INFRASTRUCTURE

International Recovery Platform

Today's Agenda

Introduction

Infrastructure in disaster recovery context

Infrastructure in the long-term recovery context includes: repair, replacement, and reestablishment:

- Transportation (road, air, sea, riverine)
- Communication (telephone, internet, radio)
- Energy (mines and extraction, refineries, generation, transportation, transmission)
- Water (treatment, distribution)
- Sanitation
- Commerce (Finance, banking, ports)
- Governance
- Education
- Health (clinics, hospitals) and public health
- Agriculture and food

Introduction

Challenges to Infrastructure Recovery

- **Pressure to Quickly Reinstate Infrastructure Services and Components**
- **Technical Planning Expertise**
- **Informal Settlements**
- **Inequality in Access to Repaired, Reconstructed, or Upgraded Infrastructure**
- **Availability and Cost of Building Materials and Labor**
- **The Loss of or Reclassification of Land**
- **Community Dynamics**

RECONSTRUCTION PLANNING, PRIORITIZATION, AND COORDINATION

Issue 1 : Reconstruction Planning, Prioritization, and Coordination

- **Pre-Disaster Recovery Planning**
- **Coordination of Infrastructure Recovery**

The recovery coordination group may perform many of the following functions:

- Collate damage and needs assessment data
- Guide and facilitate the recovery planning process
- Establish recovery and risk-reduction goals
- Centralize information on relief and recovery resources and services
- Minimize duplication, redundancy, or inefficiencies in services
- Adjudicate complaints, grievances, and other concerns of affected individuals and groups

Issue 1 : Reconstruction Planning, Prioritization, and Coordination

- **Prioritization of Infrastructure Recovery**

Factors that shape prioritization of infrastructure reconstruction:

- Criticality of the services provided by each infrastructure component in relation to – life safety, national security, community function.
- Proposed movements of populations
- The need for additional study to determine hazard mitigation options, modernization options, longer-term development goals
- The availability of reconstruction funding, materials, labor, and expertise
- The legal constraints, such as land ownership and reconstruction responsibility (in the case of privately-owned infrastructure)

Options

1. **Reconstruction Coordination and Planning (**Case 1, 3, 5,7, 8,)
2. **Prioritization and Infrastructure Inter-Dependency** (Case2, 4, 6, 7, 9,)
3. **Developing Reconstruction strategies** (Case 10)

Case 1: Earthquake and Tsunami, Indonesia, 2004

Topic: Reconstruction Coordination and Planning

Recognizing that infrastructure reconstruction was being addressed by a number of different stakeholders, the Government of Indonesia established policies for reconstruction that set standard for work in both 'Built Up Areas' (**BUA**) and at the '**plot level**'. The policy affected several different infrastructure sectors - Water supply, Drainage, Roads and pavements, Sanitation, Electricity distribution

Lessons

- Infrastructure planning is more effective when it looks at wide (regional) areas of service rather than individual plots, small communities, or even individual settlements.
- Nongovernmental organizations involved in reconstruction of infrastructure must be closely aligned in their efforts with area-wide infrastructure reconstruction planning efforts and outcomes.

Case 2: Hurricanes Katrina and Rita, Gulf Coast, USA, 2005

Hurricane Katrina resulted in the devastation of much of the transportation infrastructure in the southern portion of three large US states: Mississippi, Louisiana, and Alabama.

Electrical power failures caused the shutdown of ports, railroads, refineries, and pipeline stations that **were not significantly damaged by the storms**, and were cited as the number cause of delays in the restoration of transportation services in the Gulf Coast region. Highways and arterial roadways need electrical power to operate traffic lights and signs; railroads need electrical power to operate signal systems and crossing gates; ports need electrical power to operate cranes and elevators; and pipelines rely upon electrical power for the operation of the pumping stations.

Transportation planners and emergency managers, need to pay as much attention to restoration of power systems as to freight and passenger transportation systems.

