

EVALUATION OF DIPECHO/ UNDP “RADAR BASED EARLY WARNING SYSTEM FOR WEATHER RELATED NATURAL HAZARDS IN THE INSULAR CARIBBEAN” PROJECT (UNDP JAM/03/003) (SUPPORT TO DIPECHO RADAR PROJECT IN CARIBBEAN REGION) FROM JULY 2003 TO SEPTEMBER 2004

EVALUATION REPORT

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Date: October 2004

Disclaimer: This report has been produced at the request of the UNDP Project Manager and has been financed from project funds. The comments contained herein reflect the opinions of the Consultant only.

Evaluation of:

(UNDP JAM/03/003 - Doppler Radar based Early Warning System for Weather Related Natural Hazards in the Insular Caribbean

(Support to DIPECHO Radar Project in the Caribbean Region)

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Executive Summary

The Project

- 1 The project under evaluation has sought to improve the capabilities of relevant governmental agencies in Jamaica, Haiti and the Dominican Republic to predict flood events and to deploy these capabilities in the development of early warning (EW) systems for selected pilot communities in the three countries. It has accordingly involved various elements of training and capacitation at national, regional and community levels, and the sharing of knowledge and experience across borders. The Project had a scheduled life of 12 months – later extended by 3 months – and a budget of EUR 372,992 funded in the majority by ECHO through its DIPECHO program, and in the minority by BCPR. Management of the Project is headquartered at UNDP Jamaica, and implementation duties are shared with the various line agencies, committees and direct hires across the three countries.
- 2 Besides providing a comprehensive ex post analysis of the Project, the evaluation was to determine “the degree to which national agencies and target communities have assimilated the community flood EW concept, as a means of informing decisions for more substantive implementation of this exploratory project”.

Main Conclusions

- 3 On the matter of project design, we consider the objectives insufficiently focussed and the goals ambitious, given unforeseen capacity constraints, the short time frame, and certain set bureaucratic requirements of project administration. While stakeholding agencies were supportive of the objectives of the Project, more thoroughgoing consultation with them at formulation stage might have modified expectations to a more realistic level,
- 4 The Project has not yet been able to sufficiently engage or address the needs of the local communities, which are the main intended beneficiaries of the intervention. Communities have been sensitised, but the emphasis thus far has been more on line agency capacitation.
- 5 Progress has been made towards providing the selected communities with flood EW systems, but the job is some way off from completion – in all three countries.
- 6 In all countries, the supply of scheduled *materiel*, including hydrometric and pluviometric equipment, is relatively more advanced than public awareness and community-training activities are lagging. Radar will not be a significant feature of EW systems in Haiti and Dom Rep in the near future.
- 7 River dam release, as a source of flooding, is a major concern for the Dom Rep communities. This factor will have to be taken special account of, in the development of flood prediction models for that country.
- 8 In Haiti, the availability of funding to maintain EW systems infrastructure at the local level is evidently an issue.
- 9 The EW systems to be established by the Project, extended to other countries in the Region, would obviously complement the CMO radar project. However, this would have to be formalized by some sort of bridging action.

Lessons Learned

- 10 One year is too short a time to achieve very much from a Project of this sort. Rapid deployment requires that much of the set-up activities be done before formal start-up – by the line agencies in collaboration with UNDP. Otherwise, goals have to be more modest.
- 11 Provision of the technology alone will not deliver EW system to end user communities – will not provide intended functionality unless protocols are also put in place. Besides the gauges and the radar, the satellite telemetry and Internet access, the computers and application software, the flood prediction modelling and composition of EW messages/ alerts, and the telecommunications, getting the message out to the community requires the establishment of a reliable and durable human/ technology interface with the rules for receiving and acting on the alerts. This is by no means a trivial aspect.
- 12 It is difficult for people who have no substantial income or livelihood to afford to be volunteers – however a matter of self-interest the cause might be. They must be able to subsidize the volunteer effort and time from independent earnings. This has implications for the sustainability of the EW system at the local community level in Haiti and, to a somewhat lesser degree, Jamaica, where funding for maintenance of gauges and sites, and even for conducting the business of the local committee (Haiti) have been introduced as issues.
- 13 Achieving DIPECHO's fundamental interest in saving lives and property in the communities only partially relies on successful receipt of EW messages. It is vital to address the aspect of mitigation as well.

Recommendations

- 14 When projects of the kind are formulated, the proposers, before proceeding to execution and implementation, should obtain the express sign-off of line agencies and their ministries.
- 15 In future projects of like duration, the setting-up activities such as selection of candidate communities, baseline assessments, stakeholder agreements and establishment of PSC and PAC should be done before start of project, and probably as conditions precedent to disbursement. This would ensure that they are gotten out of the way quickly, so that project benefits for line agencies and target communities could begin to flow.
- 16 If inter-agency MOUs are an absolute requirement of the funding agencies, they should be kept as simple and as short as possible, making maximum reference to the underlying project document, to obviate the need for creative elaboration which sometimes alters the original thrust of the Project. This activity would also be better completed as a condition precedent to disbursement.
- 17 There should be more involvement of the communities in planning and decision-making activities, advantageously at the forum of the Project Advisory Committee (PAC). Treating them as partners rather than passive recipients of a benefit at the end of the line is likely to produce a better system of early warning.
- 18 The issue of sustainable funding for gauge and site maintenance on the Ravine du Sud (Camp - Perrin community) might be approached by exploring the placement of a one-time grant with the local Caisse Populaire, to be managed as part of its regular commercial credit activity, the earnings from which could be used to pay a stipend.
- 19 The Public Awareness activity should have a heavy emphasis on the target communities. The national audience should only be addressed afterwards, with a view to publicizing the pilot-community experience as a means of stimulating widespread adoption.
- 20 Funding should be sought at least to complete the pilot activity, and support more lateral technical assistance among the three countries. If similar systems have been established elsewhere in the region, e.g. Cuba, there should be a sharing of experience in that regard.

- 21 Taking into the account the size of Haiti, size of its rivers, frequency and scale of disaster events and their consequences, an additional local community should be considered for inclusion in any extension of the project. Choosing a border area would have the additional advantage of promoting closer collaboration between Haiti and the Dom Rep authorities.
- 22 On the matter of more substantive implementation of EW systems in the Caribbean, we do not see this being universally and faithfully followed without some kind of Regional project. EW systems will make use of both ground-based and radar sensing. The latter will optimally involve sharing of radar resources across borders. In this context, it would seem logical to seek to build a more organic link with the regional EU / CMO radar project. This would be very much facilitated by expanding the CMO to include all the countries of the Caribbean.
- 23 Disaster awareness imparts keener appreciation of the importance of good environmental practices - in such things as land use, and energy sourcing - as well as the possibilities of remediation. The need is probably most urgent in the case of Haiti. It turns out that, there are two NGOs operating in the Camp -Perrin area – one involved in sustainable agriculture and the other, a machine shop training facility (which can produce an inexpensive gas stove). We think these could, with some additional resources, be enlisted to make a meaningful contribution in this regard.

