

The Port Resiliency Program (PReP): Upgrading Latin American and Caribbean Ports

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ABSTRACT

Improving resiliency of airports and seaports can accelerate both humanitarian relief and economic and social recovery in regions struck by natural or manmade disasters. Ports are a critical element of effective disaster response, evacuation, and recovery. They are also essential to social and economic recovery following a disaster, especially on islands dependent on trade and isolated areas such as in the Latin America and the Caribbean region. The Port Resiliency Program (PReP) presents a practical framework to enhance port resiliency and improve evaluation to support continuous improvement. Approaches include analyzing strengths and weaknesses, fostering understanding, communication, and cooperation among stakeholders, caching essential resources ahead of time, building a comprehensive archive of literature, and targeting exercises to close gaps in preparedness.

Keywords

Port, seaport, airport, resiliency, preparedness, disasters

INTRODUCTION

When airports and seaports are hit by severe weather, problems multiply. Delays in evacuations and stalled delivery of critical food and supplies further immiserate stricken populations. Everyday commerce grinds to a halt. A cascade of hardships extends far beyond the severe damage of the original crisis. This paper describes a port resiliency program that has been designed for a particular region of the world—the Latin American and the Caribbean (LAC) region. This focus derives from the mission of the nongovernmental organization (NGO) that has created and developed the program; the NGO's humanitarian mission is focused entirely in the LAC region. However, the principles and procedures on which this program are built are applicable to all regions of the world and to all types of natural and manmade disasters.

Ports in the Latin American and Caribbean region are particularly vulnerable to disasters. Following the tragic events stemming from severe damage to the Toussaint Louverture International Airport in Port-au-Prince during the 2010 Haiti Earthquake, AmericasRelief Team (ART) initiated the Port Resiliency Program (PReP) to provide LAC ports with technical, material, and strategic support so that they can best address the complex challenges inherent in improving resiliency. The ongoing development, implementation, and maintenance of the PReP program will facilitate more timely and effective humanitarian relief efforts and reduce the social and economic collateral harm of natural and manmade disasters.

Seaports and airports are complex facilities: they both employ large numbers of workers, many of them highly skilled. They are both crucial social and economic hubs where transportation and communication connect. Both are built and maintained by large public and private investment. Their economic worth is staggering: ships and/or planes, valuable fixed facilities, complex technological infrastructure. Lastly, both kinds of ports are often iconic, representing the character and vitality of their cities, regions, and/or nations (Smith, Möhring & Link, 2013).

As was seen when both the Louis Armstrong New Orleans International Airport and Gulfport-Biloxi International Airport were severely damaged during Hurricane Katrina in 2005, ports may need extensive repairs be-

Proceedings of the 11th International ISCRAM Conference – University Park, Pennsylvania, USA, May 2014

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fore they can operate effectively following a disaster. They may also require additional personnel and equipment to expedite relief and recovery.

Even when ports lie far from the disaster zone, they can be essential to relief efforts and may need help handling increased demand (Smith, Möhring & Link, 2013). For example, while they are not at the center of the disaster, Mombasa and Djibouti in East Africa are currently facing added stress serving the chronic famine disaster in South Sudan (Smith, Möhring & Link, 2013).

Building resiliency yields benefits that range far and wide. A resilient port is able to survive stress and continue to function at a satisfactory level or be restored quickly to an acceptable level of service (Smith, Möhring & Link, 2013). Approaches to improving resiliency fall into five basic categories: policy, organizational (or relationships), procedural, structural, and defensive (Smith, Waggoner, Rabjohn & Bachar, 2008).

Areas of concern in the first three categories (policy, organizational and procedural) are relatively easy, inexpensive and quick to address if the port, its owners, operators, users and regulatory agencies can fully understand the need and work together to build plans and relationships that strengthen the port. For example, two approaches to improving resiliency that cut across all three categories are protection of key employees and their families and developing priority plans for competing use when a port is impacted by a disaster.

Conversely, structural changes are generally far more expensive and take much longer lead time. They involve wide-ranging issues such as building new disaster-resistant facilities, maintaining redundant facilities, and having spare parts on hand; initiatives regarding such issues often meet with political or economic resistance (Smith, Möhring & Link, 2013).