A primary factor hindering efforts to resume transportation services was the lack of workers. Truck, port, railroad and pipeline employees lost family and homes in the storm, and many evacuated the region. In August 2006, a year after the storm, the population of New Orleans was estimated at 250,000, about half of the pre-Katrina total. Major transportation companies brought in workers and provided them food and accommodation for months in order to staff reconstruction projects.

Lessons

- The prioritization of reconstruction and repair efforts, is often interlinked with other sectors.
- A lack of infrastructure can result in out-migration of displaced persons, which exacerbates the problem of labor force shortages.

Case 3: Wenchuan Earthquake, China, 2008

The Government of China State Council issued a detailed document "The Regulations on Post-Wenchuan Earthquake Rehabilitation and Reconstruction" on June 8, 2008, about one month following the event. These regulations provide a degree of coordination and standardization for the post-earthquake rehabilitation and reconstruction efforts.

In addition to the central and local government participation, best practices and commentary from the international community was solicited and incorporated. Of particular importance was a program initiated by the central Government which established an innovative assistance mechanism through which 19 provincial-level administrations were paired one-to-one with each of the 19 most significantly affected counties.

Lessons

- Governments can issue reconstruction guidance and make regulatory actions in order to establish base standards for reconstruction efforts.
- Technical and planning assistance can be tapped by instituting a program of 'city pairs' wherein affected cities and region are paired with unaffected cities for the provision of financial and technical support.

Case 7: Great Hanshin Earthquake, Kobe, Japan, 1995

The national government prioritized the replacement of the public infrastructure. However, given the scope of work, there was an acute **need for technical assistance**.

To address a shortage of qualified technical expertise, and much needed funding, the national **Ministry of Construction** was tasked with assisting the city and prefecture with reconstruction.

One month after the event, the national government formed a "**reconstruction committee**" to organize recovery efforts. This body was created through national legislation that required the participation of numerous national, prefectural, and local agencies as well as nongovernmental organizations (e.g. the Kobe Chamber of Commerce and Industry.)

The Prime Minister personally managed the committee, and the Chief Cabinet Secretary and Minister of the National Land Agency served as deputy managers. The reconstruction committee also included representation from cabinet ministers, the governor of Hyogo prefecture, and the mayor of the city of Kobe—as well as participants from academia.

These officials and stakeholders collaborated to create a national plan of action for recovery. This plan included broad proposals for how the national government would assist in recovery. In addition to providing an action plan, this committee also reviewed Hyogo Prefecture's and the city of Kobe's recovery plans to help localities align their recovery proposals with the funding priorities of the national government.

Lessons

- Heavy infrastructure damages necessitate demand for technical specialists
- National government agencies/ministries can be a valuable source of technical assistance
- Large infrastructure planning efforts require significant national funding and participation from the highest levels of government and from the affected local jurisdictions
- Multi-sector participation in recovery planning committees can help to quickly achieve consensus, and to more accurately determine priorities

Case 9: Earthquakes California, USA

The Loma Prieta earthquake occurred on October 17, 1989 and The Northridge earthquake occurred on January 17, 1994 in California.

In the first case, one example of **delays** included a peer review which was established by Caltrans immediately following the Loma Prieta Earthquake. The team was to review aspects of the reconstruction; however, they did not convene until several months after the earthquake. Following the review, many repairs that had already begun, had to be redone or abandoned, resulting in substantial delays.

Following the second earthquake all efforts focused on **avoiding bureaucracy** by streamlining processes The governor exercised **emergency powers** to significantly reduce the time required to issue construction permits. Some contracts were awarded the same day as the bid opening. **Innovative financing** contributed to the success - Contractors incurred significant expenses using double-shifts, 24/7 use of equipment, and by paying premiums for immediate deliveries of materials. To alleviate potential cash-flow issues, payments to contractors were made in two-week increments instead of one month.

