(Unclassified)

NAVAL WAR COLLEGE
Newport, RI

OPERATIONAL DESIGN OF HURRICANE RELIEF OPERATIONS

by

William G. Hishon
Lieutenant Commander, United States Coast Guard

A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

Signature: 

05 February 1999

Paper directed by
CAPT G. Jackson, USN
Chairman. Department of Joint Military Operations

Faculty Advisor: CAPT S. Fox, USCG

Signature: 

UNCLASSIFIED
Security Classification This Page

REPORT DOCUMENTATION PAGE

1. Report Security Classification: UNCLASSIFIED	
2. Security Classification Authority:	
3. Declassification/Downgrading Schedule:	
4. Distribution/Availability of Report: DISTRIBUTION STATEMENT A: APPROVED FOR PUBLIC RELEASE; DISTRIBUTION IS UNLIMITED.	
5. Name of Performing Organization: JOINT MILITARY OPERATIONS DEPARTMENT	
6. Office Symbol: C	**7. Address:** NAVAL WAR COLLEGE 686 CUSHING ROAD NEWPORT, RI 02841-1207
8. Title (Include Security Classification): Operational Design of Hurricane Relief Operations (U)	
9. Personal Authors: LCDR William G. Hishon, USCG	
10.Type of Report: FINAL	**11. Date of Report:** 05 February 1999
12.Page Count: 33	
13.Supplementary Notation: A paper submitted to the Faculty of the NWC in partial satisfaction of the requirements of the JMO Department. The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.	
14. Ten key words that relate to your paper: Disaster relief, hurricane, operational design, humanitarian assistance, MOOTW, Hurricane Andrew, Operation Sea Angel, Hurricane Mitch, Hurricane Georges, Hurricane Iniki	

15.Abstract:

Disaster relief operations have, for many years, been a traditional mission for the United States armed forces when crises occur either at home or abroad. Hurricane relief operations, in particular, have been a significant mission for the military over the past ten years. Yet, given the time-critical nature of hurricane relief operations, military commanders often have little time to plan for the participation of their forces. This paper discusses the applicability of operational design to hurricane relief operations and draws data from the military's participation in four domestic operations (Hugo, Andrew, Iniki and Georges) and two foreign operations (Operation Sea Angel and Hurricane Mitch) over the past ten years. The paper explores the elements of operational design most applicable to hurricane relief operations and discusses how military commanders can best incorporate elements of operational design in executing these operations. Moreover, the paper explores the various relief tasks a military commander must design an operation to accomplish in order to achieve the mission objective.

16.Distribution / Availability of Abstract:	**Unclassified** X	**Same As Rpt**	**DTIC Users**
17.Abstract Security Classification: UNCLASSIFIED			
18.Name of Responsible Individual: CHAIRMAN, JOINT MILITARY OPERATIONS DEPARTMENT			
19.Telephone: 841-6461		**20.Office Symbol:** C	

Security Classification of This Page Unclassified

Abstract

Disaster relief operations have, for many years, been a traditional mission for the United States armed forces when crises occur either at home or abroad. Hurricane relief operations, in particular, have been a significant mission for the military over the past ten years. Yet, given the time-critical nature of hurricane relief operations, military commanders often have little time to plan for the participation of their forces. This paper discusses the applicability of operational design to hurricane relief operations and draws data from the military's participation in four domestic operations (Hugo, Andrew, Iniki and Georges) and two foreign operations (Operation Sea Angel and Hurricane Mitch). The paper explores the elements of operational design most applicable to hurricane relief operations and discusses how military commanders can best incorporate elements of operational design in executing these operations. Moreover, the paper explores the various relief tasks a military commander must design an operation to accomplish in order to achieve the mission objective.

Table of Contents

List of Illustrations

I. Thesis

More than 139,000 people died in Bangladesh on the evening of 29 April 1991 when Cyclone Marian raced ashore from the Bay of Bengal with winds in excess of 150 knots. Chaos reigned in Bangladesh as the lack of food, potable water, medical care and power threatened the lives of survivors. Roughly 1.7 million people were homeless and some experts feared an additional 100,000 people would perish due to typhoid, cholera and lack of food, clean water and shelter. The U.S. Marine Corps III Marine Expeditionary Force, returning home from DESERT STORM, was directed to respond. There was no time to plan, train, procure special equipment or wargame various courses of action. Major General Henry C. Stackpole, USMC, was directed by the National Command Authority to report to the U.S. Ambassador and provide humanitarian assistance to Bangladesh. Immediate results were expected. [1]

Senior military commanders are typically experts at the operational design of achieving warfighting objectives. Yet, when confronted with the task of designing a hurricane relief operation of enormous proportions, many military commanders would likely wonder what elements of his/her warfighting planning experience were applicable and how the skills could best be applied to a humanitarian assistance mission.

The focus of this paper is to discuss operational design of hurricane relief operations and specifically address three questions. First, what are the key elements of operational design that apply to accomplishing hurricane relief operations? Second, how can military commanders best incorporate elements of operational design in executing hurricane relief operations? Third, what are the typical tasks a military commander must design an operation to accomplish in order to achieve the objective? U.S. military involvement in six hurricanes

over the past ten years will be evaluated, to include Hurricanes Hugo, Andrew, Iniki and Georges occurring in the United States, as well as Operation Sea Angel and Hurricane Mitch occurring in foreign nations.

