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# Vulnerability assessment and mitigation planning in Clark County, Nevada: The challenges of policy implementation in the intergovernmental arena

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**Vulnerability Assessment and Mitigation Planning in Clark County, Nevada:  
The Challenges of Policy Implementation in the Intergovernmental Arena**

**By Angelina L. Evans**

Submitted in partial fulfillment  
of the requirements for a

**Master of Public Administration  
Greenspun College of Urban Affairs  
University of Nevada, Las Vegas  
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## **Abstract**

As a result of recent federal legislation, Clark County, Nevada has been charged with conducting a comprehensive vulnerability assessment and implementing a hazard mitigation policy. This research paper identifies the challenges of intergovernmental relations and policy implementation, defines the mitigation and assessment process, and describes the steps taken by Clark County to date. Definition of the legislation, emergency management, and terms relating to the process are provided. Findings reveal that the attempt to implement a federal program in an intergovernmental arena meet predicted challenges and describes how these challenges have affected Clark County's ability to successfully implement policy.

## **Introduction**

Clark County is no stranger to natural disaster. Drought, high winds, extreme heat, and earthquakes are among the risks faced by those living in and around the Las Vegas Valley. When disaster does strike lives are lost, property is destroyed, and services are interrupted. The time and expense of recovering from a disaster can be immense. Advanced technology and learning from past experiences allows for anticipation of and preparation for disaster, including natural disasters. Through careful analysis of the risks to the population and infrastructure of Clark County, it is possible to reduce a disaster's effect and keep people and property out of harm's way.

Recent legislation and amendments to existing legislation have resulted in Clark County being required to conduct both community vulnerability assessment and an all-encompassing disaster mitigation plan. These actions, ordered by the US Congress' passing of the Disaster Mitigation Act of 2000 (DMA 2000) were mandated first to Nevada and then to Clark County and its entities. Legislation requires that all natural hazards posing a risk to the population and structures of Clark County be considered in the plan. The purpose of such planning is to prevent loss of human life and damage or destruction of structures as well as to assure that critical facilities are able to maintain operation and services in the event of a disaster. Compliance with DMA 2000 is required in order to obtain post-disaster funding through the Hazard Mitigation Grant Program as of November 1, 2004.

Comprehensive vulnerability assessment and mitigation planning are multi-step tasks that take a combined effort and large amount of time to implement. This research focuses on the beginning steps of the vulnerability assessment and analyzes Clark County's attempt to implement this portion of DMA 2000. The particular method that Clark County officials chose to follow as well as challenges faced and progress made will be discussed.

This paper consists of four sections. First, a review of what existing literature and research reveals about coordinated intergovernmental efforts, policy implementation, and emergency management planning is provided. The methodology utilized to date by Clark County in an effort to comply with DMA 2000 as well as findings regarding challenges faced in attempting to implement DMA 2000 are then described. Finally, future research potential is presented.

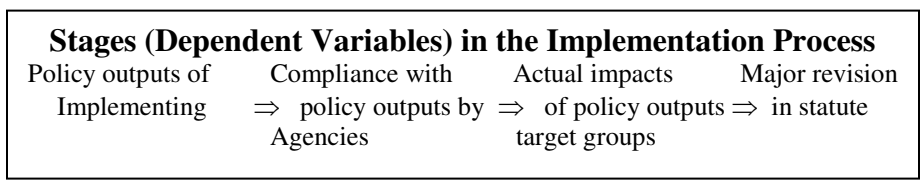
## **Review of Literature**

### **Policy and Program Implementation**

Following the passing of a law in congress, the wheels must begin to spin in order for the law, whether it is a policy or a program, to be implemented. In his book, *The Implementation Game: What Happens After a Bill Becomes a Law*, Eugene Bardach (Bardach, 1977) uses a metaphor to explain this process and the functions at work. He compares the policy or program to a machine, created by a blueprint that is the legislation mandating the item that must be implemented. The machine has been created to fix a problem, reduce federal spending and lessen the effects of disaster in the case of the Disaster Mitigation Act of 2000. In order for the machine to be effective, it must be clear as to what the machine is supposed to do, how it is supposed to do it, and who and how it will serve. If these components of the machine are not clear, implementation of the policy or program will become difficult as it trickles through the layers and agencies of government. The original objectives of a policy are generally only a hint of what the actual outcome of implementation will be. The ultimate result of policy depends on the method of implementation. Implementation is defined as those events and activities that occur after the issuing of authoritative public policy directives, which include both the effort to administer and the substantive impacts on people and events (Mazmanian and Sabatier, 1983). While challenges faced trying to enact legislation have often times been considered trivial, chance, or blamed on particular circumstances, research recognizes repeated behaviors that occur as governments attempt effective implementation.