Regardless of the type of fix, the complexity of ports and the great number of stakeholders involved mean that any effective effort to improve port resiliency will require complex interactions among many partners: the owners and operators of the port, its regulators, the financial sector, normal users of the port, and out-of-the ordinary users such as humanitarian organizations. Given this complexity, public-private partnerships that incorporate multiple stakeholders can create a synergy that can yield great advantages for port resiliency (Smith, Möhring & Link, 2013).

The Port Resiliency Program determines specific vulnerabilities by gathering and analyzing quantitative and qualitative data unique to each port. It then applies industry-wide best practices to strengthen weak areas, following a continuous improvement approach. The overall goal of the program is to increase stakeholders' ability to protect essential personnel and to efficiently obtain, distribute, maintain, and restore critical resources before and after an emergency. Implementing the PReP program can standardize and streamline response, improve interoperability among stakeholders, and support a timely reopening of damaged ports with rapid restoration of everyday activity.

Background

Many Latin America and Caribbean (LAC) countries are vulnerable to the tropical storms which sweep through the region every June through November. Moreover, analysts forecast increased magnitude and frequency of extreme weather events in the coming years, as the world has witnessed with Superstorm Sandy in 2012 and Superstorm Haiyan in 2013. The LAC region is also prone to earthquakes, volcanoes, floods, and tsunamis. In addition, the growth of urban populations, poor construction, and poverty exacerbate the vulnerability of remote and/or low-lying coastal regions. The LAC has sustained devastating loss and fragmentation of families and communities over the past decades: from 1970 to 2000, natural disasters caused an estimated yearly average of 7,500 deaths, with an estimated annual average cost of between \$700 million and \$3.3 billion (Charveriat, 2000).

Healthy ports are at the economic heart of the areas they serve; this is especially true for island nations in the LAC, as they are heavily dependent on international trade. Damage to ports can not only impede response and recovery immediately following a disaster, but can also impact the entire region and society at large for an weeks, months, or even years following a disastrous event.

The tragic aftermath of Hurricane Georges illustrates the cascade of problems that can follow in the wake of damage to ports. Georges, a category 4 hurricane, swept through the LAC and the U.S. in 1998, killing 604 people and causing nearly \$6 billion in property damage. Sadly, crippled ports delayed humanitarian aid, distri-

Proceedings of the 11th International ISCRAM Conference – University Park, Pennsylvania, USA, May 2014

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bution of supplies, and deployment of essential personnel. Economic recovery slowed, worsening the impact on fragile island communities (Babun & Smith, 2013c). Analyses of the aftermath of Hurricanes Katrina and Rita, along with the Haiti earthquake of 2010 and Typhoon Haiyan in 2014, further illustrate how severely damaged ports can impede relief and recovery efforts.

While most LAC ports plan and prepare for disasters, current disaster risk management policies and practices remain inadequate, with local and regional planning, training, and drilling of standard operating procedures (SOPs) still evolving. PReP aims to foster the disaster resiliency of LAC ports by implementing a fully integrated strategy involving ports, state coordinators, government agencies, NGOs, logistics firms, and other stakeholders. An accelerated port restoration plan will increase resiliency and support disaster-stricken countries in reopening ports in a timely fashion. Humanitarian aid will reach vulnerable populations more easily, and local and regional economies will recover with fewer setbacks, protecting lives and livelihoods.

Building Port Resiliency

Following a disaster, port authorities can face complications due to a lack of sound policies, logistical preparedness, cooperation between agencies, etc. For example, following the Haiti earthquake, some essential personnel were caught between a rock and a hard place: they could leave their jobs to procure food and shelter for their loved ones, or neglect their families and stay at work to restore port functions so humanitarian aid could reach their communities.

PReP gathers information about port operations, analyzes it, and applies lessons learned and best management practices to improve LAC port resiliency. Resiliency is not static: rather, it is a dynamic characteristic of a healthy port that must be incorporated into every aspect of port operations, regularly assessed, and maintained. A resilient port avoids or mitigates damage and responds effectively to a severe event, re-establishing normal or near-normal levels of operations efficiently, and minimizing the damage to individuals and communities who depend on the port.

Because airports and seaports are large, publicly accessible, fixed entities, they are especially vulnerable in a crisis. Ports are complex, and vary widely: each is uniquely operated and regulated depending on geography, politics, and local regulations, and is comprised of a wide array of facilities and functions such as terminals, delivery areas, storage areas, communication and information systems, security, process control coordination centers, customs and border control, emergency response, and public and protected areas.