I. INTRODUCTION

1. The Project

- ***Site***

Jamaica, Haiti and the Dominican Republic

- ***Duration***

06 July 2003 to of 05 July 2004 , extended to 30 September 2004.

- ***Objectives***

General Objective:

In case of flood or hurricane warning, the affected population will be informed and oriented in order to protect themselves and their property.

Specific Objective:

National Disaster Offices (NDOs) will have the support and technical assistance from their National Meteorological Offices (NMOs) in order to communicate on time to the population flood and hurricane warnings and, if required, evacuation orders for the target areas.

Target groups:

- High risk populations vulnerable to flood and hurricanes
- NDOs in Jamaica, Haiti, Dominican Republic

The general objective of the project will be achieved by carrying out activities in three key intervention areas:

- Strengthening and capacity building of key institutions – i.e., NMOs and NDOs
- Reinforcement of communication linkages between relevant institutions
- Advocacy and awareness raising amongst key political decision makers as well as vulnerable populations

Key Activities:

- Build capacity of NDOs to absorb and disseminate Radar information from NMOs
- Build awareness of availability of radar information as a tool for disaster preparedness

Key results:

- By fortifying the NDOs and helping them better deliver the information to vulnerable communities, people will access to information in a timely manner, know what to do with it, and will be able to use it to their benefit in case of floods or hurricane warning and be able to protect themselves and their property.
- By assisting the NMOs establish systems and capacities to share relevant information with the NDOs, the project will ensure that data generated from sophisticated radar technology will generate a value added and provide options to vulnerable populations.
- Stronger NDOs will have the capacities to interpret, use and disseminate information to vulnerable populations. They will recognize what the needs of the populations are, and will have resources and systems in place to transmit valuable information regarding floods and hurricanes to target populations in a timely and efficient manner.
- Vulnerable populations will be aware of the availability and reliability of radar generated information. When the information is shared with them in case of potential flooding or hurricanes, the population will trust the source and use it to protect themselves and their property.

Anticipated results:

Anticipated impact on target groups:

- The project will improve the situation of vulnerable communities by providing them with accurate, timely and efficient weather information in order to help them be better prepared for floods, hurricanes and other extreme weather events. ...
- In addition, the availability of reliable information can be incorporated into planning activities. ...

The project will improve the technical and management capacities of the National Meteorological Offices and the National Disaster Offices in the following ways:

- Stronger communication systems: The project will work with both sets of institutions in building stronger communications systems and institutionalizing information sharing agreements between NMOs and NDOs. The project will help both sets of institutions put in place and systematize regular communication systems in order to improve the flow of radar generated information from the NMOs to the NDOs and from NDOs to local authorities.
- Better understanding of information needs: The project will work with both NMOs and NDOs in order to help both sets of institutions understand and appreciate the information needs of their clients. NMOs will have a better understanding of the relevance of information for NDOs, line ministries and other key development stakeholders. NDOs will have a better understanding of information required by vulnerable communities. Both sets of institutions will build their capacities to share the appropriate information with their respective clientele.
- Equipment: The project will work with the NDOs to identify needs in required equipment and technology to improve the absorption and transmission of information received from the NMOs. The project will, whenever possible, provide this equipment. However, it is recognized that the current project may not be able to fill all the technological needs of the NDOs and thus, will assist NDOs in finding appropriate resources (e.g., government, donor funds) in order to equip their offices with necessary equipment.
- Trained Human Resources: The project will build the technical capacity of NDOs by providing extensive training to staff the interpretation and transmission of radar generated information.

- **Cost & Funding**

Expenditure/ Eligible Costs	EUR	Financing Plan	EUR
a) Costs of staff assigned to the operation	143,001		
b) Travel and subsistence expenses for staff involved in the operation	60,574	b) Contribution by the applicant (BCPR)	74,584
c) Cost of durable equipment (rent, purchase)	38,233		
d) Cost of consumables and supplies	18,088	d) Contribution requested from the Commission (DIPECHO)	298,338
e) Any other direct costs	73,070		
f) General costs charged to the operation	23,308		
g) 5 % contingency	13,778		
TOTAL	372,992	TOTAL	372,992

2. The Evaluation

General objective of the evaluation:

To ascertain the degree to which national agencies and target communities have assimilated the community flood EW concept, as a means of informing decisions for more substantive implementation of this exploratory project.

Specific objectives of the evaluation:

The most important specific objective is to obtain an objective and independent analysis of the Radar based early warning project in Jamaica, Haiti and the Dominican Republic implemented from July 2003 to September 2004 in terms of its relevance, effectiveness, efficiency, impact and sustainability.

Other specific objectives are:

a. To determine:

- The extent to which national agencies have assimilated the community flood EW concept
- The extent to which target communities have assimilated the community flood EW concept
- The extent to which pilot project objectives were met and reasons for unmet or partially met objectives
- Successful results of the pilot project that were not part of the set objectives
- Difficulties associated with the pilot project.

b. To identify lessons learned from the pilot project

c. To make recommendations for addressing these issues and for general improvements

d. To make recommendations for more substantive implementation of EW systems in the Caribbean.

II. FINDINGS

3. Context and Design of Project

- 1 The prominent mention of “radar” in the title of the Project is misleading: the radar installation in the Dominican Republic was not functional, Haiti had no radar installation, and whilst Jamaica did have radar, telecommunication facilities would have to be upgraded to serve the purposes of the Project. This has already been acknowledged and is mentioned here only for completeness. It is, however, illustrative of a larger more general point: that there were, and still are, capacity constraints which would have hindered the delivery of the early warning (EW) systems to the respective communities.
- 2 There was not a unified, unambiguous hierarchy of objectives in the Project document. A tendency to state too many ‘objectives’, ‘results’ and ‘key activities’, and to disperse them over different sections of the document, could well have contributed to a blurring of focus.
- 3 The goals set were somewhat ambitious, given the relatively short life of the Project. A huge scope of work was expected to be covered one year. Besides working with line agencies, community groups and NGOs across three countries, it was sought to involve third parties such as the Caribbean Meteorological Organization (CMO) - the implementing agency for the ECHO Radar Project - Caribbean Disaster and Emergency Response Agency (CDERA), and the Cuban Civil Defense.
- 4 Apart from the time factor, it would have been difficult to secure the cooperation of these third parties (at one stage, Meteo France and the Puerto Rican NMO were also mentioned), without their being official parties to the Project. Some progress was achieved with the CMO only by having a representative of that body sit on the Project Steering Committee.
- 5 Whilst the stakeholders were all very supportive of the overall program and Project objectives, some critical participants felt there should have been more consultation at project formulation stage. Indeed, insufficient concurrence on some implied assumptions and features of the design, may have affected the Project’s acceptance and rollout on the part of line agencies.
- 6 The participation of the national water resource offices (NWOs) is essential to any flood-related early warning arrangements. The importance of including them was overlooked in the design of the Project, but this was quickly rectified in the implementation.