Lessons

- Input from private infrastructure and **industry representatives** will help guide the reconstruction and recovery planning process
- Reconstruction planning should seek to **streamline processes** and eliminate bureaucracy
- **Permit fast-tracking** procedures may be developed to address work pertaining to critical infrastructure resumption work
- Contracting in recovery and reconstruction differs from typical job-specific contract needs, and should therefore be adjusted to increase efficiency given the long-term nature of equipment and supply needs

FUNDING INFRASTRUCTURE CONSTRUCTION

Issue 2 : Funding Infrastructure Construction

1. **Insurance**
2. **Government-based emergency relief funds**
3. **Donations**
4. **Loans (including the reprogramming of existing development loans)**
5. **Catastrophic bonds and weather derivatives**
6. **Private development funding**
7. **Development Incentives**
8. **Tax increases**
9. **Remittances**

Options

1. **Disaster Financial Agreements (Case 11, 19)**
2. **Donations (Case 12)**
3. **Loans (Case 13)**
4. **Cost Share (Case 14)**
5. **Financial Incentives (Case 15)**
6. **Reconstruction Loans (Case 16)**
7. **Diaspora Bonds (Case 17)**
8. **Incentives (Case 18)**

Case 11: Multiple Events, Canada **Topic: Disaster Financial Agreements**

When response and recovery costs exceed what individual provinces or territories could reasonably be expected to bear on their own, the Disaster Financial Assistance Arrangements (DFAA) provide the Government of Canada with a fair and equitable means of assisting provincial and territorial governments.

Through the DFAA, assistance is paid directly to the province or territory—not directly to the individuals or communities.

The Government of Canada may provide advance payments to provincial and territorial governments as the reconstruction of major infrastructure proceeds and funds are expended under the provincial/territorial disaster assistance program.

Lessons

- Special national-level financial arrangements can help fill gaps for local and regional governments
- The special nature of disaster-related financing requires that established mechanisms for eligibility, disbursement, and reimbursement are all established prior to the onset of an actual disaster

Case 12: Wenchuan Earthquake, China, 2008

Key Issue: Donations

In August 2008, the **IKEA Social Initiative** joined UNICEF's relief efforts and made an in-kind donation to support interventions in education, water and sanitation to 39 schools affected by the quake in Gansu province.

As a result of these joint efforts, some 10,000 students from poor rural areas have been able to return to school. In **Gansu**, 6,000 school buildings were damaged beyond use, and there were too few resources to deal with the impact.

The IKEA/Unicef partnership provided temporary classroom buildings. The prefabricated classrooms – which are equipped with quality education supplies, books and furniture – were designed to be used for at least three years, until more permanent government school buildings are constructed.

Children using them benefited from safe drinking water, sanitary latrines, washing facilities and waste disposal systems that they didn't have before the earthquake. In addition, teachers and principals were trained in child-friendly approaches to learning.

Lessons

- Major private sector stakeholders will often contribute to recovery in the communities where they operate, especially with **in-kind assistance**
- Recovery planning committees can **promote public private partnerships**

Case 13: Earthquake and Tsunami, Banda Aceh, Indonesia, 2004

Topic: Loans

In order to address the financial implications of reconstruction, the Government of Indonesia consistently applied **investment principles** that were based on a **balanced consideration** of economic, technical, environmental, social, cultural and religious factors. They used the following strategy in their funding decisions:

1. Conducted economic, technical, environmental, social, cultural and religious feasibility studies for every development activity (notably those concerned with the development of new facilities)
2. Conducted **public consultation**, which among others things explored and accommodated local cultural and religious preferences and values

Significant sources of funding to pay for the rehabilitation and reconstruction efforts came from the **reprogramming** of Asian Development Bank (ADB) **loans**.

Lessons

- Infrastructure funding decisions should be based on a balanced consideration of economic, technical, environmental, social, cultural and religious factors
- Reprogramming of development loans may not only be necessary, but also preferable, especially when the original project goals are significantly impacted by the disaster event
- Reprogramming of all loans should take place in a coordinated fashion with nationwide priorities in mind

Case 14: Loma Prieta Earthquake, California, USA,

Topic: Cost Share

The Loma Prieta earthquake damaged several major transportation structures including the Cypress Expressway.

