirements put to the ISTAC for consideration. It will be noticed that despite the rapid changes brought about by the expansion of Internet services, the basic requirements and characteristics of such a network have not changed significantly. The options put to the Committee are shown at Appendix A.

Between 1993 and 1995, there was considerable discussion on the reformulation of the UNDP-sponsored Disaster Emergency Response Management Systems (DERMS) Project which was to be executed by the CARICOM Secretariat and implemented by CDERA. The project had originally been intended to provide equipment, facilities and skills for establishing and maintaining geo-referenced databases of disaster preparedness and response in the countries of the region. During reformulation however, it was agreed that the project should have a broader focus and activities designed to improve disaster management capability in the region.

Establishment of the regional information for disaster management was one of the major activities proposed by CDERA for inclusion in the revised project. This proposal included provision for selecting appropriate media for the network, developing procedures for use, supplying equipment to participating states and provision of training and support. **Figure 2** provides an overview of the DERMS Project, highlighting the network-related activities.

The revised Project was approved in late 1995 and execution began in mid-1996 when the Project Manager assumed duties. The name of the project was changed slightly to the Disaster Emergency Response **and** Management Systems Project to reflect the change in focus. Planning for the creation of the network began shortly after project startup and the network was declared operational in the second quarter of 1997 after Participating States had received the equipment provided and obtained their Internet connections. Prior to this however, NDOs of at least eight (8) Participating States had already obtained Internet connections on their own initiative.

4.0 Availability and Cost of Internet Services in the Region

4.1 Availability

At present, full Internet access via local "dial-up" connection is available in all of CDERA's sixteen Participating States. Related services such as leased circuits, web hosting and web site design are also available in most states.

In all of the states, the local monopoly telephone service provider is one of the ISPs - in some cases the sole one. In cases where competitors exist however, they are required to lease the appropriate international circuits from the monopoly provider.

For the most part, the Caribbean is fortunate to have modern and well developed telecommunications infrastructure. It is therefore anticipated that availability of Internet services will continue to increase.

4.2 Cost

The costs of Internet access varies significantly throughout the region. Table 1 provides a sampling of approximate monthly costs for Internet usage. For ease of comparison, costs for the following levels of use are shown: 10 hours per month (low usage), 30 hours per month (moderate usage) and 50 hours per month (high usage).

The costs in the table are computed from advertised prices of the telephone companies in these countries. Note however that where competing ISPs operate, they generally offer lower prices.

Table 1: Approximate cost of Internet access in selected Caribbean countries

Country	Approximate Monthly Cost (US Dollars)		
	10 hrs (Low)	30 hrs (Moderate)	50 hrs (High)
Barbados	12.50	47.50	75.00
Belize	30.00	90.00	130.00
Jamaica	19.50	57.50	95.50
St Lucia	37.00	71.00	118.00
Trinidad and Tobago	17.00	28.00	28.00

Regional Data Communications Network: Discussion Points

Possible Uses

- Transfer of urgent information such as Situation Reports and Requests for Emergency Assistance
- Periodic dissemination of updates to selected individuals, agencies and the press
- Exchange of mail between users
- Access to regional and international databases
- Bulletin Board and Conferencing services
- Creation of regional database accessible both regionally and internationally
- Provide source of up-to-date information on individual States. (Maintained by states)

Expected benefits

- Allow transfer of information in a format amenable to further processing.
- Provide easy access to a range of data sources and allow selective retrieval of data from these sources
- Allow more rapid and accurate communication of information
- Provide demonstration of the use of currently available technologies for regional development

Requirements of DC Network

- Should provide link between CDERA and all Participating States
- Should provide international link
- Should be able to operate through a variety of communications media and routes so that it is not easily disabled by disasters
- Should be cost effective to establish and use
- As far as possible, should use resources and technology already available or which can be easily acquired.
- Should be capable of "real-time" data transfer during emergencies

Figure 1 : Network Requirements as Discussed by ISTAC in September 1993

Disaster Emergency Response and Management Systems (DERMS) Project

The DERMS Project was designed to contribute to the attainment of sustainable human development in the region by assisting Caribbean countries to reduce the impact of natural and technological disasters through a process of national and regional capacity building in the area of disaster management.