Giandomenico Majone and Aaron Wildavsky, in their article “Implementation as Evolution,” explain that policies are continuously transformed by implementation actions and that implementation consists of an altering of objectives in order to correspond with resources available and that acting to implement a policy inevitably leads to changing the policy (Mazmanian and Sabatier, 1983). The challenges that are faced in implementing a policy often result in a pattern of reformation of the original “machine” as implementation occurs.

Challenges facing policy and program implementation include the several levels involved (intergovernmental relations), resources (technical, financial, and staffing), behaviors, agendas and priorities, decision making issues, allocation of financial resources from the mandating agency, attitudes and response of constituents, and the commitment and leadership skills of those involved in implementation. (Mazmanian and Sabatier, 1983; Bardach, 1977). These challenges result in major revisions to a policy, as displayed by Mazmanian and Sabatier (1983) in the chart below.



A policy or program is a result of a bill, which passes through congress, and becomes a law. Once the law is passed, the enforcing federal agency begins the steps necessary to enact the law, generally assigning the task to agencies at the state or local level. In the interim, the law may be subject to court cases, resulting in changes, should opposition to the law exist. Once the



state and/or local levels have assumed the responsibility of implementation, the law is placed in the hands of particular agencies. The director(s) of the agency may assume the responsibility or delegate a portion of the work to his or her employees and in the case of DMA 2000, collaborating agencies and the public. It is assumed that those involved possess an understanding of the objectives and purposes of the legislation. However, interpretation and the challenges of implementation discussed in this section tend to lead to the altering of the original policy. Legislation is often vague, leaving implementers with some uncertainty as to expectations as well as enabling them to read their own interpretations into the law (Nice, Fredericksen, 1995). A metaphor that may be used to describe this issue is the child's game of telephone. The message changes as it is whispered from one child to the next until the final child reveals a message much different than the message whispered by the initial child.

Federal policies generally represent federal priority and include an incentive for implementation. The priority of the federal government may not coincide with the priorities of the local level and incentives offered by the federal government may or may not entice compliance (Nice, Fredericksen 1995). If the incentives are not enough to encourage compliance, the local government may not take the steps necessary to implement policy. Another challenge arises after implementation considering the large and growing number of local governments making it difficult to monitor and enforce compliance.

Policy implementation is a political process that, due to the nature of our government, involves many levels of government and is subject to change along

the way. Regardless of how small or large the policy at hand is, a policy will meet resistance and revision before it is implemented at its final destination to serve its intended purpose.

### Intergovernmental Relations: Coordination and Cooperation

Federalism, defined as, “a system of government in which power is divided between a central authority and constituent political units,” (American Heritage Dictionary, 2000) allows states the ability to make and enforce decisions in their given jurisdiction independent of federal involvement. However, the relationship between the federal government and state governments (and their entities) includes a financial reliance, by states and localities, on the federal government and in return for financial assistance, compliance with federal mandates. While financial assistance may provide incentive enough for state and local governments to comply, the federal government may also wield the power of the Supremacy Clause. Although states do possess and cling tightly to specified powers, this clause typically makes those laws outlined by the United States Constitution and federal legislation superior to state and local laws. If a state or local government contradicts legislative action at the federal level, the legislation at the federal level may preempt the state or local legislation under the Supremacy Clause, requiring compliance with federal mandate (AP Government, 2003).

As previously stated, mandates are often times attached to incentives and often come in the form of federal grants or loans. During the 1960’s the federal

system underwent a transformation including the number of federal grant-in-aid programs increasing. As more and more communities increased their dependence on federal funding, the federal government increased their involvement in community affairs and policy making. Federal aid expenditures grew from \$4,935 million in 1958 to \$25,029 million in 1970. This amount has continued to grow, with the United States Census Bureau reporting intergovernmental revenue to be \$291,949,750 billion in 1999-2000 (US Census Bureau, State and Local Government Finance). Due to the origin of the money being federal programs, federal supervision and control are part of the package. Federal programs, such as those created to fight poverty in the Economic Opportunity Act of 1964, had a national purpose. Issues arose when the national purpose contradicted the local purpose and priorities, but national purposes tended to take precedence when a financial incentive was attached (O'Toole, 1993). Not only did the federal government mandate how their money must be spent, measures were also set in place to monitor spending and assure that money allotted to the states for a specific purpose was in fact spent in the manner intended and not on a local priority. This system of "carrots and sticks" continues today with the idea that federal money meaning compliance with federal priorities and non-compliance resulting in a loss of funding.

The restructuring of federal support and reliance that occurred during the 1960's allowed federal agencies to pick and choose which state and local agencies they wished to work with and the conditions under which funding would be provided. In some cases federal administrators chose to charge existing

agencies with federal mandates while other cases resulted in the creation of new agencies specific to the purpose at hand.