The California Department of Transportation (CalTrans) worked with the Federal Highway Administration (FHWA) to finance the replacement of the Cypress Expressway with a **cost-sharing ratio of 90 percent of the funding from the federal government and 10 percent from the state.**

Lessons

- Cost-sharing can **increase** the amount of funding available
- Cost sharing mechanisms will require greater consensus of the affected populations which will bear some of the reconstruction costs in form of **taxes**

Case 15: Northridge Earthquake, California, USA, 1994

Topic: Financial Incentives

The earthquake forced closure of four major highway corridors that carried over 780,000 vehicles per day. This caused significant disruption to commuting patterns as well as the transportation of freight.

The city placed **priority** on the replacement and **restoration of highway** infrastructure in order to ensure the protection of **economic recovery**. To expedite the completion of highway rebuilding projects, the California Department of Transportation (CalTrans) included financial incentives in its contracts. Under this approach, **bonuses** were available to each contractor who completed projects early. CalTrans calculated bonuses based on analysis of **economic cost** incurred to the region **as a result of the disruption** to traffic and associated delays. These incentives allowed the city to restore freeways within a few months.

Lessons

- Prioritization of transportation infrastructure recovery may be required to protect economic drivers
- Investment in financial incentives for rapid completion of infrastructure reconstruction contracts can help to provide the affected population with a resumption in infrastructure services quickly

Case 17: Earthquake, Haiti, 2010

Topic: Diaspora Bonds

Following the earthquake in Haiti, remittances were expected to surge 20%. Prior to the quake, remittances already constituted between 25 and 50% of national income. While a rise in remittances is common after disasters, Haiti represented the first time the restoration of remittances services was seen as a critical part of disaster relief and response. The World Bank explored the role that a wealthy national diaspora living in the United States, Canada, France and other countries continues to play in Haiti's recovery.

The World Bank proposed Haiti issue reconstruction diaspora bonds to tap the wealth of the diaspora. This group is typically more willing than other foreign investors to lend money to the affected national government at a cheap rate.

Lessons

- Remittances can be valuable source of reconstruction funding, but reliable mechanisms that allow for contributions in this manner must be established
- Diaspora bonds must be issued by a credible organization

Case 19: Wenchuan Earthquake, China, 2008

In China, a program that pairs cities of differing economic status called "**twinning**" has been implemented. This program has helped in providing badly needed financial and **technical assistance** to disaster-affected areas from a pre-established partner province or municipality.

This mechanism pairs a more affluent province with a province of lower economic status. The agreement involves the diversion of **one percent of the annual GDP** and technical capacity of the wealthier province to fund recovery projects in the disaster affected province for a period of three years.

Ultimately, this partnership serves a mutually beneficial purpose in that it bolsters the recovery of the disaster affected province while using the surplus capacity in the donor province.

Lessons

- Twinning provides benefit to both recipients and donors.
- Twinning provides a stable source of funding for a number of years, which is pre-agreed before a disaster allowing for fast and predictable deployment.
- Twinning helps cope with the increase demand needed for skills after a disaster as well as building these capacities.

Case 19: Wenchuan Earthquake, China, 2008

UPGRADING OF INFRASTRUCTURE

Issue 3: Upgrading of Infrastructure

There are three primary motivators for modernization of infrastructure. These include:

- **Expansion of Access**: Communities can expand faster than the infrastructure built to serve them. E.g. road capacity
- **Modernization**: Technological advances can improve the efficiency and output of infrastructure. E.g. internet and telephone systems
- **Risk Reduction**: Knowledge of infrastructure risk increases with scientific analysis and time. To meet that risk, systems are modified to minimize the chance that a disaster might disrupt services. E.g. aerial and buried telephone lines

Options

- **Improved Infrastructure Access** (Case 20)
- **Infrastructure Modernization/Infrastructure Risk Reduction** (Case 21, 22, 23, 26, 29)
- **Prioritization** (Case 24)
- **Hazard Resistant Design and Materials** (Case 25)
- **Infrastructure Modernization and Expansion of Infrastructure Access ((**Case 27)
- **Hazard Risk Reduction** (Case 28)

Case 22: Tsunami, Sri Lanka, 2004 — Infrastructure Modernization / Risk Reduction

Cost estimates of infrastructure reconstruction in Sri Lanka were not based on replacement cost of what was damaged, but rather on the cost of upgrading infrastructure to meet modern standards and increased resilience to future hazard risk.