4. Status of Activities

4.1 Target Communities Status of Activities

4.1.1 Pedro River (Jamaica)

- 7 The Pedro River Community Club, which pre -dates the Project, was formed to deal with community development issues. It meets every Thursday, and relates to the Parish Disaster Coordinator (PDC) located in the St. Ann Parish Council on matters of disaster preparedness.
- 8 A flood watch committee was formed as a sub-committee of the Club, to host activities under another UNDP project - "Community-based Disaster Management" -, which is being implemented by ODPEM. This committee meets every Tuesday, and has also been adopted by the Radar project.
- 9 Community members expressed strong interest in getting information from the line agencies to inform mitigation practices.
- 10 ODPEM has held two basic disaster training seminars for Committee members under the other project. The members want a disaster response drill to be included in the training program.
- 11 The Red Cross has been engaged to complete the program in terms of the Radar component; this will include a drill simulation. They are to evaluate for completeness, the training already given by ODPEM under the Disaster Management project. Progress has reportedly been delayed by the intervention of hurricane 'Ivan'.
- 12 The WRA already has a stream flow gauge in place near the community. WRA has maintained contact with the community over many years. No gauges are to be provided under the Project.
- 13 Flood level gauges and road traffic diversion gates have been installed under the other UNDP project. There are no arrangements presently in place for maintenance of staff gauge sites.
- 14 The regular clearing of sinkholes is an important flood prevention/ mitigation factor and is regarded by the community members as the highest priority action.

4.1.2 Rivoli/ Thompson Pen (Jamaica)

- 15 Core community flood watch group of 3 people on the Rivoli side has been part of a parish disaster preparedness zonal committee since 1981. This group has been concerned mainly with watching the river (Rio Cobre) for immediate flood threat to the community residing along banks of river.
- 16 The Parish Disaster Coordinator (PDC), with the help of the Social Development Commission, assembled a larger group (mainly from young men of the community) expressly to receive training under the Project
- 17 Under the Project, the expanded group received basic disaster training from ODPEM (July '04), and prepared a response plan with the Red Cross (August '04)). The program was well received. The drill simulation exercise remained to be completed.
- 18 The community recently (September '04) had to carry out a real-life response to a major flood event associated with hurricane 'Ivan'. It is understood that this is to be written up by the Red Cross and reviewed with the community – which will obviate the need for the simulation exercise and members are eager to go to the next level.
- 19 More work is needed to establish the group as a more permanent committee, and distribute responsibilities more broadly among members.

- 20 Riverbank erosion is a major issue for the community - severe and ongoing erosion of riverbanks and sedimentation in river was observed. Members suggested specific works that would mitigate damage from flooding of river, namely, clearing of accreted sedimentation (island) and river training works. (We concur in principle, however hydraulic assessment should precede and inform any such works.)
- 21 Two flood level gauges – one on either side of the river –, which were installed in 1994 under a previous UNDP project, are now in very poor condition. They are to be replaced under this Project. Members also wish to have the signage replaced as a means of boosting community sensitization.
- 22 The Project provides 2 stream flow gauges which are to be placed upstream and used in the EW system for the community. (These will be part of WRA's network.)

4.1.3 Camp-Perrin (Haiti)

- 23 Well-organized Communal Committee is a regular committee of Municipality- formed by the Mayor's office. The Communal Committee has representation from all social, NGO, and private citizen organizations. The Committee for Civil Protection is a sub-committee of the Communal Committee. It is concerned with matters such as flood disaster, reforestation, and pollution. It has access to radio stations to sensitize the public, and can also distribute flyers.
- 24 These committees have acquired new membership since the political change of May '04.
- 25 Basic disaster training received in August '04 under other UNDP project ("Management of Risks and Disasters")
- 26 Training and public awareness activities under Radar project have been delayed by political changes and disaster events.
- 27 Plans for installation of gauges (2 stream flow and 1 rainfall) are in place – funds and opportunity to conduct site preparation activities (latest flood disaster in September has diverted national attention to Gonaives and surrounding areas) awaited.
- 28 Major concerns of the Committee include: funding to pay persons to safeguard the equipment and maintain the sites which are far away; funding to conduct the Committee's business, including acquisition of administrative and operational equipment; facilities to operate a cyber café. This would ordinarily be a governmental responsibility, however, a more creative approach may be needed. The Committee indicated that it needed help in identifying sources of grant funds to do its work.
- 29 The existence of two locally -based NGOs with satellite Internet access and willing in principle to accommodate Committee (Organization pour la Rehabilitation d'Environnement (ORE) and Les Ateliers -Ecole de Camp -Perrin), provides the possibility of a good channel for receiving EW alerts from DPC/ CNM/ SNRE. The modus operandi is to be worked out.
- 30 Some community opinion-leaders expressed the view that the people most at risk are not likely to abandon their habitations, or even to do short-term evacuations, because they are poor, have whatever they have invested in the area, and have nowhere else to go. The challenge then becomes how to bring about appropriate and sustainable economic development in the area, to exist side by side with, and contribute to the amelioration of these risks.

4.1.4 Tamayo (Dom Rep)

- 31 Has formal disaster prevention, mitigation and response (PMR) Committee as part of municipal government machinery
- 32 Several well-organized and motivated NGO and civic committees operate with wide volunteer participation - Red Cross, Firemen, Civil Defense (local committee), Vision Mundial, Oxfam, etc. – all represented on PMR committee
- 33 Very impressive participation of the young and very young in local Red Cross Committee
- 34 Flooding of area from time to time, from Yaque del Sud – due to both rainfall and periodic opening of dams. Community has an issue about insufficient warning from INDRHI of opening of dam gates.
- 35 The community has identified Uvilla and El Jobo as most vulnerable areas - very susceptible to flooding. After hurricane 'George', a wall was established which doesn't work. Flood level gauges had been put in by INDRHI and Civil Defense. When the water level reaches yellow, the places are already flooded. The river should be rechannelled to extend the wall to the two communities. Smaller dams should also be constructed down to Penon. INDRHI is aware of the situation.
- 36 The Project is providing 1 stream flow gauges and 2 rainfall gauges as part of the EW system for Tamayo. These will be part of INDRHI's network.
- 37 Defensa Civil has had to postpone training several times due to effects of bad weather (hurricane season) and lateness in Project disbursement.
- 38 Public awareness activity outstanding also - videos for national message already produced.
- 39 The NGO Vision Mundial has operated in Tamayo for about 8 years. It works with the Comision Nacional de Emergencias (CNE) at the local level, and has implemented a disaster preparedness strategy with the Red Cross Committee and Firemen for 2 years. The NGO is supporting the Project as part of its poverty reduction mission, poverty being closely related to disaster vulnerability. Vision Mundial will take part in the training and public awareness activities; it has funded the videos, and will pay for brochures, tee shirts and other promotions.