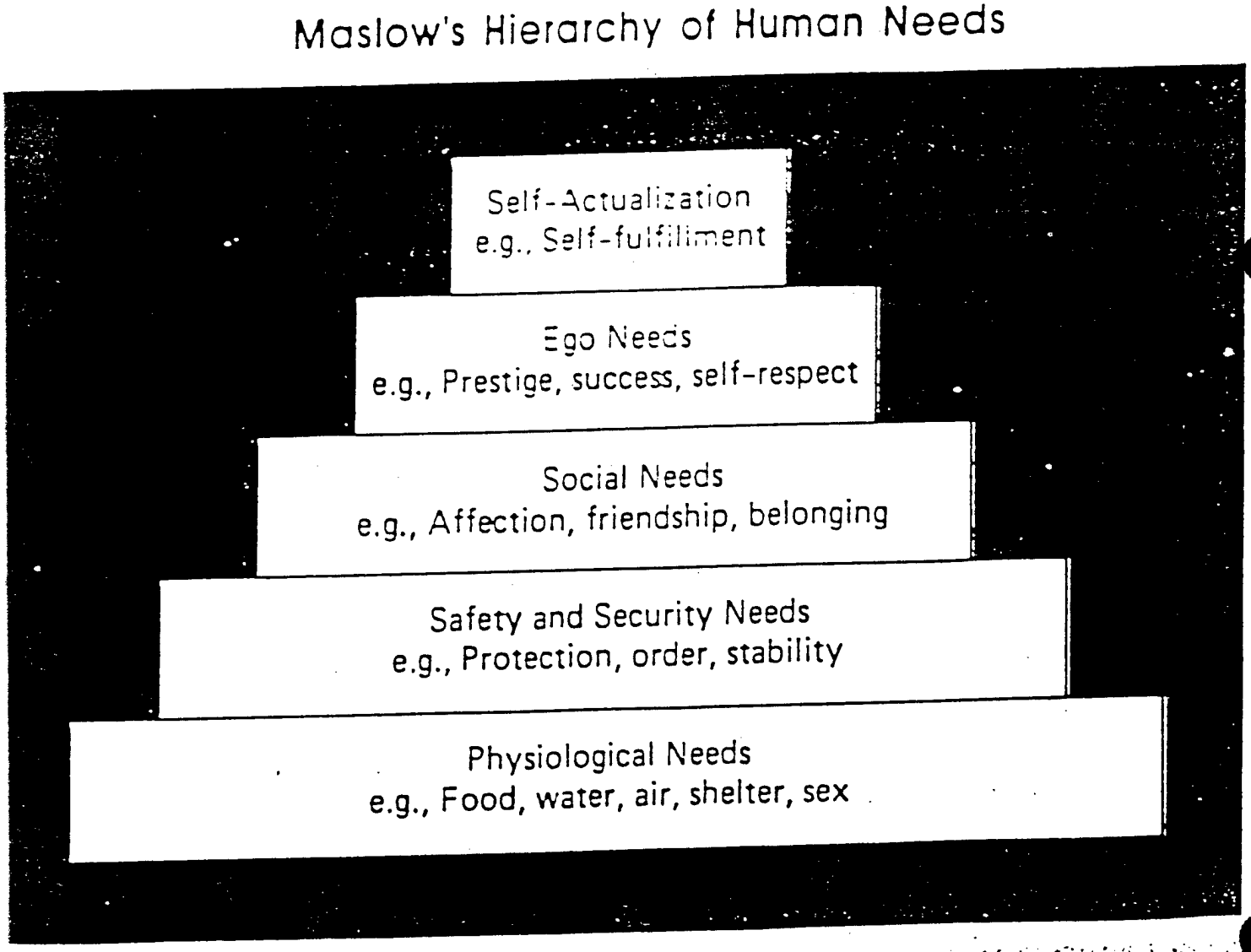
II. Background

a. *Magnitude of the Problem.* A strong hurricane typically leaves in its wake destruction of enormous proportions. Hurricane Andrew, for instance, killed 26 persons, destroyed 85,000 homes, left 230,000 persons homeless and virtually eliminated all sources of food, water, electricity and sewage in a 165 square mile area.[2] When a hurricane hits developing nations, the devastation and loss of life can be even more staggering. In Hurricane Mitch, for example, an estimated 10,000 persons died, numerous persons were rescued by helicopter while clinging to their rooftops, nearly all road transportation was impassable, and little food, potable water, or electricity existed.[3]

The predicament faced by survivors can be aptly described by Dr. Abraham Maslow's theory on the hierarchy of human needs (see Figure 1). The Maslow theory, in short, states that the primary motivator of human behavior is the lowest level of need that remains unsatisfied.[4] Maslow claims, "for the man who is extremely and dangerously hungry, no other interests exist but food...he dreams food, he perceives only food and he wants only food."[5] In the United States and most developed nations, physiological and safety and security needs are generally satisfied for most people and the higher level needs—social, ego and self-actualization—are usually dominant.[6] A hurricane changes things, however. In a matter of hours, all sources of shelter, protection, order, food and water can be washed

Figure 1

Maslow's Hierarchy of Human Needs



Source: Leon G. Schiffman and Leslie Lazar Kanuck, Consumer Behavior (Englewood Cliffs, NJ: Prentice-Hall, 1983), 62.

away, placing victims in a survival mode for the first time in their lives.

b. *Military Commander Responsibilities.* The military normally becomes involved in disaster relief when either a domestic disaster is declared by the President or when the National Command Authority decides to deploy forces to a foreign nation to assist with its disaster.[7] In order to deploy to austere environments with adequate force, the military has traditionally had extensive self-sustainment capabilities--and it's these capabilities that make it so valuable in hurricane relief operations.

In domestic disasters, military tasking is driven by the Federal Response Plan. FEMA implements the Federal Response Plan and coordinates the efforts of all participating federal agencies. Under this plan, the military is the lead agency on Public Works (i.e., Army Corps of Engineers) and is a supporting agency on the remaining 11 Emergency Support Functions (see Appendix A).[8] Typical Public Works tasks are reestablishment of electrical power, providing temporary roofs, emergency repair of sewage facilities and emergency contracting. Typical support missions are providing transportation, medical support, water purification, food and clearing debris.[9]

In foreign disasters, the role of the military is less well organized. Generally, as in Operation Sea Angel, the mission of the military is to work under the U.S. Ambassador or U.S. Agency for International Disasters (USAID) and provide whatever assistance is needed by the host nation.[10] Although the response structure is different, the relief tasks are similar to domestic operations.

Joint doctrine states that both domestic and foreign hurricane relief operations are military missions. Military Support to Civilian Authorities is described in Joint Pub 3-07 as providing temporary assistance to civil authorities when an emergency overtaxes their

capabilities. Although limited in law enforcement roles by Title 18, U.S. Code Section 1385—the Posse Comitatus Act—there are many other forms of assistance the military can provide, including providing relief in the aftermath of a hurricane.[11] Humanitarian Assistance is described in Joint Pub 3-07 as relieving or reducing the results of natural or manmade disasters. It states that U.S. efforts are generally limited in duration and are intended to supplement the efforts of the host nation. To prepare for these operations, the Atlantic, Pacific, European, Central and Southern Commanders each maintain a regional contingency plan for conducting disaster relief operations. [12]

The military commander's mission can have political as well as military objectives. In Hurricane Andrew, the Bush Administration received criticism for a weak federal response and, consequently, President Bush directed the military to respond quickly and massively. Commander, JTF Andrew's objective was to provide tangible relief support, but an implied additional objective was to prevent the Bush Administration from losing votes in the upcoming presidential election.[13] In Operation Sea Angel, the democratic government of Bangladesh was only several weeks in existence and perceived as very fragile. In response, one of the military commander's implied responsibilities was to support the government and prevent it from failing since the United States had political interests in seeing this fledgling democracy succeed.[14]

III. Analysis of Operational Design in Hurricane Relief Operations

The focus of this analysis is to evaluate how operational design can be applied to address the problems caused by hurricanes and accomplish the tasks assigned to military

commanders. It has already been established that hurricanes cause tremendous suffering and that military commanders are often tasked with providing assistance. The next step is to evaluate the planning tools available to accomplish the mission in the most effective and timely manner.

a. *Elements of Operational Design*: To discuss all the elements of operational design in sufficient detail is beyond the scope of this paper. Rather, the objective is to discuss the most important elements of operational design that specifically apply to hurricane relief operations. To this end, analysis will focus on seven key elements of operational design considered most critical to the success of hurricane relief operations. The seven elements are:

* Objective
* Command and Control
* Operational Maneuver
* Operational Intelligence/Information Gathering
* Operational Logistics
* Operational Phasing/Sequencing
* Principles of MOOTW[15]