Water Supply and Sanitation – restoration of services and meet needs of **10 year** planning

Roads and Bridges - There was a recognized need to upgrade national roads to a uniform standard, including widening of embankments and carriageways to 2 lanes, repairing pavement and drainage, adding flood protection measures

Railway. Railway tracks, signaling and communication systems were improved.

Lessons

- Cost estimates should look not just at **replacement** but rather at improvement and upgrading to meet future needs, modern standards, and a reduction in risk.
- Contracting **Processes** are time consuming and impractical for post-tsunami re-construction activities which has to be completed within a very short period. Promotion of a **Turn-Key Approach** provided a much faster alternative. This enabled donors to make decisions on their own with respect to purchase of equipment, selection of contractors/sub contractors and awarding of tenders. In addition, a special group of officers was assigned to tsunami related activities at each ministry and agency levels.

Case 26: Earthquakes (multiple), Turkey, 1990's — Topic: Infrastructure Modernization

In rural areas, many **barns** had collapsed as a result of the 1990's earthquakes. In response, the Government of Turkey and the World Bank initiated a project to fund the reconstruction of barns, to restore some of the lost capital resulting from a loss in agricultural infrastructure. However many barns were used for purposes other than housing livestock because the barns as designed were **not warm enough** for the livestock, thus they had been used for other purposes. This experience highlights that a certain degree of caution must be taken when introducing innovation when rebuilding infrastructure. Introducing new, untested infrastructure methods or designs involve careful analysis which may delay reconstruction. If this level of analysis is not completed, the reconstructed infrastructure may not meet expectations. In reconstruction work, relying on simple, well tested and easily scalable solutions may be more efficient if an appropriate level of analysis on innovation is not available.

Lessons

- The introduction of **innovative yet untested** infrastructure can result in negative impacts
- In the absence of analysis on the expected outcome of innovative infrastructure technology applications, it may be preferable to rely on simple yet known solutions

Case 27: Earthquake, Bhuj, India, 2001 — Infrastructure Modernization

Bhuj Municipality was almost paralyzed. Many municipal buildings were destroyed, and records were lost.

The municipality lost several staff, and other staff members lost their families and suffered injuries. The government established the Gujarat State Disaster Management Authority (GSDMA) to finance and oversee the entire post-disaster reconstruction project in the State.

Government created Area Development Authorities in Bhuj, Bhachau, Anjar and Rapar under the provisions of legislation. The ADAs were made responsible for implementing town planning proposals and ensuring adherence to improved regulations.

Lessons

- Local municipalities that suffer a loss in technical staff, especially from within government offices, may be incapable of assuming a lead role in long-term reconstruction of damaged or destroyed infrastructure; in such cases outsourcing may be necessary
- Social infrastructure assets, such as schools, hospitals, community halls, and others, can provide immense protection in the aftermath of a disaster if they are designed to withstand hazard forces, and as such reconstructed facilities should be built with this alternative use in mind. Such infrastructure should be built to higher standards of resilience, as done in India and China

Case 27: Earthquake, Bhuj, India, 2001

Infrastructure Modernization

Case 28: Tsunami, Maldives, 2004

Topic: Hazard Risk Reduction

The Government of the Maldives introduced a number of strategies through which communications may be better maintained in emergencies in future events. These include:

- **Increased Use of Satellite-Based Handheld Phones.** To have one satellite phone in each of the inhabited islands.
- **HF radio transceivers.**
- **CB radio transceivers.**
- **VSAT.**
- **Optical Fiber.**

Lessons

- Improvements in telecommunications infrastructure can help to **link previously isolated** regions
- **Vulnerable** infrastructure **nodes** puts the entire infrastructure network at risk; as such, reconstruction efforts must place special care in ensuring that these vulnerabilities are addressed in planning
- The **speed** with which **communication technology** advances mandates that technological advancements be applied in the reconstruction plans that are formulated

LABOR, MATERIALS AND TECHNICAL ASSISTANCE

Issue 4 : Labor, Materials and Technical Assistance

Personnel are needed for design, demolition, cleanup, manufacturing of materials, structural repair, construction, supervision, inspection, ancillary support (e.g. meals and lodging support), etc. The most important personnel **source** is the **affected region** itself. The second largest pool of personnel is drawn from the **governmental** (affected government and bilateral assistance) and **nongovernmental agencies**. **Private contractors** from around the country and the world may be lured with the promise of recovery dollars.

Of concern to recovery planners is keeping **recovery funding** where it is needed most – in the **affected community** itself. It is of dire importance to the economic balance of the community that the use of local labor is utilized in such a way as to avoid negatively impacting livelihoods. When recovery labor schemes offer **salaries** that exceed market rates, workers can be drawn away from their jobs thereby causing the **weakening of other markets**.

Similar issues with **material** – local use, appropriate for the climate, workers familiarity with the material, recycling, etc.

Options

- **Labor, Materials and Technical Expertise** (Case 30, 31, 32, 33, 34)
- **Reconstruction Materials** (Case 35)

Case 30: Matata Flood, New Zealand, 2005

Topic: Labor

The government of New Zealand identified in planning efforts that the process by which of building permits are issued at the early stages of reconstruction and recovery will present a bottleneck to the pace of recovery. But of particular importance in these findings was that there will inevitably exist shortages of qualified personnel. These assessments determined that a more flexible approach to the standard permit process would likely be required.

Lessons and Replicability

- The inspections associated with permitting construction can present a bottleneck to reconstruction progress; however, a more flexible disaster-specific permitting process can alleviate much of this pressure
- In small disasters, there may not be much variance between regular contracting and disaster-related contracting. However, in the event of a major disaster the processes will be highly divergent
- A nation may need to mobilize all available construction resources to meet the construction labor requirements that exist following a major disaster
- A recovery facilitator can be used to provide an interface between the central government and the affected jurisdictions

An advantage of including parties normally involved during the construction projects in the affected area in the reconstruction process comes in the form of familiarity with the affected area and its associated issues, and an enhanced level of trust-based collaboration.

Case 31: Great Hanshin Earthquake, Kobe, Japan, 1995

Technical Expertise

To address technical needs, the Japanese government created a formal organization through which human capital resources from all levels of the government were leveraged to plan for and implement recovery strategies.
A committee comprised of high-ranking officials (including members of the Japanese House of Representatives and leaders of affected jurisdictions and their staff) developed intergovernmental recovery strategies. In addition to those high-ranking officials, the committee also included working-level staff from national ministries to provide expertise for developing specific details to be included in the recovery plan. For example, staff from the Ministry of Transportation brought expertise on infrastructure replacement while those from the Kobe Chamber of Commerce and Industry contributed knowledge regarding economic recovery matters.

Lessons

- A government committee comprised of both high-ranking officials and working level staff can ensure that there is technical oversight for all reconstruction plans
- All infrastructure departments need to collaborate on a central infrastructure reconstruction plan given the cross-dependencies and effects that exist between them

Case 33: Hurricane Mitch, Honduras, 1998

Topic: Technical Assistance

The international NGO Save the Children participated in projects to repair and reconstruct transportation (mainly river crossings), **water and sanitation** infrastructure following Hurricane Mitch in 1998. To address the sustainability of water and sanitation projects, Save the Children organized Water Administration Boards in recipient communities where they did not previously exist. Those communities that did have such a board were given assistance in strengthening them through training on issues that contributed to an adequate operation and maintenance of the systems.