Similarly complex are the interdependencies among the various stakeholders, customers, clients, and the local community. All of these factors, taken as a whole, call for careful, considered, and creative planning for responding to crises. Human resources, the physical plant, equipment, administrative procedures, operational procedures, the legal environment, business continuity planning, and relationships with neighbouring agencies all need to be aligned with the probability that a major disaster will occur and be prepared to quickly and effectively address the varied situations that arise both during and after a crisis.

Risk management experts maintain that the most effective approaches to improving preparedness and resiliency in the face of both natural and manmade disasters is to implement strategies that emphasize

- careful assessment of vulnerability to natural disasters;
- implementation of prevention or risk reduction measures to avoid and/or mitigate damage;
- extensive advance preparation to ensure a quick and effective response to save lives and secure property; and
- proactive efforts to ensure that financing is available in advance to pay for rescue, recovery, and rebuilding (Conger, 2011).

THE PReP APPROACH: FOCUSED, INFORMED, LOCAL

PReP's fundamental approach is to assist airports and seaports in building on their existing strengths and identifying and addressing their logistical and strategic weaknesses. The program coaches participants in evaluating current plans and specific risks. Identified gaps are closed through custom-tailored training, exercise, monitoring, and mentoring, with a continuous improvement cycle ensuring that, as more ports are served, emerging best practices are shared and implemented.

Resiliency begins at the local level, for as local stakeholders work together to strengthen preparation, response, recovery, and mitigation practices, resiliency naturally emerges as a lasting and meaningful shared cultural val-

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ue. Individuals practicing and implementing preparedness learn the importance of resiliency from the ground up and have full ownership of the specific strategies they develop. Establishing sound working relationships and trust long before a serious event occurs forms strong strategic alliances that can remain flexible, creative, and effective when a disaster strikes.

Working from the local level promotes lasting community and national resiliency. Local alliances can create an integrated framework to bridge local and industry knowledge, capacity, and support with the necessary resources, yielding practical, sustainable, stable, and equitable measures to reduce vulnerability (Babun and Smith, 2013a).

PRéP helps airports and seaports build resiliency by improving interagency coordination and implementing relatively simple methods that economize on costs, labour, and time. To strengthen preparedness for effective disaster response at all levels, the program helps ports identify, assess, and monitor disaster risks; apply knowledge, innovation, and education to build a culture of safety and resiliency; and upgrade early warning systems. PRéP helps ports protect life, property, and community vitality by

- facilitating efficient procurement and distribution of humanitarian aid and other goods following a crisis;
- protecting vital transportation infrastructure;
- making disaster risk reduction a top port priority with a strong basis for implementation;
- decreasing recovery time following a disaster;
- improving information sharing and alternative communications;
- helping ports build sounder relationships with local and national agency partners and private sector stakeholders such as airlines and maritime companies;
- helping coordinate timely resumption of commercial service with extraordinary relief activities during disaster response and recovery;
- developing a centralized archive for plans, SOPs, checklists, and related materials to build knowledge, facilitate innovation and collaboration, and establish baseline capability and maturity levels; and
- promoting mutual aid among regional and global networks of ports.

Table 1 illustrates how identified needs are addressed by the PRéP approach.

The Need	The PRéP Solution
Non-formalized, inadequately communicated standard operating procedures (SOPs) create a disjointed, hurried response, particularly in the early phases of recovery.	✓ A planned, well-communicated set of SOPs provides a valuable roadmap for essential port personnel. Procedures are formalized, and the approach is unified and coordinated. Disaster response practices are coordinated with Strategic Operations Centers' (SOC's) pre-positioned goods as well as with the efforts of all partner alliance organizations.
Port personnel are inadequately trained.	✓ Trained port personnel with a full understanding of SOPs, including how to best use materiel in the SOCs, are on standby for short-notice dispatch in the face of a disaster.
Key participating organizations (vendors, suppliers, local government, NGOs, Consuls General, etc.) lack coordination.	✓ An alliance of organized, mapped member organizations coordinates and harmonizes efforts, preventing confusion and redundancy.

Table 1. The PRéP Approach (Babun & Smith, 2013a)

PRéP is compatible with the United Nations' Office for the Coordination of Humanitarian Assistance (UN OCHA) and the USAID's Office of U.S. Foreign Disaster Assistance (USAID/OFDA) programs aimed at saving lives, alleviating human suffering, and reducing the social and economic impact of disasters in the LAC region. These programs support disaster risk reduction (DRR) by enhancing local and national self-sufficiency in disaster preparedness and management via risk identification, prioritization, and reduction, as well as post-disaster recovery and short-term rehabilitation projects.