4.1.5 Castanuelas (Dom Rep)

- 40 Castanuelas is located in Montecristi province. Area of Montecristi municipality lies on earthquake fault line – big earthquake in September '03.
- 41 Well-organized PMR committee and Defensa Civil local committee – as for Tamayo. Also Red Cross Committee, Mother's Club, Neighbour's Association, Firemen.
- 42 Members were looking forward to the training program and expected to come away with practical knowledge that could be applied to the real life hazard situation in their community. Six of the 9-member local PMR Committee were invited to participate in the Workshop, which was being taken seriously. Persons at both local and provincial levels expressed disappointment at having been excluded. The workshop had to be postponed as for Tamayo.
- 43 Public Awareness plans have been completed and are to be implemented after community training.
- 44 Dam release by INDRHI is also a major issue here – maybe even more so than Tamayo. It was even seen by some as the major cause of flooding here.

- 45 The effect of floods on human health (from water-borne disease), displacement, livestock and property losses were of great concern. Water quality for human consumption and domestic use - also major concern. Since November '03 floods, Oxfam has played a key role in water supply and purification, and training in health aspects of emergency.
- 46 Flooding of Yaque del Norte cuts off one side of Castanuelas community from the other – people often marooned for relatively long periods – members express need for specific facilities such as a boat to carry out evacuation exercises. On the macro level, addressing the hydraulics of the river and delta was mentioned as the essential mitigation measure.
- 47 The Project is providing 1 rainfall- and 2 stream flow gauges as part of the flood EW system for Castanuelas. These will be part of INDRHI's network.

4.2 Line Agencies

4.2.1 National Water Offices (NWOs)

- 48 The NWOs are in various stages of equipment acquisition. Equipment provided by the Project includes stream flow - and rainfall gauges, and weather stations, with satellite uplinks; computers and DSL lines for downloading - rainfall and stream flow data, and radar images, and software for viewing archived radar images.
- 49 Most of the equipment is in hand. Funds are awaited to carry out installation of gauges. Complete implementation will include tie-up with the NOAA satellite and Colorado Center, access of information via the Internet, developing and putting into application, the flood prediction models.
- 50 SNRE's computers will not be delivered (at their request) until stable office accommodation has been arranged.
- 51 WRA had developed a flood warning model for Rio Cobre, which is to be used in the EW system for Rivoli/ Thompson Pen. (Radar data will be used to increase the warning time.) A model is to be developed for Pedro River as well. (This will involve upgrading the stream gauge for transmission to satellite – independent of the Project).
- 52 SNRE and INDRHI have begun to develop flood warning interpretation models for Haiti and Dom Rep. Those for Dom Rep will incorporate dam level and dam release data.
- 53 WRA received training in radar interpretation from NMS, and shared its knowledge in flood warning model development, interpretation and use with NMS, ODPEM, SNRE, COE, CNM, INDRHI, and ONAMET.
- 54 SNRE and INDRHI personnel visited WRA (Jamaica) in December '03 for consultations on flood EW systems. SNRE also got exposure to radar from NMS.
- 55 WRA and INDRHI undertook a joint technical assessment visit to Haiti in January '04, in connection with EW system designs.
- 56 Besides Camp -Perrin, SNRE has expressed a wish for the area of Mapou to be included in any continuation of the Project in Haiti.
- 57 INDRHI has a network of 120 automatic, real-time rainfall, stream flow and dam level gauges.
- 58 For the gauges to be provided by the Project, INDRHI will be able to receive data simultaneously from the field and via the Internet from NOAA's Colorado Center. This will be passed to the Emergency Operations Center (COE) of the National Emergency Commission (CNE), the Defensa Civil, and placed on its website.

4.2.2 National Meteorological Offices (NMOs)

National Meteorological Service (NMS) (Jamaica)

- 59 Jamaica's radar facility has some deficiencies. The microwave link between the radar station and the forecasting centre has been frequently out of service. It last went down in early 2004 and is still awaiting repair. Equipment at the site suffers from frequent damage due to lightning; proper grounding and lightning protection are required. A baseline quantity of spares is required to assure reliability. Real time images can thus only be viewed at the station, and the forecasters have to rely on verbal description.
- 60 The Project has provided some upgrading for the facility, including a standby generator, filters to suppress radio interference on the microwave link, and a pair of interface modems. The link was repaired, but more recent lightning strikes put it out of service again. The further repairs needed to restore the link are beyond the capacity of Project.
- 61 The Project has also provided an automatic weather station with satellite uplink. This is to be placed at the eastern end of country, from which direction come most of the weather effects. Data from the rainfall gauge will be used to calibrate the radar. Information provided by the radar will permit lead time for flood warnings to be increased significantly.
- 62 NMS has software that can be used to process NOAA data, but this is not essential to the Project objective).
- 63 Planned links for WRA and ODPEM cannot be provided until the microwave link is back in service. Links provided temporarily from the radar station are not sustainable due to the lightning hazard.
- 64 From the radar, NMS is to provide WRA with quantitative rainfall forecasts, to be used in the flood prediction models.
- 65 NMS conducted training in radar interpretation for ODPEM, WRA and parish disaster coordinators in May '04.
- 66 During the recent passage of 'Ivan', NMS for the first time broadcast radar pictures of the hurricane on the Web.

Centre National de Meteorologie (CNM) (Haiti)

- 67 CNM: Use of Jamaica's radar not technically possible. Radar images from Guantanamo Bay are being viewed on the Web. However, as most weather effects come from the east, there is a substantial gap in Haiti's coverage. Working radar in Dom Rep could cover part of Haiti.
- 68 Besides providing a flood warning service for the community, the EW system will aid in level 3 of Haiti's 4-level hurricane alert, i.e., confirmation
- 69 The precise arrangements between CNM, SNRE and DPC for launching flood alerts to target communities discussed but not yet finalized. (CNM and SNRE will jointly develop community forecasting tables.) CNM could use the Ministry of Agriculture's HF radio system to disseminate alerts to the local committee. Local propagation could be by way of community radio, horn/megaphone, and portable 2-way radio.
- 70 The Project is providing CNM with automatic weather stations with satellite uplink, and website development.

Oficina Nacional de Meteorologia (ONAMET) (Dom Rep)

- 71 The radar installation, situated at the agency's offices in Santo Domingo, has not worked for several years and is probably unserviceable. ONAMET desires to acquire a Doppler radar, to look at meteorological phenomena in real time and to facilitate forecasting. It expects to have access to a station being established by a hotel investor group at Punta Cana in the east, within nine months. This is expected to cover a 400 km radius; however, additional facilities will be needed to cover the north-eastern part of the country (Montecristi, etc.), which is in the shadow of a mountain range. Some coverage of Haiti will be given.
- 72 ONAMET has a network of 44 automatic weather (climatological) stations plus 9 other traditional stations. However, these are not now all functional. When rainfall intensity exceeds a certain level, they inform the media and agencies (CNE/ COE) of impending flood conditions.
- 73 Macro-forecasting employs web-based and direct satellite services.
- 74 The Project has provided support for development of ONAMET's website.
- 75 ONAMET has received training in flood warning model development, interpretation and use from WRA (Jamaica) and INDRHI.