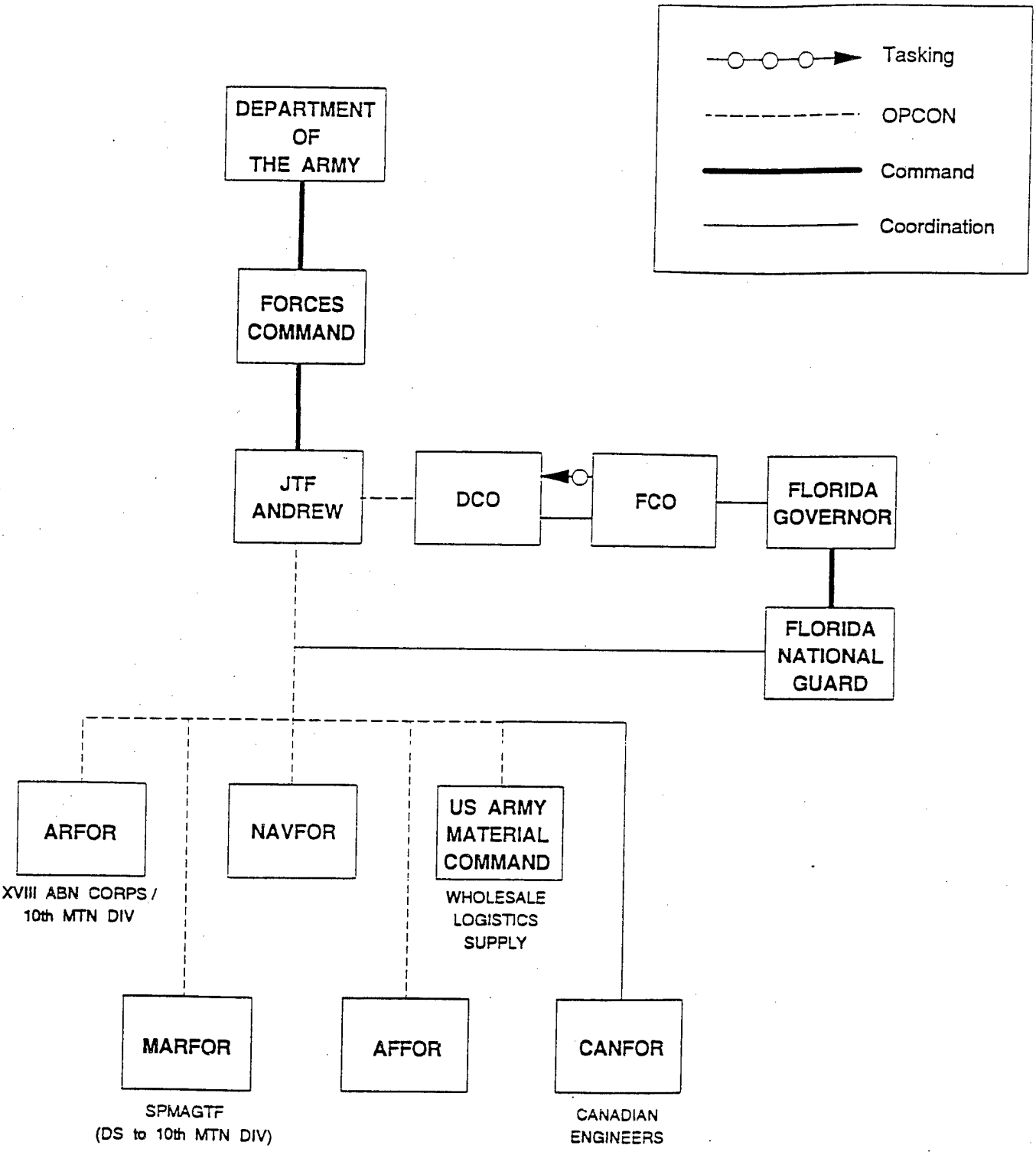
1. Objective. Ideally, the mission objective should clearly describe for the military commander the desired end state, thus enabling him/her to plan backward to determine the forces, series of actions and milestones needed to achieve the desired end state.[16] In war, the desired end state is the political and military condition attained after the military strategic objectives are achieved—for example, expulsion of Iraqi forces from Kuwait and restoration of the legitimate Kuwaiti government.[17] In Military Operations other

than War (MOOTW), and specifically in hurricane relief operations, it could take decades to restore the economic, agricultural, sociological and infrastructure conditions that existed prior to the hurricane.[18] Thus, a desired end state of achieving pre-hurricane conditions is unacceptable due to the length of time military forces would be committed. A reasonable end state should focus on two parameters. First, the military commander must assess the capability of local authorities, private volunteer agencies (PVOs) and non-government organizations (NGOs) in assuming the relief mission. When the point is reached that these organizations can manage the situation unaided, military forces should be redeployed. During Hurricane Hugo, for example, a key consideration was ground transportation. Once roads were cleared so that trucks could be used for transportation, the reliance upon military airlift capabilities was significantly reduced.[19] Second, military commanders must assess the stability of the region for other U.S. Departments to provide assistance. In Hurricane Mitch, for example, Honduras sustained extensive agricultural damage due to heavy rains, flooding and mudslides. Assisting with the restoration of that country's agricultural economy is a non-military function and should correctly transition to the U.S. Department of Agriculture.[20] In short, the military mission is complete when conditions in the region are sufficiently stable such that local organizations are capable of rendering the required level of disaster relief and other U.S. agencies are capable of providing follow-on assistance.

2. *Command & Control.* The overwhelming choice for command structure in rendering hurricane relief assistance has been the two-tiered Combined Joint Task Force (CJTF).[21] It was used, in some variation, in each of the six hurricane relief operations. Figure 2 illustrates the CJTF implemented for Hurricane Andrew. Military commanders, commenting in their after action reports, praised the CJTF concept since it provided them

Figure 2

JTF Andrew Task Organization



Source: Joint Task Force Andrew, Joint Task Force Andrew After Action Report (Miami: 1992), Enclosure 2.

maximum flexibility and adapted well to the operational tempo experienced once forces were in place.[22] When acting as a supporting commander, rather than lead agency, flexibility is an essential component of the command and control structure.