The PRéP Framework

While ports vary widely across the globe, core preparedness, response, recovery, and mitigation principles universally apply. Most challenges ports face during disasters are related to six factors: loss of or injury to 1) infrastructure, 2) communications, 3) information gathering and analysis, and 4) essential personnel. Problems can

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be exacerbated by 5) poor interagency coordination and information gathering, as well as 6) lack of specialized equipment needed to unload vehicles that are not typically used during normal operations.

While the goal of perfect resiliency is more ideal than real, improved resiliency is indeed possible. With PReP's assistance, LAC ports can create coherent and robust plans and relationships to foster long-term resiliency. The program utilizes a systematic process to lead managers into insights regarding their ports' unique strengths and weaknesses as they relate to risks. The universal concepts of Business Continuity Planning (BCP) and Continuity of Operations (COOP) analyze an organization's capability to withstand unexpected shocks, repair itself when necessary, and thrive when conditions are optimal. Applying these concepts to real-world challenges can support large and small ports in becoming more resourceful, proactive, and flexible when facing the unexpected and changing circumstances of disaster response.

Following the initial risk assessment, ports can then take the necessary steps to build strengths, correct weaknesses, and develop more effective continuity plans to address all six of the most common challenges.

Participation in PReP is completely voluntary and separate from regulations. Once a port requests assistance, the following four-phase process unfolds.

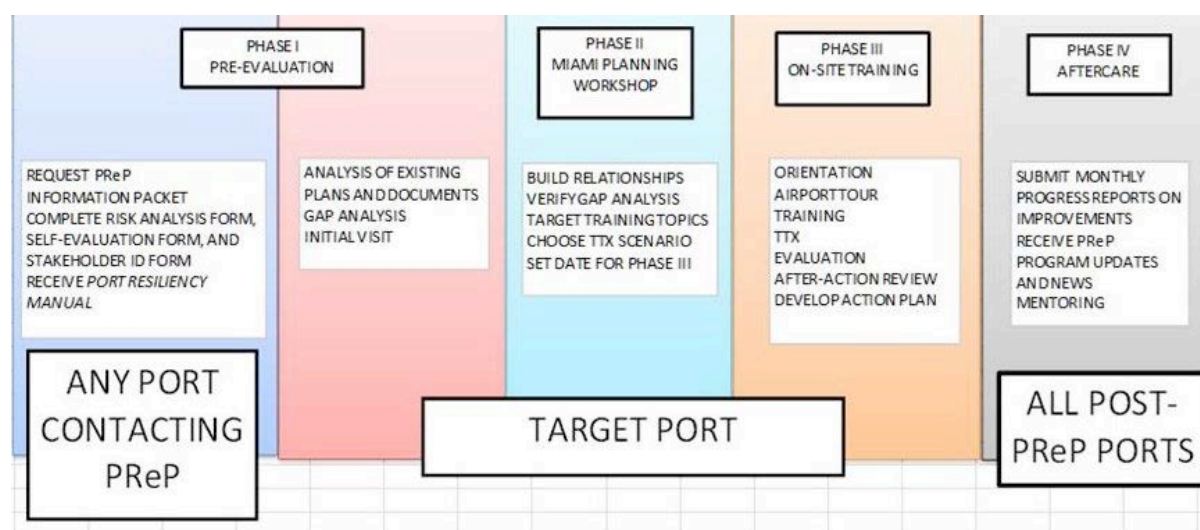


Figure 1: The PReP Process (Babun & Smith, 2013b)

While the same basic principles of preparedness apply to all types of ports, the use of a single framework does not imply that identical procedures should be enacted at every port. In short, there is no “one size fits all” approach. Each port is guided to customize the basic PReP framework to match its own specific capabilities, situation, and risk profile. General best practices are blended with tailored training and assistance to identify specific critical issues regarding response and recovery and address the unique needs of each individual port.

The PReP framework is built upon a consistent definition of port preparedness following recognized industry standards. This universal definition of “resiliency maturity” (ASIS, 2012) allows ports to establish benchmarks, which in turn allows comparison of performance among ports with similar characteristics. PReP's proactive process employs adaptive management techniques, with lessons learned shared among all ports in the program. A cooperative learning network of ports can emerge from working with common benchmarks to identify pressing issues and share knowledge and experience over time.