Immediate Objective 2 of the project is "to improve networking capabilities through the strengthening of data collection and data communication networks, to facilitate structured exchange of information between participating Caribbean States and CDERA in normal and emergency conditions.

The project provides for the establishment of a reliable communications network linking CDERA, sub-regional focal points, NDOs and regional and international agencies using appropriate media.

Activities to achieve this objective are as follows:

1. Select appropriate media for implementation of wide area and local area networks between NDOs, national, regional and international agencies and CDERA, and identify resources required for its effective functioning under normal and emergency conditions.
2. Define policies, procedures and protocols for access to the network.
3. Support national users in linking to the network and provide training in its use.
4. Monitor the network and evaluate its efficiency and effectiveness on an ongoing basis
5. Refine the network's structure and operation as required
6. Procure equipment and software to support the network and create its databases.
7. Review and make recommendations for upgrading emergency telecommunications facilities at CDERA and subregional operational focal points
8. Develop a fully operational LAN at CDERA
9. Liaise with all relevant programmes and establish a functional Disaster Management Programme network and a regular schedule of activities including meetings, issuance of harmonized schedules of activities including workshops, and training programmes.

Figure 2: Information Systems activities of the DERMS Project

5.0 The Regional Information Network

5.1 Purpose and Function

The regional electronic information network for Caribbean Disaster Management is a network linking CDERA and the National Disaster Organisations of Participating States with each other and with relevant regional and international organisations. The network operation is based on use of the Internet and for this reason it is an open network - participants have full access to individuals, organisations and sources of information that are not part of the network and vice-versa.

Figure 3 outlines the main reasons for using the Internet as the medium for the network.

The network was developed to enhance disaster management capability through increased information sharing and enhanced access to required sources of information. It is intended to facilitate specific information-related functions including the following:

- ▶ Exchanging information among interested parties via electronic mail and other means.
- ▶ Maintaining easily accessible repositories of information through on-line databases and "web sites"
- ▶ Obtaining warning information (e.g. weather reports)
- ▶ Sharing relevant information on disaster management experiences from both within and outside the region.
- ▶ Conducting group discussions through use of "conferences".

Advantages of Using the Internet for Network Implementation

- ▶ **Wide availability.** Internet services are available through local service providers in nearly all of the target countries.
- ▶ **Cost effectiveness.** Use of the Internet requires no investment in communications infrastructure on the part of the Project. The cost of Internet access is also relatively low or dropping in most of the target countries.
- ▶ **Versatility.** Many types of information, including sound and video, can be communicated through the Internet.
- ▶ **Ease of use.** The key Internet facilities, particularly electronic mail and WWW access, are easy to use, even for novice users.
- ▶ **Wide access.** Use of the Internet provides the ability to easily communicate with thousands of individuals and also provides access to thousands of information sources.

Figure 3: Reasons for using Internet for network implementation

5.2 Examples of Uses

Some of the specific uses for which the Network has been applied since its creation include:

- ▶ Dissemination of situation reports on disaster events
- ▶ Obtaining bulletins on tropical weather systems
- ▶ Obtaining current information on the ongoing volcanic crisis in Montserrat
- ▶ Communicating with CDERA, other NDOs and relevant individuals and organisations via electronic mail
- ▶ Obtaining information required to respond to specific queries from interested parties including government officials, researchers, local organisations and members of the public. (E.g. information on El Nino phenomenon)
- ▶ Obtaining technical information on topics such as hazard-specific mitigation techniques (e.g. chemical, geological, meteorological)
- ▶ Obtaining information on sources, costs and availability of resources required by NDOs.
- ▶ Providing information to the public through "web sites"

5.3 Use of Web Sites

As mentioned earlier, the appeal of the World Wide Web is possibly the single most important factor contributing to the widespread interest in use of the Internet in the Caribbean and elsewhere. Given the versatility of the WWW, CDERA and NDOs have decided to use this medium for sharing information with colleagues and disseminating information to various target audiences. CDERA established a web site in November of 1996 (<http://www.cdera.org>). The NDOs of Barbados, Montserrat and St Lucia have also established sites and most NDOs have expressed an interest in having their own sites.