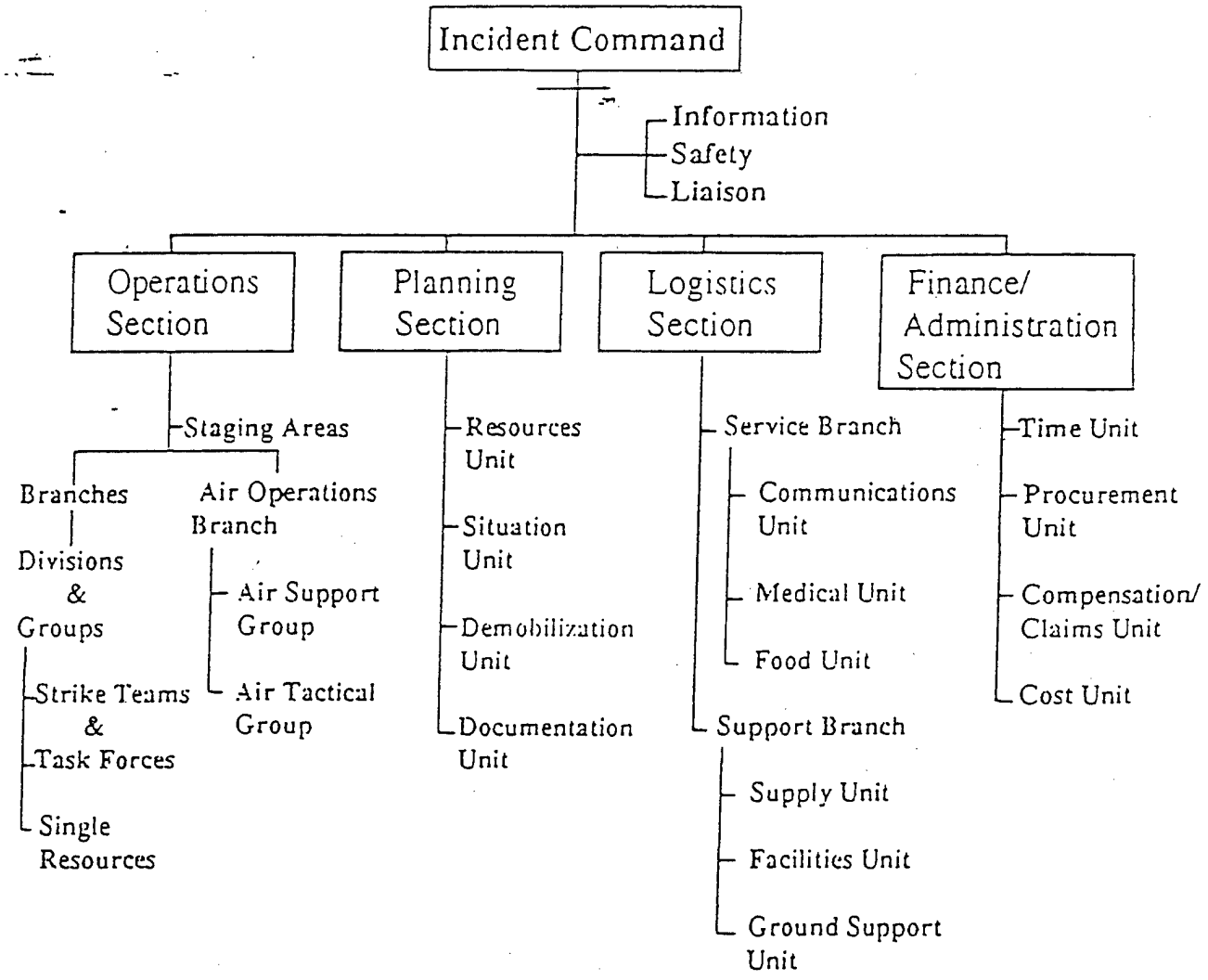
The military command structure must be capable of interacting with other government agencies at the federal, state and local level and with PVOs/NGOs. Moreover, military commanders tasked with domestic operations must be prepared to integrate as part of an Incident Command System (ICS). Figure 3 illustrates a typical ICS command structure. ICS is a command and control structure used frequently by civilian authorities, one they feel comfortable with and implement when conducting contingency exercises. ICS was first used by the National Wildfire Coordinating Agency for the western wildfires that occurred in the early 1980s and proved to be a valuable command and control structure for focusing the efforts of numerous federal, state and local authorities on a common objective.[23] Since its introduction, ICS has gained wide acceptance by civilian agencies, and military commanders should anticipate that a civilian lead agency might integrate the military into an an ICS structure during a hurricane relief operation. A variant of ICS was used during Hurricane Iniki operations to integrate the combined efforts of federal agencies, under the FEMA umbrella, with those of the Hawaiian State and local agencies.[24]

Communications is a vital concern in the command and control of any operation and, in a hurricane relief operation, a military commander should assume that most local communications have been destroyed and that extensive military communications must be deployed.[25] Mobile communications have proved critical to mission success in past relief operations.[26] For domestic hurricanes, the military commander should request coastal communications assistance from the U.S. Coast Guard. As part of its search and rescue

Figure 3

Incident Command System

INCIDENT COMMAND SYSTEM ORGANIZATION



urce: National Wildfire Coordinationg Group, Unified Command (Washington: 1985), 1-4

mission, the Coast Guard is required by law to maintain the maritime component of the National Distress System, which requires the capability to receive distress broadcasts along the coastline and up to 20 miles offshore via VHF-FM. To fulfill this requirement, it maintains VHF high level sites along the coast throughout the United States. In Newport, Rhode Island, for instance, the Coast Guard maintains a high level VHF-FM site atop the Newport Bridge which it uses for command and control of maritime operations in Narragansett Bay and offshore.[27] Although the Coast Guard retains exclusive control of Channel 16 VHF-FM for maritime emergencies, it has several working frequencies which it could provide a military commander access to coordinate the action of coastal forces. In the event a Coast Guard's high level site is destroyed, a cutter will deploy to the area within 24-48 hours and perform communications picket duties afloat until the damaged site is repaired.

3. *Operational Maneuver.* The essential components of operational maneuver in hurricane relief operations are the ability for a military commander to deploy forces to an austere theater in a rapid manner and then be capable of mobility within the theater.[28] To accomplish these objectives, troops must be ready to deploy on short notice, must be trained, and unit integrity must be maintained.[29] Air mobility, both fixed and rotary wing, has been critical to the effectiveness of relief operations in the past ten years. During Hurricane Mitch operations, for example, fixed wing aircraft were necessary for the transportation of supplies into the theater, while rotary wing aircraft were instrumental in distributing supplies to the victims. Even if the impacted area had excellent ground transportation capabilities prior to the hurricane, air mobility will likely still be a vital resource as roads will be impassable until debris can be removed.

4. Operational Intelligence/Information Gathering. Intelligence and information gathering is a deceptively important aspect of hurricane relief operations since there is often little known about the extent of damage, the needs of victims, and the impact of relief efforts.[30] In past operations, military commanders have been successful in using civil affairs personnel and special forces units in gathering information.[31] Military commanders must have timely information about the local environment, population, extent of the damage, and the effectiveness of relief efforts. In Operation Sea Angel, General Stackpole gathered information by deploying Army Special Forces platoons to remote areas of Bangladesh. Through this technique, he learned that many villages did *not* have immediate food shortages, but instead faced long-term food crises in that numerous crops and fields were ruined by saltwater flooding. In response, he altered the type of food supplies delivered from perishable items to durable staples, such as rice and grains.[32]

5. Operational Logistics. During hurricane relief operations, operational logistics means much more than just supporting the troops. It means supporting the troops plus the population of the impacted area until the sources of goods and services, and the means for transporting and distributing them, adequately recover. The principal objective of hurricane relief logistics, therefore, is sustainment of the population until the infrastructure is capable of once again sustaining itself.[33] Basing is a critical concern for a military commander since he/she must be determine what airfields and ports within theater are capable of acting as the logistics hub for the influx of supplies and materials required. For Hurricane Mitch, the Soto Cano Air Base in Honduras served this purpose. Although the airfield sustained damage, CINCSOUTH repaired it, augmented the base's capabilities, and designated Soto Cano the logistics center of relief operations.[34]

6. Operational Phasing/Sequencing. Military commanders in past operations have found it useful to divide relief efforts into three phases. Each phase marks a milestone in the operation and signals a change in mission focus and employment of forces.[35] Moreover, this methodology has been incorporated into Army doctrine on disaster relief. The three phases are:

a. *Relief.* Focused on saving lives and restoring order.

b. *Recovery.* Focused on making victims self-sufficient.

c. *Reconstitution.* Focused on rebuilding the damaged infrastructure.[36]

This methodology has assisted military commanders with evaluating measures of effectiveness (MOEs) and with transitioning toward termination of operations.