Practice is key to preparedness. After identifying critical needs and vulnerabilities, ports troubleshoot and/or validate plans through exercises, drills, and simulations to enhance proficiency, identify gaps and weaknesses, organize and test response capacity of all stakeholders, and increase the confidence of both the port and its surrounding local community in perceived resiliency. Through joint exercises, participants have the opportunity to experience meaningful cross-departmental contact, improve competence, and build the communication networks and trust that are central to effective response during stressful situations. Exercises provide a practical platform for participants to identify deficiencies in mission-critical recovery functions and revise protocols and policies accordingly.

After completing the initial review process, PReP provides participating ports with a Critical Supplies Container (CSC) which resides on site. The contents of the CSC are identified during the PReP process and customized to address the specific needs of the port, with the overarching goal of maximizing resiliency in the face of an

emergency. CSCs are stocked with equipment and supplies not only to support continuity of operations, but also to meet the basic needs of critical personnel and their families, for when staff are assured that their own and their families' basic needs are taken care of, they can focus their full attention on port restoration. The CSC increases port functionality during extreme events by eliminating logistical delays, allowing more efficient response and recovery efforts.

Completion of the PReP program yields lasting, beneficial outcomes. Participants at the local level increase formalized knowledge regarding continuity and preparedness. Following a maturity model for preparedness brings an inherent discipline to the planning process, leading to more effective and efficient operations during emergency situations.

Moreover, ports and stakeholders more fully understand their critical roles during a disaster. Knowing precisely which actions to take decreases anxiety and confusion during extreme events and increases the probability that stakeholders will initiate and sustain focused, effective action. Vendors, users, and the community at large benefit from sharing interdependencies in mission critical functions.

Communication and Cooperation are Central to Resiliency

For decades, AmericasRelief Team has brought large and small entities together to work toward common goals in providing humanitarian relief. They have applied their expertise to helping private sector organizations, public agencies on the ground, and public agencies in the U.S. harness the strengths of each organization and create a synergy of effective approaches. Following the models of UN OCHA's and USAID/OFDA's community resiliency programs, AmericasRelief Team utilizes PReP to engage communities, local and national governments, international and regional organizations, and non-governmental organizations to develop effective strategies tailored to improve port resiliency and disaster response. PReP supports capacity development; strengthens the linkages between risk identification, monitoring, early warning, and early action systems; and expands partnerships and joint programming between ports and their stakeholders.

PReP's role is supportive, not proscriptive. Therefore, the port itself, not PReP, identifies key stakeholders. Regulatory agencies and aid organizations may participate in or observe training or exercises, but only with the port's consent. Generally, the main stakeholders for ports are threefold:

- 1) ports, their tenants, mutual aid partners, and communities;
- 2) academic institutions and universities; and
- 3) acting partners, organizations providing materials and curriculum, local and national governments, international and regional organizations, and non-governmental organizations.

Public-private partnerships yield great benefits, for each sector contributes diverse skills and resources, with the result being that the whole is greater than the sum of its parts. The PReP Team is a strong public-private partnership comprised of the following participants:

- Private Non-Profit Organization: AmericasRelief Team
- Private Corporations: FedEx Corporation; AERODOM; American Airlines; Smith-Woolwine Associates
- Public Agencies: Miami-Dade County (Miami International Airport; Port of Miami; Miami-Dade Fire Rescue); Florida International University
- Observers and Advisors: U.S. Government (Southern Command [SOUTHCOM]; Federal Aviation Administration (FAA); State Department; Department of Commerce; Caribbean Community (CARICOM) and its Caribbean Disaster and Emergency Management Agency (CDEMA); Airports Council International (ACI); Airports Council International-Latin America and Caribbean (ACI-LAC); International Air Transport Association (IATA); Latin American and Caribbean Air Transport Association (ALTA)

Florida International University (FIU), Miami International Airport (MIA), and the Port of Miami complete the PReP Team. Following the pilot study described below, the company operating Las Americas International Airport also joined the team; new members are welcome as PReP evolves.