4.2.3 National Disaster Offices (NDOs)

Office of Disaster Preparedness and Emergency Management (ODPEM) (Jamaica)

- 76 At this time, ODPEM does not transmit early warnings directly to local communities, but to Parish Development Coordinators which are attached to Parish Councils. ODPEM relies on the PDCs to get the message out to the specific communities at risk. Realization of EW systems for this Project's pilot communities may necessitate another look at this protocol.
- 77 ODPEM has conducted basic training for Rivoli/ Thompson community. Some training has been given to the Pedro River community under another UNDP project being implemented by ODPEM (Support to Community-based Disaster Management). The program is not yet complete, however Project Management has assigned the remaining training under the Project to the Red Cross.
- 78 As for the other two countries, Public Awareness activities have barely started. It is planned to include a video production aired on government television, exercise books for school children flyers and posters.
- 79 ODPEM has received training in radar interpretation from NMS, and in flood warning models, from WRA. It has also received 1 computer from the Project.
- 80 As with the WRA, the real-time link from the radar cannot yet be provided on a durable basis.
- 81 We have the impression that the relationship with Project Management became strained, and ODPEM's participation in the Project, somewhat reserved. This might have been partially due to the pressure on ODPEM of other activities, as well as the benefits to the organization from the Project not presenting enough of an incentive.

Direction de la Protection Civile (DPC) (Haiti)

- 82 Training for the community of Camp-Perrin under the Project was due in early September, but had to be postponed due to the hurricane 'Ivan' situation. (Some disaster training had been given in early August under the other UNDP project (Management of Risks and Disasters).
- 83 The Public Awareness program is being developed with assistance of the Project's Training Coordinator. This has similarly been delayed.
- 84 DPC was still working out with CNM and SNRE, the details of the operation of the community EW system, including choice of the party responsible to launch the alert.
- 85 DPC has received some of its computers. The remaining units are in transit.
- 86 DPC, along with CNM and SNRE, has got exposure to flood warning model development, interpretation and use, from WRA (Jamaica).

Defensa Civil (DC) (Dominican Republic)

- 87 The location of responsibility for getting early warnings out to the public and specific communities at risk is somewhat more involved than in the other two countries. This is largely due to the existence of COE (Centro de Operaciones de Emergencias) a permanent emergency operations centre, and the operational arm of the CNE (Comision Nacional de Emergencias), a body which integrates some 28 institutions. It is COE that has the job of sending out alerts. Furthermore, there is a provincial structure of committees which stands between the central government and the local municipalities and communities.
- 88 Training programs for Tamayo and Montecristi/ Castanuelas, which included the participation of Vision Mundial and Oxfam along with the line agencies, were planned and ready to go. They had to be postponed at least twice due to adverse weather associated with hurricane threat.
- 89 Public Awareness activities are somewhat more advanced than in the other two countries, but still not yet done. Materials prepared include brochures, posters, caps, tee shirts, 2 videos for national TV. At the date of our visit, Project funding had not yet been received.
- 90 Personnel from DC received exposure in flood modeling from WRA at the workshop held in Santo Domingo, and later from INDRHI and ONAMET.

4.3 General

- 91 We accept that natural disaster and political events in the Dom Rep and Haiti would have caused unavoidable delays in those countries. These events were, essentially, the floods in Dom Rep (November '03), Dom Rep and Haiti (May '04), and Haiti (September '04); the insurgency and subsequent Administration change in Haiti, which has brought about changes in local-committee personnel and a somewhat unsettled ongoing situation (from February '04); and, the change of government in Dom Rep following elections, which brought changes in the top management of line-agencies, and political administration of provinces and municipalities (July/ August '04).
- 92 At 08 September '04, some 78 % of Project funds had been expended
- 93 Provision of goods and services under the Project (rainfall-, weather-, stream- and flood level gauges, computers, training, public awareness, website development, etc.) is in various stages of progress. Further action will be required to activate networking with NOAA, and complete development of the EW systems for the 5 target communities.
- 94 Among other things, the Policy Makers Workshop, which was to be held at the Regional Disaster Management Conference in Montego Bay in September '04, had to be postponed due to hurricane 'Ivan'.

- 95 The CMO has provided valuable technical advice regarding satellite-based weather station and stream flow gauge telemetry.
- 96 The general absence of radar facilities has forced NMOs in Haiti and Dom Rep to make more use of the substantial web-based resources available– they have become more proficient in sourcing and applying this information. This is a mixed blessing, which encourages a set of responses to be developed, first using currently available tools, later expanding to make use of existing external radars (say Cuba, Guantanamo Bay, Puerto Rico), then using own radars when acquired.
- 97 Relations between line agencies across the 3 countries have improved significantly as a result of the peer training and exchanges facilitated under Project. This has stimulated interest in deepening collaboration.
- 98 We are still uncertain about the precise aims and content of the Public Awareness component. Reports have mentioned, among other things, “..raising political awareness at regional, national and local levels of the availability of climate information...”. Generally, we think the first priority should be to support the adoption of the EW systems in the respective pilot communities. The results and lessons learned from the demonstration would indicate a strategy for promoting wider-scale adoption – whether regionally, nationally, or in other targeted communities. Given the modest level of funding available under the Project, this may be a more productive approach than trying to cover too many audiences at the outset.
- 99 In all the circumstances, the Project is still some way off from delivery of end-to-end EW systems for the pilot communities, whether from radar or ground level sensing.
- 100 EW system = message + communication facilities + human interfaces + protocols. The message itself originates from data supplied by the gauges and/ or radar, further processed by the NMO and NWO, and probably repackaged by the NDO.
- 101 Under this Project, data from the gauges would be fed back data from NOAA’s Colorado Center via the Internet, and processed by the NMO. The NWO would apply flood prediction models which integrate data from gauges, dam release information as applicable, and radar images. The NDO would derive high-level EW messages (suitable for dissemination to the public), and get them out to the target communities via some practical, reliable and convenient mechanism. The community level response would need to be instituted as a procedure with specific persons responsible for specified tasks.
- 102 Dom Rep displayed the highest level of community volunteerism.