With the increased involvement of the federal government in state and local affairs came a debate over which type of federalism the United States was modeling, cooperative or dual federalism. In dual federalism, the state and federal governments possess separate and independent powers. Cooperative federalism, which more closely defines the post-1960's transformation system, results in greater shared responsibility and levels relying upon each other in part to survive and succeed (O'Toole, Jr. 1993). Argument exists that federal government powers extending or intermingling with local governments leads to the weakening of the local government. Eisenhower, while running for president, advocated for the preservation of state and local control in order to maintain the foundation upon which our country was built. While a case does exist for federal intervention and the promotion of a national purpose and comprehensive policy, just a strong of case exists for the maintaining of local authority.

Not long after the federal government became a regular player in state and local government, it was realized that cooperation and coordination problems existed. Grant-in-aid programs were developed with a program approach, treating each program or incentive as an independent case. This resulted in the lack of a master or strategic plan, confusion, and lack of coordination between government levels and agencies. It became difficult to determine which agencies took precedence when contradiction of interests arose and became clear that if coordination was to become a reality in the community, a need exists for

someone to be able to say that when inter-agency conflict occurs, one practice or project is to prevail over another (O'Toole, Jr. 1993). In an attempt to improve coordination between agencies and levels of government, policy makers chose a system of mutual adjustment, which promotes negotiation among agencies that are considered equal instead of a system of central direction, which would have created more of a hierarchical system. This action was taken when it became clear that coordination and cooperation among intergovernmental agencies was not an easy task.

While the focus turned to improving cooperation and coordination in an effort to make government processes smoother, the effort to do so instead resulted in additional layers of government as more players became involved. Beyond the federal, state, and local governments, counties, towns and townships, neighborhoods, and new agencies were among groups and governments desiring a role in policy and decision-making. The rise in the number of individuals and agendas involved in carrying out federal programs created a need for competent leaders with the ability to plan, initiate, and coordinate effectively (Sundquist, James and Davis 1969). Federal programs are reliant on strong leadership and structured community institutions. In order to assure the success of the mandate, a community must have available the necessary resources and be willing to commit them to the project at hand. If cooperation is expected, the agency charged with facilitating the implementation process must possess the respect of the cooperating agencies and should not hold a competitive interest in the matter.

## Emergency Management, Definitions

Mankind has faced natural disaster and devastation throughout time, responding and rebuilding as damage occurs. Realizing that simply responding to a disaster was not enough and seeking a more pro-active approach, the 1990's were declared the International Decade for Natural Disaster Reduction. This proclamation called for an anticipation of natural disasters and a reduction of their effects through hazard mitigation. Mitigation, defined as, "advanced actions to lessen the impact of disaster on social and built environments," became an important step in comprehensive emergency management (Drabeck, Thomas and Hoetmer 1991). Mitigation goes a step further than simply being prepared for a disaster as mitigation efforts strive to reduce the impact of a disaster through structural and non-structural actions. Adding mitigation to the process resulted in four phases of emergency management; preparedness, response, recovery, and mitigation. While this research focuses on the mitigation phase, it is important that the remaining phases be identified as all phases are set into motion by a disaster and overlap each other. These phases, presented in the following order by International City Manager's Association, are the four phases of comprehensive emergency management (Drabeck and Hoetmer, 1991).

**Preparedness:** Action taken prior to a disaster occurring to develop the plans and systems of emergency operations and emergency management.

**Response:** Action taken immediately before, during, and directly after a disaster. The purpose of response is to minimize personal injury and damage through emergency functions. Emergency functions may include warning systems, evacuation, search and rescue, and providing food, shelter, and medical services.

Recovery: Occurs immediately after a disaster strikes and includes the efforts to restore services in the area affected and bring community back to a normal state. Recovery activities may include damage assessment, removing debris, and restoring supply of necessary survival items. Recovery also has a long-term component, which includes the creation of mitigation plans based upon the events of the recent disaster.

Mitigation: Mitigation may take place as a result of a prior disaster that is likely to re-occur or in anticipation of a different type of disaster. The purpose of mitigation is to reduce risk through planning for a disaster and may include evaluating and planning land use, creation of management plans in areas at risk, relocation or strengthening of structures in harms way, implementing codes and policy, and educating the public.

Although acts mandating hazard mitigation planning are drafted and passed at the federal level and directed first to the states and then to individual localities within each state, it is at the local level that planning must occur. Mitigation plans are specific to the types of hazards that pose a risk to individual communities and the infrastructure located within. Therefore, specific planning must occur at the local level and extend upward in an effort to create a comprehensive national disaster hazard mitigation program. Officials must follow three steps in this process; identification, analysis, and strategy preparation. (Drabeck and Hoetmer, 1991) In identifying hazards posing a threat to their community, officials should consider all potential hazards and their characteristics, the locations at which they have historically occurred and are likely to occur again, the probability of occurrence or re-occurrence, the impact on livelihood and property, and what actions are currently underway to reduce damage from the identified hazard. Analysis must include analyzing risks in the event of the disaster occurring, the vulnerability of the population and property of the community to injury or damage, and estimated economic loss. Strategy

preparation includes preparing the plans, recommending plans for approval, and maintaining and updating plans as necessary (Drabeck and Hoetmer 1991).