Lessons and Replicability

- Nongovernmental organizations can serve as an effective **source** of infrastructure reconstruction expertise, funding, and labor, especially in areas that fit within their specific scope of work
- **Training** of local workers in the **operation and maintenance** of new infrastructure must be included in reconstruction planning if long-term sustainability is to be achieved

Case 34: Earthquake and Tsunami, Aceh and Nias, Indonesia, 2004

In Aceh and Nias, roads that were bad before the tsunami simply disappeared afterward. For aid to be delivered and for the economy to recover, road networks were in dire need of quick repair. Furthermore, conditions made the use of advanced technology not only costly but also generally infeasible. The ILO adopted a local resource-based approach to allow the restoration of roads for the flow of economic and humanitarian services. Simultaneously, the ILO's local resource-based infrastructure rehabilitation generated short-term jobs, immediate income, and local capacity to build good roads and create local employment far beyond the recovery phase. With a budget of $1 million from UNDP-ERTR and OCHA, the ILO restored 18 kilometers of roads, created 28,000 worker-days of employment.

Lessons

- Infrastructure recovery projects can alleviate post-disaster employment shortages and provide immediate **income** to the affected
- Job creation for both men and women is key to recovery; construction relies on local workers and materials. **Local procurement** means that jobs are created not only for the construction of the project but also in the production of **supplies**
- Develop practical **publications on construction issues** common after crises. Topics could include skills for construction workers (such as cement mixing and bricklaying), employment services for construction trades, skills certification, construction site supervision, and labour relations. By having practical materials on construction skills training ready in advance of any crisis, agencies can implement immediate projects to give workers the skills they need to rebuild their communities

Case 34: Earthquake and Tsunami, Aceh and Nias, Indonesia, 2004

Case 35: Hurricane Ivan, Granada, 2004

Topic: Reconstruction Materials

The Caribbean Electric Utility Services Corporation (CARILEC) facilitates communication among its members and serves as a focal point for information, advocating reform in the electric utility industry throughout the Caribbean. It provides services to members including the CARILEC Hurricane Action Plan (CHAP). CARILEC created CHAP to provide for the assembly, dispatch and coordination of emergency teams of linesmen from member utilities.

Their role is to help restore electric transmission and distribution systems in a country affected by a serious hurricane. To be eligible for assistance and training under the program, each utility pays an annual fee of US$2,000 to the Hurricane Fund. After Hurricane Ivan, Grenlec requested assistance through the CHAP, which deployed 100 linesmen from the region to help repair and restoration of Grenlec's operations.

The main warehouses on the island, severely damaged during Ivan, created initial challenges in the distribution of materials. To overcome this obstacle, site vendors located throughout the country supplied materials before the main distribution centers came back on line.

Lessons and Replicability

- Trained infrastructure utility experts can be inventoried prior to a disaster
- Site vendors located throughout the affected areas can be tapped for materials until main distribution centers are able to begin providing centralized assistance

Pre-disaster Recovery Planning

The Organization of American States' Unit for Sustainable Development and Environment (OAS/USDE) implemented a disaster mitigation capacity building program which included the pre-disaster planning for recovery.

This program recognizes the pressure to quickly rebuilds that exists in the aftermath of a disaster. Time constraints and communication and transportation difficulties in the post-disaster environment can confound efforts to improve the resilience of structures that are constructed in this period.

Pre-disaster planning is often necessary to ensure adequate materials are available following a disaster and to ensure that builders, homeowners and government agencies are aware of damage reduction measures and construction techniques that can reduce vulnerability to future hazard events.

For further information:

Los Angeles Recovery and Reconstruction Plan
http://emergency.lacity.org/pdf/epa/Recovery_and_Reconstruction_Annex.pdf

International Recovery Platform
http://www.recoveryplatform.org/resources/tools_and_guidelines