5. Project Direction and Management

- 103 We wish to restate here our opinion that much was expected to be accomplished from this Project within a relatively short time frame.
- 104 The Project agreement was executed in June '03 and the Project Manager was recruited in September, followed by the other staffing. The need for on-the-ground coordination in Haiti, not part of the original design, was addressed by hiring a Technical Coordinator in early-2004.
- 105 Key preparatory activities such as establishment of the PSC and PACs, selection of beneficiary communities, and assessment of baseline conditions, institutional and community needs, were thereby substantially delayed. (The first PSC meeting was held in October 2003.) In a project of such short duration, these might have been better placed as project preparation and pre-start-up activities, performed by BCPR and UNDP.
- 106 The obviously huge effort involved in developing legal documents (procurement agreements between UNDP offices and line agencies, MOUs between line agencies), seems disproportionate to their contribution to desired output. Indeed, despite much executive time spent by Project Management and at PAC meetings, etc., all three countries have yet to complete these requirements. Moreover, these documents are, as a practical matter, unenforceable. We note that the community-level representation (civil society) has not been included as party to these agreements – in our view, an omission, given that we have to have these documents.
- 107 The Project carries a high overhead in reporting and monitoring (quarterly reports, half-yearly evaluations, giving ad hoc monitoring/ evaluation interviews). It has had to operate within a new UNDP financial management system which is having 'teething pains' and has caused delays in the release of funds and therefore of progress in delivery of inputs.
- 108 We came away with the perception of a disproportionate balance between 'paper' work and 'doing' work. This might well be due to a culture of project design which seems to be as much about dictating a set process, as about achievement of the set objectives.
- 109 We regard the non-inclusion of community-group representation on any of the PACs as an omission. Engagement of local communities has largely been by way of 'visits to local communities'. We feel, rather, that they should be at the centre of the Project - not a residual entity. The benefits of their inclusion at the level of the PAC, or even as occasional guests at PAC meetings, could be expected to include: better informing their situation and needs with respect to community EW solutions; giving sharper focus to the complementary needs of line agencies; motivating community participation and support for the longer-term program; and, stimulating Project Management to give greater priority to community deliverables, and sharper focus to designated outputs.
- 110 The Project Advisory Committee (PAC) device seems to have been put to best use in Haiti, where, notwithstanding the somewhat slower progress due to external factors, we have the impression of more coordinated planning and movement on the Project, as well as better inter-agency relations, towards more effective working in general. UNDP Haiti's approach of bringing together the key line-agency personalities who are involved in both this Project and the larger, longer-term Management of Risks and Disasters project, in a single PAC makes efficient use of executive time, and makes for greater coherence and sharing of resources between the two.
- 111 The Radar Project has been a good complement to the Risks and Disasters project in Haiti. It has also received much administrative support from that project, as well as technical support of UNVs in training, sensitizing and coordination at the local level.
- 112 We would have wanted to see greater demarcation, in Project reports, between attainment of intended benefits and spin-offs.
- 113 We are somewhat uncomfortable about publicity materials that may suggest the implementation of EW systems as completed activities under the Project. Any such suggestion would be premature.

6. General Stakeholder Comments and Issues

- 114 Some agencies did not see the sense in signing agreements which would commit them to somewhat open-ended performance whilst not providing the funds to go with it. Furthermore, they felt it would be superfluous to sign agreements between agencies already accustomed to working together - in effect, restating just what they were originally established to do. Finally, these agreements were not flexible enough to take account of unforeseen changes, e.g. the implications of a new agency created in Jamaica following hurricane 'Ivan'.
- 115 It is understood that the relevant line ministry in at least one of the three countries did not have an opportunity to sign off on the formulation of the Project, prior to execution.
- 116 The project has commendable objectives and our visits to the participating communities indicated robust support among stakeholders at all levels. Many of the stakeholders and participants saw the need for more capacity building at all levels and support was expressed for more training and for more initiatives to ensure a sustainable 'joined up' approach to what was perceived of as a long standing impediment to the well being of persons, families, communities and livelihoods in all three participating countries.
- 117 At all locations support and interest was indicated for a wider range of training interventions. At the same time concerns were expressed at the need for the DIPECHO initiatives to be better 'coupled' with other similar loss reduction and disaster management activities. Some concern was also expressed at the short duration of this DIPECHO intervention compared to the scale of the problem. There appears to be acceptance of the strategic value of the project and the need for all the deliverables, and capacities to be in place and if possible institutionalized. Doubtless the recent hurricane/ flood disasters (November - Dom Rep, May - Fonds-Verrettes, Mapou and Jimani, September - Gonaives and surrounding areas) will reinforce demands for urgent improvement in Early Warnings (with or without radar support).
- 118 From discussion with Ministry officials and NGOs in Haiti, the areas of Mapou, Maniche, Fonds-Verrettes in the south have been suggested as candidates for inclusion in any extension of the Project. The recent (Sep'04) flood disaster in Gonaives will no doubt have refocused attention on the need for improved early warning mechanisms/ systems in the north of the country.
- 119 In a number of instances, community participants, while supporting the overall objective of the project were on the view that additional activities including innovative approaches to maintaining of drains, channel management, stream bank protection, and other local preventative activities as well as more appropriate products from the national meteorological / hydrological agencies could have been coupled with the warning activity and would have afforded them more significant protection in future flood events.
- 120 The UNDP delegations tend to see the Project as part of or supporting longer-term, wider-scale integration between agencies, within and between countries, towards a more comprehensive and durable regional disaster management program. As a humanitarian agency, ECHO's mission is about saving lives, not institutional strengthening per se. ECHO Caribbean is accordingly more focussed on delivery of the EW systems to the ultimate intended beneficiaries of the project, i.e. the selected communities at risk from flood and hurricane events.

III. CONCLUSIONS, LESSONS LEARNED, RECOMMENDATIONS

7. Conclusions

- 121 A tendency to state too many objectives for the Project might have contributed to a blurring of focus.
- 122 The goals set for the Project were somewhat ambitious, and will not have been accomplished within the one-year time frame. The Project started off slowly; progress on the ground has been hampered by structural requirements of project management (MOUs, frequent reporting), snags in UNDP's financial management system which have contributed to delays in the release of funds and therefore of progress in delivery of goods and services. There has been, in our view, difficulty in engaging the line agencies fully, perhaps due to perceived benefits derived being disproportionate to effort demanded (Jamaica), political changes and natural disasters (Haiti, Dom Rep).
- 123 Progress has however been made towards the ultimate objective of providing the selected communities with EW systems for flood (and hurricane) events. The emphasis thus far has been more on line agency- and less on local community capacitation. Communities have however been sensitized and caused to expect tangible results before too long; in order not to lose their good faith, this needs to be followed up closely with intensive engagement.
- 124 The Project has begun the process, but the job is some way off from completion. There is still an appreciable amount of work to be done to meet the fundamental objectives of the Project – even without radar as a significant component.
- 125 Overall, the main challenge is still to develop – or complete the development of – appropriate EW systems that are of practical benefit to end-users in the communities at risk. Provision of the technology alone will not deliver EW system to end user communities – will not provide intended functionality unless protocols are also put in place. This calls for the establishment of a reliable and durable human/ technology interface – probably a far less trivial aspect than foreseen, or addressed thus far. It is clearly not possible to reach this stage within the time frame of this Project, and in the absence of an extension to the Project, would have to be continued within the framework of the national agency-community relations, advantageously pledged under UNDP auspices and followed-up by UNDP offices.
- 126 Of the 3 countries, we feel Dom Rep will present the greatest technical challenge to implementation of the EW system – due to the larger number of agencies involved in getting EW alerts to the ultimate audience at the community level, namely INDRHI, ONAMET, DC, CNE, COE, provincial government, municipal government/ PMR committee. Hopefully, the experience of this Project will motivate the Dom Rep authorities to look more closely at the process with a view to possible simplification.
- 127 River dam release, as a source of flooding, is a major concern for the Dom Rep communities. It is clear that the respective flood EW systems would not be adequate unless these events were programmed into them. It is understood that this is being taken into account in development of the underlying flood prediction models for Dom Rep.
- 128 In Jamaica, the main challenge seems to be the insufficient readiness of communities, in terms of action units organized, practically trained (drill simulations) and otherwise prepared to receive and act on the EW messages. ODPEM has to take the initiative on establishment and organization of viable community response units. We feel that more involvement (by Project Management) of the Ministry of Land & Environment (MLE) would have made for better direction and coordination of line-agency effort.