In the long run the site is intended to provide comprehensive information on disaster management in the Caribbean including:

- ▶ Information on CDERA and its activities
- ▶ Fact sheets and special features on selected disaster management topics.
- ▶ Contact Information for NDOs and other disaster management organisations in the region.
- ▶ Listing of upcoming events of interest to the Caribbean's disaster management community.
- ▶ Reports on activities of NDOs and other institutions
- ▶ Links to other web sites with content of particular relevant to the disaster management in the region.
- ▶ Country profiles for Participating States.
- ▶ Reports on current or recent disaster events, including photographs where available.
- ▶ Current news of interest to the public and the regional disaster management community.
- ▶ On-line databases that can be searched by users

Note however that a number of the above features have not yet been implemented.

Also under consideration for future consideration is a restricted conferencing facility to facilitate consultation among CDERA and NDOs and to allow the harmonization of activity schedules.

CDERA, through the DERMS Project is providing training and technical assistance to NDOs to assist in development of individual web sites. These sites will focus on country-specific information and will complement the types of information identified above. It is anticipated that one of the primary target for NDO sites will be their local populations.

6.0 Key Success Factors and Issues to be Addressed

In developing the regional network and promoting the use of Internet by NDOs, it was recognised that a number of factors would determine the success of this initiative. The major ones can be summarised under three (3) headings:

- ▶ Access
- ▶ Content
- ▶ Use

6.1 Access

This refers to the ability of the participants to gain access to the network as and when required. Specifically, it is necessary to ensure that:

- a. all targeted participants have access to the necessary computer hardware and software, facilities and communications links.
- b. all participating organisations have available adequate personnel skills for using the network.

6.2 Content

This refers to the extent to which use of the Internet allows users to find the disaster management information they require and which will assist them in planning and executing these activities.

6.3 Use

This refers to the extent that users take advantage of the information and tools available through the Internet to strengthen their disaster management programmes. This in turn depends on the extent to which:

- a. the management of NDOs appreciate the potential benefits to be derived from proper use of the network and are committed to taking advantage of this.
- b. participating organisations put procedures in place to ensure regular and useful network use.

The extent of use is highly dependent on users' recognition of the benefits of improved access to information and enhanced communications capability as well the availability of information which is considered to be truly useful. It is also dependent on users' skills - not only to use the Internet but also to use available information to improve the functioning of their organisations. Commitment to success of the network is also a crucial consideration.

6.4 Steps Taken to Address Success Factors

The following are some of the main steps taken prior to and since the introduction of the network to address the success factors.

- ▶ Provision of equipment and software to NDOs. This primarily addressed the issue of access.
- ▶ Establishing formal agreements with NDOs for participation in the network. This was done to obtain firm commitments to participation and addressed all three issues. The points covered by the agreement are shown in **Figure 4**.
- ▶ Provision of training and Technical Support. This is an ongoing activity and is intended to address all of the above issues, particularly Use. The Internet training being provided also develops participants' skill in locating relevant sources of information on the Internet using Search Engines, Directories and other tools.
- ▶ Provision of content through web sites containing information specifically tailored to the needs of the region.
- ▶ Other measures being taken to increase the volume of exchange among NDOs. NDOs are being encouraged to share more information with each other. The use of other Internet tools and components such as newsgroups and conferences is also being encouraged.

Undertakings of NDOs Participating in Regional Network

- Make necessary arrangements with a local Internet Service Provider for Internet access.
- Provide a suitable telephone line for access to "dial-up" Internet service.
- Provide suitable physical arrangements for computer use (e.g. furniture, wiring, etc.)
- Assign at least one member of staff the responsibilities related to ongoing use of the network and ensure that the necessary tasks are carried out.
- Ensure that persons assigned the responsibilities acquire and maintain the necessary skills and perform the required tasks.
- Avail themselves of relevant training opportunities provided by the DERMS project and through local service providers.
- Take any other action as necessary to ensure beneficial and effective use of the network.
- Undertake responsibility for ongoing maintenance of equipment provided, including the provision of required supplies (e.g. diskettes, paper, printer supplies, etc).
- Provide a report on their use of the network every two (2) months for the first six (6) months of operation. (The purpose of this is to assist in evaluating and "fine tuning" the network.)