Sequencing of hurricane relief operations is the coordination of numerous relief tasks in terms of objective and time to accomplish the mission objective. Figure 4 illustrates relief tasks that military commanders are typically tasked with coordinating. During Hurricane Georges, for example, the Army Corps of Engineers staged large quantities of relief supplies in various locations throughout the U.S. The military commander's responsibility was to sequence the distribution of these items to Puerto Rico in terms of importance to victims. Thus, the delivery of ice and medical supplies took a higher priority than plastic roofing, and the conduct of search and rescue operations was executed immediately before all other relief tasks.[37]

7. Principles of MOOTW: The general principles of MOOTW—objective, unity of effort, legitimacy, restraint, perseverance and security—provide a worthwhile operational planning tool for military commanders tasked with conducting hurricane relief operations.[38]

Figure 4

Hurricane Relief Tasks [1]

Task	Objective
Damage surveys	To assess damage to critical structures
Debris removal	To remove debris and dispose at waste sites
Distribution of goods & materials	To distribute donated food, clothing, building materials, etc.
Electrical power	To restore electrical power
Garbage disposal	To perform garbage disposal services until municipal services are restored
Information dissemination	To promulgate information about relief supplies, medical care, etc.
Information gathering	To gather information about damage, victims' needs and impact of relief
Law enforcement	To restore law and order (i.e., National Guard under state jurisdiction)
Medical care	To provide emergency medical support to victims
Plastic roofing	To provide victims' capability of installing temporary roofs
Portable kitchens	To provide meals for victims
Portable sewage	To provide portable toilets established at temporary shelter areas
Portable showers	To provide shower facilities at temporary shelter areas
Potable water	To provide safe drinking water
Road clearing	To clear debris from roads to enable ground transportation to resume
School repair	To enable schools to resume classes
Search & assist	To patrol devastated areas and assist victims at their residences
Search & rescue	To rescue victims from flooded areas
Temporary shelter	To organize temporary camps to shelter homeless persons
Transportation-Air	To transport supplies and materials to areas inaccessible by roads
Transportation-Ground	To remove debris and transport supplies and materials
Transportation-Sea	To transport supplies and materials and berth relief personnel

[1] Sullivan, Gordon R., "Hurricane Andrew: After Action Report, Army, January 1993, 16-22 (Summary of tasks discussed throughout the report).

Objective. As discussed above, the objective normally comes directly from the National Command Authority and directs the military to assist a foreign nation or provide support to civilian authorities. The objective is normally expressed in general terms and it is the military commander's responsibility to tailor the relief effort to the specific disaster.[39]

Unity of Effort. Unity of effort during a hurricane relief operation means more than just coordination among military commands. The military commander must also unify his/her efforts with all organizations involved, including international forces, PVOs/NGOs, and other federal, state and local agencies.[40] FEMA coordinated the participation of 27 federal agencies during Hurricane Andrew,[41] and the military's coordination with the American Red Cross was vital to delivering food and medical support to the most needy regions in Hurricane Mitch.[42]

Legitimacy. The military's participation in a hurricane relief operation must be viewed as legitimate by both the host region and the American public. Generally, legitimacy of hurricane relief operations has not been an issue in the past since the military's involvement has been viewed as beneficial to the recovery of the devastated area.[43] The only criticism the military has received in this regard is that relief actions were not taken soon enough.

Restraint. Restraint has little applicability in disaster relief operations. However, one planning item of note is that most military commanders have seen decided benefits in leaving the National Guard under State control rather than incorporate them into the federal command structure. The key benefit of this arrangement is that the National Guard can then exercise its law enforcement authority under the State, which would be lost if

placed under federal control.[44] This was the case during Hurricane Iniki. Even in an area where looting is unlikely, the law and order role of the National Guard can be significant since the local police departments have been victimized by the hurricane and will likely be in need of assistance.[45]

Perseverance. Hurricane relief missions are temporary in nature, so concern over perseverance is generally unnecessary.[46] Nonetheless, two bona fide concerns are: 1) that military forces not be a burden on the local infrastructure, and 2) that military forces disengage when local authorities are capable of conducting the mission independently. The U.S. answer to self-sufficiency in Operation Sea Angel was sea-basing. As a result, only 500 or less personnel were in Bangladesh during any given night, with the remainder berthed afloat aboard naval vessels and transported ashore daily via aircraft.[47]

Security. The threat during hurricane relief efforts is mainly from the environment, not from hostile forces. Deploying personnel into an area with no potable water, poor sanitation, etc. introduces obvious force protection risks.[48] In addition, there was some concern among military commanders about gang violence during certain relief operations, but the presence of National Guard forces was effective in reducing this threat. In fact, the crime rate in southern Dade County actually went down during Hurricane Andrew relief operations.[49]

b. Is Operational Design Applicable? A counter-argument to the central theme of this paper is that operational design has no applicability to hurricane relief operations. Some critics would argue that operational design is a warfighting concept and has no value in the MOOTW realm. The fault of this argument is that it ignores the principal goal of operational design, which is to focus forces in a coherent manner on the accomplishment of the assigned

mission.[50] The need for *focus, efficient use of forces*, and *completing the mission* exists in both war and MOOTW and, therefore, operational design is equally applicable in both situations.

IV. Recommendations

Based on the preceding analysis, the following recommendations are made:

a. **Use operational design concepts to plan for hurricane relief operations.** The concepts are applicable in both war and MOOTW and the military commander's skills in operational design can be effectively applied to hurricane relief.

b. **Plan collectively with other organizations**. A military commander must not plan in a vacuum. Instead, he/she must plan, from the onset of operations, for the capabilities and objectives of other organizations participating in the mission. Collective planning will result in synergistic efforts that achieve common objectives.

c. **Implement a CJTF command and control system.** The value of the Joint Task Force in disaster relief operations has proven itself time and again. Two benefits this command structure offers are essential to high-tempo relief operations: 1) flexibility to respond to various unplanned contingencies, and 2) unity of effort among numerous, disparate military units that have not trained together.

In sum, the concept of operational design can be effectively applied to the hurricane relief planning process. The key aspects of operational design that apply to accomplishing hurricane relief operations are establishing a clear, attainable objective, implementing a flexible command and control system, and executing effective coordination

of multiple relief tasks. Military commanders can best incorporate elements of operational design in executing hurricane relief operations by focusing on the desired end state and then designing the military actions required to achieve that end state. The typical tasks that a military commander must design an operation to accomplish in order to achieve the objective are numerous, but can be generally summarized as those tasks that fulfill victims' physiological and safety/security needs per Maslow's hierarchy of human needs.[51]

Hurricane relief is a traditional military mission and will continue to be so in the future. While no one is capable of predicting when or where the next hurricane will occur, a military commander can, nevertheless, prepare for this contingency by simply training his/her forces for their wartime mission. Since many of the tasks are applicable to both missions, readiness for war will also result in readiness for humanitarian assistance. The American public expects the military to respond when natural disaster strikes and the application of operational design will enhance the military commander's ability to successfully deliver.

Notes

1. Henry C. Stackpole, "Angels From the Sea," U.S. Naval Institute Proceedings, May 1992, 110-111.

2. John Daigle, Bob Hart, Maria L. Jonkers and Kristi Moon, "Andrew's Wrath Mobilizes the National Guard," National Guard, October 1992, 20.

3. "Cruel Legacy of a Killer Storm" U.S. News &World Report. 16 November 1998. <http://www.proquest.umi.com/pqdweb/> (05 January 1999), 1.