- 129 The Project has caused attention to be focused anew on the gaps in NMS's (Jamaica's) radar facility needing attention to make it fully functional and available to the forecasters. (In September '04, NMS for the first time placed radar images – of the approaching hurricane 'Ivan' - on its website. It has thus begun to take responsibility for the eye of the hurricane when within its zone.) It will promote more rapid development of CNM's forecasting capability by piloting remote acquisition of ground-based metrology, and laying the groundwork for integration of radar whenever such facility becomes available. It has probably urged ONAMET to try to move more quickly in accessing radar facilities (probably from Punta Cana) and in upgrading and rehabilitating its own network of weather stations – several of which are not now functioning.
- 130 Whenever radar comes to Haiti and Dom Rep, whether owned or otherwise accessed (via Internet or dedicated medium), it will hopefully be to enhance systems already in place – implemented with initiatives such as this Project.
- 131 The means have to be found to maintain EW systems infrastructure, especially within the local communities. This will require considerable creativity, as agency budgets are already under strain.
- 132 The Project has been a good companion for the larger, longer-term disaster management project in Haiti.
- 133 The Project Advisory Committee (PAC) is potentially a very effective mechanism for guiding, coordinating and controlling project activity, and building and reinforcing inter-agency relations towards more effective working in general.
- 134 The Jamaican and Dom Rep agencies are clearly prepared to give further collaborative assistance to their Haitian counterparts. However, this would require a program of lateral cooperation properly formulated and funded.
- 135 The EW systems to be established by the Project, extended to other countries in the Region, would obviously complement the CMO radar project. However, there would have to be a more deliberate, organic, initiative in this regard - it is not going to happen on its own momentum.

8. Lessons Learned

- 136 One year is too short a time to achieve very much from a Project of this sort. Rapid deployment requires that much of the set-up activities be done before formal start-up – by the line agencies in collaboration with UNDP. Otherwise, goals have to be more modest.
- 137 Provision of the technology alone will not deliver EW system to end user communities – will not provide intended functionality unless protocols are also put in place. Besides the gauges and the radar, the satellite telemetry and Internet access, the computers and application software, the flood prediction modelling and composition of EW messages/ alerts, and the telecommunications, getting the message out to the community requires the establishment of a reliable and durable human/ technology interface with the rules for receiving and acting on the alerts. This is by no means a trivial aspect.
- 138 It is difficult for people who have no substantial income or livelihood to afford to be volunteers – however a matter of self-interest the cause might be. They must be able to subsidize the volunteer effort and time from independent earnings. This has implications for the sustainability of the EW system at the local community level in Ha iti and, to a somewhat lesser degree, Jamaica, where funding for maintenance of gauges and sites, and even for conducting the business of the local committee (Haiti) have been introduced as issues.
- 139 Achieving DIPECHO's fundamental interest in saving lives and property in the communities only partially relies on successful receipt of EW messages. It is vital to address the aspect of mitigation as well.

9. Recommendations

- 140 When projects of the kind are formulated, the proposers, before proceeding to execution and implementation, should obtain the express sign-off of line agencies and their ministries.
- 141 In future projects of like duration, the setting-up activities such as selection of candidate communities, baseline assessments, stakeholder agreements and establishment of PSC and PAC should be done before start of project, and probably as conditions precedent to disbursement. This would ensure that they are gotten out of the way quickly, so that project benefits for line agencies and target communities could begin to flow.
- 142 If inter-agency MOUs are an absolute requirement of the funding agencies, they should be kept as simple and as short as possible, making maximum reference to the underlying project document, to obviate the need for creative elaboration which sometimes alters the original thrust of the Project. This activity would also be better completed as a condition precedent to disbursement.
- 143 There should be more involvement of the communities in planning and decision-making activities, advantageously at the forum of the Project Advisory Committee (PAC). Treating them as partners rather than passive recipients of a benefit at the end of the line is likely to produce a better system of early warning.
- 144 The issue of sustainable funding for gauge and site maintenance on the Ravine du Sud (Camp - Perrin community) might be approached by exploring the placement of a one-time grant with the local Caisse Populaire, to be managed as part of its regular commercial credit activity, the earnings from which could be used to pay a stipend.
- 145 The Public Awareness activity should have a heavy emphasis on the target communities. The national audience should only be addressed afterwards, with a view to publicizing the pilot-community experience as a means of stimulating widespread adoption.
- 146 Funding should be sought at least to complete the pilot activity, and support more lateral technical assistance among the three countries. If similar systems have been established elsewhere in the region, e.g. Cuba, there should be a sharing of experience in that regard.
- 147 Taking into the account the size of Haiti, size of its rivers, frequency and scale of disaster events and their consequences, an additional local community should be considered for inclusion in any extension of the project. Choosing a border area would have the additional advantage of promoting closer collaboration between Haiti and the Dom Rep authorities.
- 148 On the matter of more substantive implementation of EW systems in the Caribbean, we do not see this being universally and faithfully followed without some kind of Regional project. EW systems will make use of both ground-based and radar sensing. The latter will optimally involve sharing of radar resources across borders. In this context, it would seem logical to seek to build a more organic link with the regional EU / CMO radar project. This would be very much facilitated by expanding the CMO to include all the countries of the Caribbean.
- 149 Disaster awareness imparts keener appreciation of the importance of good environmental practices - in such things as land use, and energy sourcing - as well as the possibilities of remediation. The need is probably most urgent in the case of Haiti. It turns out that, there are two NGOs operating in the Camp -Perrin area – one involved in sustainable agriculture and the other, a machine shop training facility (which can produce an inexpensive gas stove). We think these could, with some additional resources, be enlisted to make a meaningful contribution in this regard.

List of Persons Interviewed

Pedro River Community (Jamaica)

Alvin Clarke – Parish Disaster Coordinator (PDC), St. Ann (Parish Council)

Neresia Williams – Secretary of Pedro River Community Club and Disaster Preparedness Committee, shop owner/ proprietor

Harold Whitter – Key member of Club and Committee, local liaison for PDC, maintenance agent for Pedro River sinkholes.