Figure 4: Conditions included in agreements with participating NDOs

7.0 Summary of Experiences

The following summary of experiences is based on the following:

- ▶ Observations and experiences of CDERA
- ▶ Comments by NDO personnel
- ▶ Responses to an evaluation carried out by questionnaire survey conducted between September-October 1997.
- ▶ Discussions of CDERA's Information and Communications Systems Advisory Committee²

7.1 Access

- ▶ Twelve (12) NDOs are now Internet users. At present all of these have full access through "dial-up" connections. The other four (4) are expected to obtain such connections within the next three months.
- ▶ Of the four cases where no connections have been obtained, one (1) is known to be the result of technical difficulties which are currently being resolved while the others are thought to be the result of internal administrative difficulties.
- ▶ Many NDOs have complained of frequent difficulties in accessing their services due to heavy use of their local ISP facilities. Problems include frequent busy signals, poor quality connections, disconnections and slow communications speeds.

7.2 Content and Use

- ▶ NDOs primarily use the electronic mail and WWW. Only two reported using other Internet features (Newsgroups and Internet telephony). E-mail is checked 2-4 times daily on average.
- ▶ NDOs generally agree that access to the Internet has improved their ability to provide information to others, including the public. For example, the National Office of Disaster Services (NODS), which is Antigua/ Barbuda's NDO, indicated that when Antigua was affected by ashfall in September 1997, NODS was able to use the WWW to obtain information on dealing with such situation. Also, the National Emergency Management Agency (NEMA) of Trinidad and Tobago indicated that it was now able to obtain more visuals for use in its public education activities.

²This Committee was formed in 1996 to replace both the Telecommunications Advisory Committee and the Information Systems and Technology Advisory Committee. Its formation was based on recognition of the increasing convergence between computer and communications technology.

- ▶ In the case of Montserrat, the NDC indicated that at times the Internet became the primary vehicle for obtaining news because of the interruption of local broadcast service.
- ▶ All NDOs indicated a desire for more training for their staff in order to take greater advantages of the benefits of the Internet.
- ▶ Most NDOs were generally not satisfied that the establishment of the network had led to a significant increase in the level of exchange of information among themselves.
- ▶ All NDOs responding to the evaluation questionnaire expressed interest in maintaining "home pages" on the WWW. Several of them stated their expectation that this would reduce the number of requests for information that they had to respond to.
- ▶ One NDO has pointed to an irony created by the rapid increase in the volume of information available online - as the volume of information available on a particular topic increases, it becomes more difficult to find the specific information that is being sought.

7.3 Cost

- ▶ Most NDOs indicated that while there were some new costs introduced by Internet use, these were less than the perceived savings resulting from fewer overseas telephone and fax calls. Unfortunately most were unable to quantify the costs. In some cases this was because the offices were not directly responsible for paying the bills. One NDO was of the view that the cost of the Internet service exceeded the savings in communications costs.
- ▶ At least two NDOs (Barbados and Grenada) have been able to negotiate free Internet access with their service providers.

7.4 Other Matters

- ▶ The basic skills required for Internet use are now available within all the NDOs that have connections. There are also some persons with high levels of skill.
- ▶ CDERA has found maintaining a web site to be a challenging activity. While the Agency has all the requisite technical and other skills available "in-house", staff members have been unable to allocate the amount of time required to source and package all of the information which the Agency intends to provide through this medium. A number of steps are being taken to alleviate this. Among these is the use of short term contracts for preparation of material.

8.0 Special Considerations

8.1 Use of Internet for Emergency Communication

For the purpose of this discussion, Emergency Communication is considered to be the transfer of very urgent information concerning an emergency situation for the purpose of generating appropriate actions within a time frame that will allow these actions to affect the outcome of the situation. This is of course a loose definition and depends on what is classified as an "emergency". It is however adequate for the discourse that follows.