4. Leon G. Schiffman and Leslie Lazar Kanuk, Consumer Behavior (Englewood Cliffs, NJ. Prentice-Hall, 1983) 64.

5. Ibid.

6. Ibid.

7. Joint Chiefs of Staff, Joint Doctrine for Military Operations Other Than War (Joint Pub 3-07) (Washington, D.C.: 16 June 1995), III-4 - III-8

8. Joint Chiefs of Staff, Interagency Coordination During Joint Operations: VolumeII (Joint Pub 3-08) (Washington, D.C.: 09 October 1996), Annex J to Appendix A.

9. Ibid., A-J-6.

10. Ibid., Annex M to Appendix A.

11. Joint Pub 3-07, III-8.

12. Ibid., III-4.

13. Carl E. Fischer, "Interagency Cooperation: FEMA and DOD in Domestic Support Operations," (Unpublished Research Paper, U.S. Army Command and General Staff College, Fort Leavenworth, KS: 1997), 3.

14. Stackpole, 110.

15. Milan Vego, On Operational Art (Third Draft), September 1998 (Naval War College, Newport, RI), 266-269.

16. Vego, 121.

17. Ibid.

18. Joint Pub 3-07, III-5.

19. Federal Emergency Management Agency, Response to Hurricane Hugo and the Loma Prieta Earthquake (Washington: 1991), 18-19.

20. "Army Filling Hurricane Mitch Victims' Basic Needs." Army Link News. 13 November 1998. <http://www.dtic.mil/armylink/news.html/> (22 December 1998), 1.

21. Paul A. McCarthy, Operation Sea Angel: A Case Study, K028, (Santa Monica, CA: Rand, 1994), 11.

22. Henry C. Stackpole and Eric L. Chase, "Humanitarian Intervention and Disaster Relief: Projecting Military Strength Abroad to Save Lives," Marine Corps Gazette, February 1993, 20.

23. National Wildfire Coordinating Group, Unified Command, (Washington, 1985), 3.

24. Vern T. Miyagi, "The National Guard in Disaster Relief Operations: A Case Study," (Unpublished Research Paper, U.S. Army War College, Carlisle Barracks, PA: 1996), 8.

25. Ken MacNevin, "Major General Robert L. Moorehead Speaks Out: The Virgin Islands Survived Hugo's Wrath," National Guard, February 1990, 26.

26. Stackpole, 114.

27. Commander, First Coast Guard District, Communications Plan, (CCGDONEINST M2000.1A) (Boston, MA: 03 November 1994), 15-1.

28. Gordon R. Sullivan, "Hurricane Andrew: An After-Action Report," Army, January 1993, 19.

29. Stackpole and Chase, 20.

30. John Daigle, "Guard Plan Hurries Help," National Guard, August 1996, 16.

31. Keith Butler, "SOF Support to Hurricane Andrew Recovery," Special Warfare, July 1993, 12-13.

32. Stackpole, 113-114.

33. Gerald F. Nalepa, "Marine Corps Humanitarian and Disaster Relief Operations," Marine Corps Gazette, February 1993, 24.

34. "Joint Task Force Gets Supplies to Most Needed Areas in Honduras." Army Link News. 16 November 1998. <http://www.dtic.mil/armylink/news.html/> (22 December 1998), 1.

35. Department of the Army, Domestic Support Operations, (Field Manual 100-19) (Washington: 1993), 5-4.

36. Fisher, 24.

37. "Corps of Engineers Increase Emergency Response Efforts." Army Link News. 1 October 1998. <http://www.dtic.mil/armylink/news.html/> (05 January 1999), 1.

38. Joint Pub 3-07, II-1.

39. Ibid., II-2.

40. Ibid., II-3.

41. A.G. Smart, "Military Support to Domestic Disaster Relief: Doctrine for Operating in the Wake of the Enemy?" (Unpublished Research Paper, U.S. Army Command and General Staff College, Fort Leavenworth, KS: 1993), 27-29.

42. Stackpole, 22.

43. Joint Pub 3-07, II-5.

44. Ibid., II-4.

45. Miyagi, 10.

46. Joint Pub, II-4.

47. Gary Anderson, "Unity Rewarded in Typhoon Rescue," Marine Corps Gazette, November 1991, 90.

48. Joint Pub 3-07, II-3.

49. Sullivan, 19.

50. Vego, 264.

51. Schiffman and Kanuk, 64.

Bibliography

Anderson, Gary W. "Operation Sea Angel; A Retrospective on the 1991 Humanitarian Relief Operation in Bangladesh." Unpublished Research Paper, U.S. Naval War College, Newport, RI: 1992.

Anderson, Gary. "Unity Rewarded in Typhoon Rescue." Marine Corps Gazette, November 1991, 90.

Anderson, Mary B. and Peter J. Woodrow. Rising from the Ashes: Developing Strategies in Times of Disaster.. Boulder, CO: Lynne Rienner Publishers, 1998.

"Army Doctors Treat Honduran Children." Army Link News. 14 December 1998. <http://www.dtic.mil/armylink/news.html/> (22 December 1998)

"Army Filling Hurricane Mitch Victims' Basic Needs." Army Link News. 13 November 1998. <http://www.dtic.mil/armylink/news.html/> (22 December 1998)

"Army Helping with Relief After Hurricane Georges." Army Link News. 28 September 1998. <http://www.dtic.mil/armylink/news.html/> (05 January 1999)

"Aviation Regiment Keeps Aircraft Flying in Support of Hurricane Relief Mission." Army Link News. 8 December 1998. <http://www.dtic.mil/armylink/news.html/> (22 December 1998)

Barrell, Marjorie. "Cleanup on Kauai." Soldiers, December 1992, 6-9.

Bracht, Gary A. "Disaster Relief Logistics Doctrine for U.S. Army Units: Fact or Fiction." Unpublished Research Paper, Florida Institute of Technology, Orlando, FL: 1991.

Bunker, Robert M. "Military Engineers and Disaster Relief." The Military Engineer, March-April 1990, 36-39.

Butler, Keith. "SOF Support to Hurricane Andrew Recovery." Special Warfare, July 1993, 12-17.

Center for Naval Analyses. Training Requirements for Humanitarian Assistance Operations. Alexandria, VA: 1995.

Choike, Daniel J. and William J. Bowers. "Special Purpose Task Force Deploys to Kauai." Marine Corps Gazette, February 1993, 25-29.

Commander, First Coast Guard District. Communications Plan. (CCGDONEINST M2000.1A). Boston, MA: 03 November 1994.

"Corps of Engineers Increase Emergency Response Efforts." Army Link News. 1 October 1998. <http://www.dtic.mil/armylink/news.html/> (05 January 1999)

"Cruel Legacy of a Killer Storm" U.S. News &World Report. 16 November 1998. <http://www.proquest.umi.com/pqdweb/> (05 January 1999)

Daigle, John "Guard Plan Hurries Help." National Guard, August 1996, 16-18.

Daigle, John, Bob Hart, Maria L. Jonkers and Kristi Moon. "Andrew's Wrath Mobilizes the National Guard." National Guard, October 1992, 20-23.

Federal Emergency Management Agency. Federal Assistance Handbook: Emergency Management, Direction and Control Programs. Washington: 1984.

Federal Emergency Management Agency. Response to Hurricane Hugo and the Loma Prieta Earthquake. Washington: 1991.

Federal Emergency Management Agency. The Federal Response Plan. Washington: U.S. Government Printing Office, 1992, with changes.