Barrington Williams – Member of Club and Committee

Gervaise Smith 18 yrs. - Part time farmer

Rivoli/ Thompson Pen Community (Jamaica)

Evonne Mundell – Parish Disaster Coordinator (PDC), St. Catherine (Parish Council)

Donna Baker-Linton - Informal leader of community river watch/ early warning group, Parish Disaster Committee community affiliate, WRA community liaison (reads stream gauge)

Carmen Moulton - Member of informal community river watch/ early warning group, Parish Disaster Committee community affiliate, school caregiver/ caterer

Derrick Williams - Member of informal community river watch/ early warning group, Parish Disaster Committee community affiliate

Ann-Marie Cohen - Member of informal community river watch/ early warning group, Teacher

A group of young men – new recruits to informal community river watch/ early warning group (part of the group receiving training under Project)

Camp-Perrin Community (Haiti)

Mme. Yousson Finnigan - Organization pour la Rehabilitation d'Environnement (ORE)

Sebastien Delahaye - Les Ateliers-Ecole de Camp-Perrin (an NGO)

Maxime Dumont – Ingenieur Mecaniqu. Hydro.

Montuma Hebert – Relations publiques

Baptiste Buxout – Ingenieur Electricien

Town Hall of Camp-Perrin (Mairie de Camp-Perrin)

Gustave Jn Dunes - Maire principal

Marie Laurette Bellevue – 2nd Councillor

Leonie Louis Lorwinsky – 1st Councillor

Chery Fred - Relations publiques

Gerard Merson - Businessman / Community Supporter

Tamayo Community (Dominican Republic)

Domingo Seguro – President, Red Cross Committee

Several other members of the Local Red Cross Committee – young men and boys

Ramon Sena – Chairman, Local (Municipal) Defensa Civil Committee

Montecristi and Castanuelas Community (Dominican Republic)

Maximo Ventura - Chairman, Provincial Defensa Civil
 Fabiola Rivas - Asiste le Gobernadora Montecristi
 Gilna Felyse v du Molina - Auxiliary de Laboratorio (canselado)
 Justo R. Garcia S. - Ing., INDRHI (canselado)
 Members, Defensa Civil Local (Municipal) Committee of Castanuelas - representatives from Local Red Cross, Firemen, Mother's Club, Neighbour's Association

Water Resources Authority (WRA) (Jamaica)

Andreas Haiduk – Senior Hydrological Engineer

Office of Disaster Preparedness & Emergency Management (ODPEM) (Jamaica)

Barbara Carby - Executive Director
 Marlene Smith - Director of Training
 Ronald Jackson - Director of Operations

National Meteorological Service (NMS) (Jamaica)

Sylvia McGill - Director
 Reggie Campbell - Head, Radar Service

Ministry of Land & Environment (MLE) (Jamaica)

Philbert Brown - Senior Director, Emergency Management & Weather Services (oversight of ODPEM, NMS and Earthquake Unit), member of the Jamaica PAC for the Radar project

Ministere de l'Agriculture, des Ressources Naturelles et du Developpement Rural (MARNDR) (Haiti)

M. Pierre Karly Jean-Jeune, Directeur General Adjoint aux Amenagements et Valorisation des Ressources Naturelles (Oversight of SNRE)

Centre National de Météorologie (CNM) (Haiti)

M. Ronald Semelfort, Directeur-General

Instituto Nacional de Recursos Hidraulicos (INDRHI) (Dominican Republic)

Sr. Domingo Morillo - Director, Hydrology
 Sr. Antonio Ortiz - In charge of Hydrological Network
 Sr. Jose Raul Perez Duran – Gerente, Planificacion y Proyectos Especiales (Director of Planning and Special Projects)

Defensa Civil (DC) (Dominican Republic)

Major General Luis Antonio Luna Paulino - Director-General (also Chairman, Comision Nacional de Emergencias (CNE))
 Sra. Jacqueline Suarez - Training Coordinator
 Sr. Sergio Vargas - Director, Centro de Operaciones de Emergencias (COE), Comision Nacional de Emergencias (CNE)

Oficina Nacional de Meteorologia (ONAMET) (Dominican Republic)

Sr. Jose Duquela - Director-General (Representante Permanente)
Sr. Bolivar Ledesma - Director, Forecasting
Sr. Wagner Lorenzo - Forecaster
Sr. Francisco Holguin Castillo - Forecaster
Sr. Julio Ordonez - Technical IV

Programme des Nations Unies pour le Developpement (PNUD/ UNDP) (Haiti)

M. Bjoern Rongevaer - Representant Resident Adjoint (Deputy Resident Representative)
M. Arnaud Dupuy - Assistant Representant Resident, Responsable de l'Unite Environnement et Developpement Durable

Projet HAI/03/002 – Appui a la mise en oeuvre du Plan National de gestion des risques et des desastres (GRD project):

Mme. Julia Quillet -VNU - Specialiste en Gestion des Risques et Desastres, GRD project
M. Jean Renand Valiere -VNU - Coordonnateur Technique, GRD project

European Commission - Humanitarian Aid Office (ECHO), Caribbean (Dominican Republic)

Stephane Quinton - Regional Coordinator
Daniel Urena – Deputy Regional Coordinator

Vision Mundial (Dominican Republic)

Henry Pimental - Regional Operations

Radar Project Management

Lt. Col. (Ret'd) Stacey Thompson - Project Manager
Sr. Cesare Lopez - Training Coordinator
M. Pierre Baguidy - Coordonnateur Technique (Technical Coordinator), Haiti
Ms. Lois Morgan - Project Assistant

[Courtesy calls only]

Mme. Marie Alta Jean-Baptiste, Directrice a.i. (*ad interim* Director) de la Direction de la Protection Civile (DPC) of the Civil Protection Management), Haiti

M. Yvelt Chéry, Chef du Service National des Ressources en Eau (SNRE), Haiti

M. Rony Semexant, Assistant-Directeur, Centre National de Météorologie (CNM), Haiti

List of Abbreviations

BCPR - Bureau for Crisis Prevention and Response
CDERA - Caribbean Disaster and Emergency Response Agency
CMO - Caribbean Meteorological Organization
CNE - Comision Nacional de Emergencias (Dom Rep)
CNM - Centre National de Météorologie (Haiti)
COE - Centro de Operaciones de Emergencias (Dom Rep)
Dom Rep – The Dominican Republic
DPC - Direction de la Protection Civile (Haiti)
ECHO – European Commission Humanitarian Office
EW – Early Warning
INDRHI - Instituto Nacional de Recursos Hidraulicos (Dom Rep)
MOUs – Memoranda of Understanding
NDOs – National Disaster Offices
NGO – Non-Governmental Organization
NMOs – National Meteorological Offices
NMS – National Meteorological Service (Jamaica)
NOAA – National Oceanographic and Atmospheric Administration (USA)
NWOs – National Water Offices
ODPEM – Office of Disaster Preparedness and Emergency Management (Jamaica)
ONAMET - Oficina Nacional de Meteorologia (Dom Rep)
ORE - Organization pour la Rehabilitation d'Environnement (Haiti)
PAC – Project Advisory Committee
PDC – Parish Disaster Coordinator (Jamaica)
PMR – Prevention, Mitigation and Response
PNUD - Programme des Nations Unies pour le Developpement
PSC – Project Steering Committee
SNRE - Service National des Ressources en Eau (Haiti)
VNU - Volontiers des Nations Unies
WRA - Water Resources Authority (Jamaica)