The author has concluded that there has not been significant use of the Internet for emergency communications in the region. While the Internet has been extensively used as a vehicle for disseminating information about the Montserrat situation, it has generally not been the medium used for communicating the information on which "life and death" decisions have to be made.

Perhaps the most significant use of the Internet for emergency communications in the region has been for obtaining bulletins on threatening weather systems.

The main hindrances to using the Internet for emergency communications in the region are as follows.

- ▶ **Reliability.** For most, access depends on the integrity of the public telephone system which is highly vulnerable and the quality of service provided by each party's ISP.
- ▶ **Speed.** The speed of transfer of electronic mail can be very slow. During Region Rap '97, CDERA annual regional emergency communications simulation exercise, it was discovered that some e-mail messages did not reach the recipients' mailboxes until several hours after they were sent from another territory.

It is anticipated however that as Internet use becomes more widespread in the region and the quality and reliability of service improves (both within and outside the region), the potential for emergency communications will increase.

8.2 Use of the Internet for Public Information and Education

Use of the Internet and particularly the WWW as a medium for public information and education has been cited by some as one of its greatest potential applications for disaster management. The popularity of the Web and the multimedia presentation options available make it an attractive information.

The above potential should certainly be exploited. However, when considering whether the Internet should be used in addition to existing methods or instead of existing methods, close attention should be paid to determining the extent to which the target audience can be reached.

Two of the main issues that need to be considered are:

- ▶ The number of people that can be reached via the Internet and
- ▶ The characteristics of the audience that be reached via the Internet

No statistics on Internet usage in the Caribbean are immediately available. However, the following may help throw some light on the above.

Availability of Telephone Lines

Appendix B presents some data on the availability of telephone lines in CDERA Participating States. While no attempt is made here to analyse this data, it seems reasonable to draw the following conclusions:

- ▶ As Internet connections are most frequently obtained through telephone, the availability of such lines is one of the factors constraining the extent of use of Internet by the public.
- ▶ The potential application of Internet will be considerably lower in those countries with low rates of availability (as indicated by number of lines per 100 households).

Demographic Profiles

In the absence of demographic profiles for Internet users in the Caribbean, one can turn to numerous studies on Internet use carried out in the US. (See Appendix C). According to several studies, a majority of Internet users have the following characteristics:

- ▶ Educated to University Level
- ▶ Male
- ▶ Are over 35
- ▶ Have above average income

One cannot necessarily assume that the profile for the Caribbean will be similar. It does seem reasonable to hypothesize however, that most Internet users will be from the better educated, sections of the population.

This profile suggests that only a relatively small section of the population can be reached through this medium. It could also be interpreted to mean that a very influential section of the population can be reached through the medium. Both of these considerations have significant implications for determining the most effective use.

Other Factors

Effectiveness of public information web sites will also depend on promotion of these sites. In general the foregoing discussions suggests that there is ample room studying the topic of using web sites for public information in the Caribbean.

9.0 Recommendations and Conclusion

The foregoing discussion has addressed a wide range of issues related to use of the Internet for Disaster Management in the Caribbean. It can be seen that the Internet has provided the opportunity to satisfy a need that had long been identified - providing the regional disaster management community with an effective means for obtaining and sharing the information which it required.

Although most National Disaster Organisations have been using the Internet for less than two (2) years, several are showing a keen interest in using it to help fulfill their responsibilities. It is therefore incumbent on CDERA and other interested regional and international agencies to provide the type of support that would best enable disaster management personnel in the region to take full advantage of the available benefits.

Actions that can be taken to achieve this include:

- ▶ Placing increased emphasis and resources (particularly human) on supporting the provision of information through the Internet and the use of Internet services.
- ▶ Providing advocacy to encourage reduction of charges generally and provision of service on concessionary terms. This will encourage wider use of the Internet and make it an even more useful communications medium for NDOs.
- ▶ Coordinated promotion of disaster management information services. This is necessary to ensure that disaster management information get the appropriate level of visibility.
- ▶ Identification of technical limitations so that they may be overcome.

It is likely that despite shortcomings, the importance of the Internet in disaster management in the Caribbean will continue to increase over the next few years.