"FEMA Begins Recovery Efforts in Puerto Rico, U.S. Virgin Islands After Hurricane Georges." FEMA Situation Reports: Hurricane Georges. 22 September 1998. <http://vita.org/disaster/fema.html/> (05 January 1999)

Finch, Frank R., Ralph V. Locurio and Deborah L. Nykyforchyn. "Piercing Winds Hit Hawaii." The Military Engineer, January-February 1993, 4-11.

Fischer, Carl E. "Interagency Cooperation: FEMA and DOD in Domestic Support Operations." Unpublished Research Paper, U.S. Army Command and General Staff College, Fort Leavenworth, KS: 1997.

Genega, Stanley G. "When Nature Strikes Back: From One Edge of America to the Other, Trouble Was Brewing." The Military Engineer, November-December 1992, 4-6.

Harrison, Thomas G. "Peacetime Employment of the Military – The Army's Role in Domestic Disaster Relief." Unpublished Research Paper, U.S. Army War College, Carlisle Barracks, PA: 1992.

Joint Task Force Ancrew. Joint Task Force Andrew After Action Report. Miami: 1992.

"Joint Task Force Gets Supplies to Most Needed Areas in Honduras." Army Link News. 16 November 1998. <http://www.dtic.mil/armylink/news.html/> (22 December 1998)

"Joint Task Force Helping with Honduran Hurricane Relief Efforts." Army Link News. 3 November 1998. <http://www.dtic.mil/armylink/news.html/> (22 December 1998)

Kappelman, Paul B. and Robert E. Armstrong. "PSYOP Task Force to JTF Andrew: A Case tudy in Support to Disaster-Recovery Operations." Special Warfare, July 1993, 18-21

Latham, William C. "Hurricane Andrew--A Most Devastating Disaster." U.S. Army Aviation Digest, January 1993, 32-24.

Luke, Ivan T. "Caribbean Mass Migration: MOOTW with the U.S. Coast Guard in the Lead." Unpublished Research Paper, U.S. Naval War College, Newport, RI: 1998.

MacNevin, Ken. "Major General Robert L. Moorehead Speaks Out: The Virgin Islands Survived Hugo's Wrath." National Guard, February 1990, 26.

MacNevin, Ken, Bob Garrett, Dawn Shelton, Edna Rivera, Les Carroll and Phil Miller. "The Devastation of a Hurricane." National Guard, February 1990, 18-25.

McAuliffe, Michael A. "When Nature Strikes Back: Andrew, Prince of Storms." The Military Engineer, November-December 1992, 6-8.

McCarthy, Paul A. Operation Sea Angel: A Case Study. K028. Santa Monica, CA: Rand, 1994.

McGlasson, W. D. "To the Rescue: The National Guard Is the First to Commit and the Last to Leave in Domestic Missions." National Guard, July 1993, 32-36.

"Medical Personnel Providing Care to Remote Honduran Villages." Army Link News. 22 December 1998. <http://www.dtic.mil/armylink/news.html/> (22 December 1998)

Metz, John M. "Humanitarian Assistance Operations: A Command and Control Dilemma." Unpublished Research Paper, U.S. Army Command and General Staff College, Fort Leavenworth, KS: 1995.

"Military Helps with Hurricane Relief in Caribbean." Army Link News. 24 September 1998. <http://www.dtic.mil/armylink/news.html/> (05 January 1999)

Minear, Larry and Phillippe Guillot. Soldiers to the Rescue: Humanitarian Lessons from Rwanda. Paris: Organization for Economic Cooperation and Development, 1996.

Miyagi, Vern T. "The National Guard in Disaster Relief Operations: A Case Study." Unpublished Research Paper, U.S. Army War College, Carlisle Barracks, PA: 1996.

Nalepa, Gerald F. "Marine Corps Humanitarian and Disaster Relief Operations." Marine Corps Gazette, February 1993, 22-24.

National Wildfire Coordinating Group. Unified Command. Washington: 1985.

"Nicaragua Task Force Building Roads and Hope." Army Link News. 21 December 1998. <http://www.dtic.mil/armylink/news.html/> (22 December 1998)

Palmer, James T. and Charles R. Rash. "Operation Hurricane Andrew Relief: Humanitarian Assistance, Redleg Style." Field Artillery, October 1993, 31-35.

Peterson, Grant C. "FEMA and Hugo." The Military Engineer, March-April 1990, 40-42.

"Preparations Begin as Hurricane Georges and Tropical Storm Hermine Approach U.S. Territories and Mainland." FEMA Situation Reports: Hurricane Georges. 20 September 1998. <http://vita.org/disaster/fema.html/> (05 January 1999)

"Psychiatric Intervention Team Helps Hondurans Deal with Traumatic Stress." Army Link News. 30 November 1998. <http://www.dtic.mil/armylink/news.html/> (22 December 1998)

Schiffman, Leon G. and Leslie Lazar Kanuk. Consumer Behavior. Englewood Cliffs, NJ. Prentice-Hall, 1983.

"Secretary of Army Heads Up Hurricane Mitch Relief." Army Link News. 9 November 1998. <http://www.dtic.mil/armylink/news.html/> (22 December 1998)

Selvage, Donald R. "Operation Sea Angel: Bangladesh Disaster Relief." Marine Corps Gazette, November 1991, 89-97.

"Service Members Helping with Hurricane Relief Efforts Shift Focus." Army Link News. 9 December 1998. <http://www.dtic.mil/armylink/news.html/> (22 December 1998)

Shafiq-ur-Rahman. "Disaster in Bangladesh: A Multinational Relief Effort." Naval War College Review, Winter 1993, 59-72.

Smart, A.G. "Military Support to Domestic Disaster Relief: Doctrine for Operating in the Wake of the Enemy?" Unpublished Research Paper, U.S. Army Command and General Staff College, Fort Leavenworth, KS: 1993.

Stackpole, Henry C. "Angels From the Sea." U.S. Naval Institute Proceedings, May 1992, 110-116.

Stackpole, Henry C. and Eric L. Chase. "Humanitarian Intervention and Disaster Relief: Projecting Military Strength Abroad to Save Lives." Marine Corps Gazette, February 1993, 16-20.

Stoll, Koburn C. "Translating Policy into Action, The Federal Military Response to Domestic Disasters." Unpublished Research Paper, U.S. Naval War College, Newport, RI: 1994.

Sullivan, Gordon R. "Hurricane Andrew: An After-Action Report." Army, January 1993, 16-22.

Topp, Kevin O. "The Application of Operational Art to Domestic Disaster Relief Operations." Unpublished Research Paper, U.S. Naval War College, Newport, RI: 1995.

U.S. Department of the Army. Domestic Support Operations. (Field Manual 100-19) Washington: 1993.

U.S. Joint Chiefs of Staff. Interagency Coordination During Joint Operations: Volume I and II (Joint Pub 3-08) Washington, D.C.: 09 October 1996.

U.S. Joint Chiefs of Staff. Joint Doctrine for Military Operations Other Than War (Joint Pub 3-07) Washington, D.C.: 16 June 1995.

U.S. Joint Chiefs of Staff. Joint Tactics, Techniques, and Procedures for Peacekeeping Operations (Joint Pub 3-07.3) Washington, D.C.: 20 April 1994.

U.S. Joint Warfighting Center. Joint Task Force Commander's Handbook for Peace Operations. Washington, D.C.: 16 June 1997.