PReP Pilot Study

The PReP training team successfully completed a pilot program at the Las Americas International Airport and its corporate owner, AERODOM, in Santo Domingo in the Dominican Republic in February 2013. Following the original PReP outline, the pilot study included three major activities:

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1. Evaluation of plans and programs using both internal review by the airport staff and external review by external airport emergency management experts working as volunteers.
2. A planning workshop to examine the evaluations of plans and programs, identify gaps, and plan a customized training program to address the gaps.
3. Delivery of the customized training with a final evaluation of its effectiveness using a detailed table top exercise.

In addition, all participants in activities 2 and 3 were surveyed immediately upon completion to evaluate the effectiveness of the training and exercise and separately to evaluate the overall shape of PReP and identify needed improvements.

AERODOM provided complete sets of emergency and operational plans as well as answers to a risk assessment questionnaire, an inventory of emergency equipment, and a self-evaluation of preparedness. In addition, AERODOM identified the key stakeholders.

The planning workshop in Miami in December 2012 identified gaps in preparedness through both self-evaluation and outside expert evaluation. The gaps and evaluations were discussed in detail by the full range of stakeholders. Specific training was designed to address identified gaps and enhance capabilities. The major gap areas verified in the workshop were protection of essential employees, alternative communications in disasters, pre-contracting for materials and services to repair the airport, and relationships among the stakeholders.

In February 2013, the PReP Team, expanded by volunteer expert instructors, delivered the customized training for the four gaps to local emergency response stakeholders, responders, military, and government personnel in Santo Domingo. At the conclusion of the training, a half-day tabletop exercise (TTX) to test the extent of learning achieved. The TTX scenario of a major earthquake with subsequent tsunami was chosen because it is the airport's second highest risk. Las Americas International Airport's greatest risk is a hurricane, but the airport has outstanding plans and preparedness for a hurricane, whereas earthquake preparedness was a gap reviewed in the external review of the airport's emergency plans.

Stakeholders involved in the pilot project included AERODOM airport and corporate operations, security, and safety personnel. Senior representatives from the Dominican Republic's national agencies involved in airport regulation, air traffic control, aviation and transportation security, emergency management, and law enforcement also participated. Two airlines and the main customer service concessionaire at the airport rounded out the diverse group of stakeholders participating in the TTX.

Participant feedback on the pilot test validated the PReP approach and pointed to necessary improvements going forward: expanding training menu topics, establishing mentoring of new airports by PReP alumni airports, providing more structured follow-up during the aftercare (Phase 4) stage, and facilitating the advancement of airport-to-airport mutual aid (Babun & Smith, 2013a). Since the pilot project of all the recommendations made during the after action review have been incorporated in PReP.

CONCLUSION

Immediately following a disaster, ports are critical in the delivery of humanitarian aid and maintenance of public health and safety. In the weeks following a disaster, families, livelihoods, communities, and the overall social and economic viability of a region greatly depend on the ability of ports to resume normal operations in a timely manner.

The current local response capacity of Latin American and Caribbean airports and seaports can be rapidly overwhelmed in the face of severe disasters, especially when damage is sustained to basic infrastructure. The mission of the AmericasRelief Team's Port Resiliency Program (PReP) is to systematically upgrade the disaster readiness of airports and seaports in the LAC region in order to swiftly revitalize the logistics supply chain following a disaster, facilitating prompt delivery of aid to stabilize traumatized communities. A heightened proactive stance and effective regional response can ensure that ports are fully operable as quickly as possible, maximizing the timely delivery of critical humanitarian aid to local communities while minimizing avoidable hardships that can unfold in the wake of a disaster.

PReP applies lessons learned and best practices to create, develop, and disseminate state-of-the-art disaster mitigation standard operating procedures and training. PReP's approach promotes capacity building, implements resiliency assessment and planning activities, and provides post-disaster technical and commodities support. With a multi-agency articulation, the program creates effective policies and procedures for disaster mitigation

and port reconstruction that can be communicated to essential port personnel via realistic training, drills, and practice.

Full implementation of PReP can accelerate port restoration following a major crisis. Strong, resilient ports protect vital assets and interests, and they help communities bounce back from disasters. But most of all, strong ports save lives.

ACKNOWLEDGMENTS

We thank FedEx for funding the development of PReP and the execution of the pilot project at Santo Domingo. Thanks also to AERODOM, the national agencies of the Dominican Republic, and other participants in the pilot project. Adam Widera, Daniel Link, and Bernd Hellingrath provided helpful suggestions. Lastly, we wish to thank our editor, Carol White.

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