Vego, Milan. On Operational Art (Third Draft). September 1998, Naval War College, Newport, RI.

White, Clarence E. "Planning Utilization of Federal Resources to Respond to Domestic Disasters." Unpublished Research Paper, U.S. Army War College, Carlisle Barracks, PA: 1996.

Youngbluth, Terry R. "A Post-Hurricane Andrew Review of Trends in Department of Defense Disaster Relief Operations." Unpublished Research Paper, U.S. Army War College, Carlisle Barracks, PA: 1996.

ESF* / ORG	1 Trans.	2 Comm	3 Public Works & Eng	4 Fire-fighting	5 Info/ Plans	6 Mass Care	7 Spt.	8 Health and Med.	9 USR	10 Haz Mat	11 Food	12 Energy
USDA	S	S	S	P	S	S	S	S	S	S	P	S
DOC		S	S	S	S	S	S			S		
DOD	S	S	P	S	S	S	S	S	S	S	S	S
DOEd					S							
DOE	S		S		S		S			S		P
DHHS			S		S	S	S	P	S	S	S	
DHUD						S						
DOI		S	S	S	S					S		
DOJ					S			S		S		
DOL			S				S		S	S		
DOS	S									S		S
DOT	P	S	S		S	S	S	S	S	S	S	S
TREAS					S							
VA			S			S	S	S				
AID								S	S			
ARC					S	P		S			S	
EPA			S	S	S			S	S	P	S	
FCC		S										
FEMA		S		S	P	S	S	S	P	S	S	
GSA	S	S	S		S	S	P	S	S	S		S
ICC	S											
NASA					S							
NCS		P			S		S	S				S
NRC					S					S		S
OPM							S					
TVA	S		S									S
USPS	S					S		S				

Emergency Support Function Assignment Matrix[1]

* The Emergency Support Functions are explained in detail later in this appendix
P = Primary Agency: Responsible for Management of the ESF
S = Support Agency: Responsible for supporting the Primary Agency

ESF 1, ***Transportation***, provides for the coordination of federal transpiration support to state and local governmental entities, voluntary organizations, and federal agencies requiring transportation capacity to perform disaster assistance missions following a catastrophic earthquake, significant natural disaster, or other event requiring federal response. The lead agency is the **Department of Transportation** (DOT) and the support agencies are the U.S. Department of Agriculture (USDA), Department of Defense (DOD), Department of Energy (DOE), Department of State (DOS), General Services Administration (GSA), Interstate Commerce Commission (ICC), Tennessee Valley Authority (TVA), and U.S. Postal Service (USPS).

ESF 2, ***Communications***, assures the provision of federal telecommunication support to federal, state, and local response efforts following a presidentially-declared emergency, major disaster, extraordinary situation and other emergencies. The lead agency is the **National Communications System** (NCS) and the support agencies are USDA, the Department of Commerce (DOC), DOD, the Department of the Interior (DOI), DOT, the Federal Communications Commission (FCC), the Federal Emergency Management Agency (FEMA) and GSA.

ESF 3, ***Public Works and Engineering***, includes technical advice and evaluations, engineering services, construction management and inspection, emergency contracting, emergency repair of wastewater and solid waste facilities, and real estate support for the stated purposes. The lead agency is the **DOD (U.S. Army Corps of Engineers)**, and the support agencies are USDA, DOC, DOE, the Department of Health and Human Services (DHHS), DOI, the Department of Labor (DOL), DOT, the Department of Veterans Affairs (VA), the Environmental Protection Agency (EPA), GSA and TVA.

ESF 4, ***Firefighting***, provides for detecting and suppressing wildland, rural, and urban fires resulting from, or occurring coincidentally with, a catastrophic earthquake, significant natural disaster or other event requiring federal response assistance. The lead agency is the **USDA (Forest Service)**, and the support agencies are DOC, DOD, DOI, EPA, and FEMA.

ESF 5, ***Information and Planning***, provides for the collection, processing, and dissemination of information about a potential or actual disaster or emergency to facilitate the overall activities of the federal government in providing response assistance to an affected state. The lead agency is **FEMA** and the supporting agencies are USDA, DOC, DOD, the Department of Education (DOEd), DOE, DHHS, DOI, the Department of Justice (DOJ), DOT, The Department of Treasury (TREAS or DOTr), the American Red Cross (ARC), EPA, GSA, The National Aeronautic and Space Administration (NASA), NCS, the Nuclear Regulatory Commission (NRC) and the Small Business Administration (SBA).

ESF 6, ***Mass Care***, includes coordinating efforts to provide sheltering, feeding, and emergency first aid following a catastrophic earthquake, significant natural disaster or other event requiring federal response assistance; to operate a Disaster Welfare Information System to collect, receive, and report information about the status of victims and assist with family reunification within the disaster area, and to coordinate bulk distribution of emergency relief

supplies to disaster victims following a disaster. The lead agency is the **ARC** and the support agencies are USDA, DOD, DOD, DHHS, the Department of Housing and Urban Development (DHUD), DOT, VA, FEMA, GSA, and USPS.

ESF 7, ***Resource Support***, provides logistical/resource support following a catastrophic earthquake, other significant natural disaster or other event requiring federal response. The lead agency is **GSA** and the support agencies are USDA, DOC, DOD, DOE, DHHS, DOL, DOT, VA, FEMA, NCS, and the Office of Personnel Management (OPM).

ESF 8, ***Health and Medical Services***, provides coordination assistance to supplement state and local resources to respond to public health and medical care needs following a significant natural disaster or man-made event. The lead agency is the **DHHS (U.S. Public Health Service)**, and the support agencies are USDA, DOD, DOJ, DOT, VA, the Agency for International Development (AID), ARC, EPA, FEMA, GSA, NCS, and USPS.

ESF 9, ***Urban Search and Rescue***, describes the use of federal urban search and rescue assets following an event requiring a federal response. The lead agency is **FEMA** and the supporting agencies are USDA, DOD, DHHS, DOL, DOT, AID, EPA, and GSA. (Change 2 to the FRP, effective February 3, 1995, installed FEMA as the primary agency for ESF 9, replacing DOD. FEMA maintains an Urban Search and Rescue program nationally, and is in continuous contact with local and state agencies that habitually conduct rescue operations and possess specialized equipment and capabilities.

ESF 10, ***Hazardous Materials***, provides federal support to state and local governments in response to actual or potential discharge and/or release of hazardous materials following a catastrophic earthquake or other catastrophic disaster. The lead agency is **EPA** and the support agencies are USDA, DOD, DOE, DHHS, DOI, DOJ, DOL, DOS, DOT, FEMA, GSA, and NRC.

ESF 11, ***Food***, identifies, secures, and arranges for the transportation of food assistance to affected areas following a major disaster or emergency or other event requiring federal response. The lead agency is **USDA (Food and Nutrition Service)**, and the support agencies are DOD, DHHS, DOT, ARC, EPA, and FEMA.

ESF 12, ***Energy***, facilitates restoration of the nation's energy system following a catastrophic earthquake, natural disaster, or other significant event requiring federal response. The lead agency is **DOE** and the support agencies are USDA, DOD, DOS, DOT, GSA, NCS, NRC, and TVA. In February 1995, Change 4 to the FRP updated this ESF.[2]

---

[1] FRP, 14.

[2] Federal Emergency Management Agency, *The Federal Response Plan*, (Washington: U.S. Government Printing Office, 1992, with changes).