While mitigation efforts may be applied to natural or man-made disasters, DMA 2000 requires only natural hazard mitigation which would include damage caused by floods, hurricanes, tornadoes, earthquakes, soil problems, winds, or any other damage that occurs as a result of a force of nature. People and property are affected by such hazards and mitigation takes both into consideration, prioritizing first human life and second property.

Two forms of mitigation actions exist, structural and non-structural. Structural mitigation actions strive to contain or lessen the effects of a hazard through the use of actual, physical structure. When attempting to mitigate disaster by use of structural efforts a focus is given to strengthening exposed infrastructure to withstand the effects of a disaster. Examples of structural mitigation include building dams or dikes to prevent flooding or relocating buildings directly in harms way. Non-structural mitigation involves a policy approach and includes such actions as adopting and enforcing codes and regulations, acquiring land that is considered at risk to prevent unsafe usage, and providing preferential taxation and insurance rates based on a property owner's proximity to the hazard risk area.

In order to effectively assess community vulnerability, officials on the local, state, and federal levels must work together and offer both financial and personnel resources. Local emergency management officials generally lead the effort to assess vulnerability and implement mitigation and often times face



resistance for various reasons. These reasons include costs, time, personnel commitment, and contradiction of priorities. The outcome of plans generally result in regulations or programs that not all participants agree with, making decision making difficult. Public, private, and non-profit agencies must participate in order to create a comprehensive vulnerability assessment and mitigation plan. A further challenge to the process of mitigation is the fact that, due to growth and changes in population and infrastructure, plans must be updated regularly. Emergency Managers must face resistance and promote mitigation by educating the community on its benefits. These officials must be able to convince community leaders, policy makers, and the public that while expenses are incurred and sacrifices are made, the benefit of mitigating disaster outweighs the costs. The case must be made that preventing disaster saves lives and property and costs less than repeatedly recovering from disaster.

## **Methodology: The Vulnerability Assessment Process and Mitigation**

### **Planning Undergone by Clark County, to Date**

In order to comply with the Disaster Mitigation Act of 2000, the state of Nevada and Clark County has begun the chore of assessing vulnerability and planning mitigation efforts. During this portion of the paper, focus will be given to the vulnerability assessment steps taken thus far (steps one through three) and the progress made since the implementation process began during the summer of 2002. Discussion will include the model Clark County is following and the steps involved, progress made to date, participating individuals and agencies and their roles, and what the county is yet to achieve to complete implementation requirements.

### **Disaster Mitigation Act of 2000**

In an effort to curb the disaster-repair-disaster cycle and reduce federal spending in the area of emergency response, congress passed the Disaster Mitigation Act of 2000 on October 30, 2000 (Public Law 106-390). This act amends the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988 and sets into place a requirement for state, local, and tribal governments to create and implement hazard mitigation plans. The primary goal of this legislation is to identify where hazards are occurring and re-occurring, where disaster funds are being spent, and what steps can and will be taken to mitigate the effects of the disaster. Ultimately, DMA 2000 aims to establish a national disaster hazard mitigation program in order to reduce the number of lives as well

as structures lost. Plans are required to be submitted for review by January 30, 2004 and as an incentive to create and implement pre-disaster plans, the federal government has ordered that states without such plans will not be eligible for hazard mitigation funding (post-disaster relief) beyond this date.

The verbatim definition of the act includes “to authorize a program for predisaster mitigation, to streamline the administration of disaster relief, to control the Federal costs of disaster assistance, and for other purposes” (DMA 2000). DMA 2000 focuses on natural disasters and requires states to identify and assess hazards that pose a risk to their community. The act requires localities to consider historical damage in their area. Specifically, hazards that have repeatedly caused damage in a given area and the area affected by the given hazard are to be targeted to prevent repeat damage. Beyond preventing avoidable damage to property and loss of life, the act states that planning should also assure that critical services and facilities, such as government buildings and emergency response, are able to maintain operation in the event of a disaster.

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#### Implementing DMA 2000 in Clark County, Nevada

The Clark County Office of Emergency Management has been assigned the task of carrying out Clark County’s vulnerability assessment and mitigation planning. The ultimate goal of this effort is the creation of a comprehensive local mitigation plan. The purpose of the resulting plan is to represent Clark County’s “commitment to reduce risks from natural hazards, serving as a guide for decision makers as they commit resources to reducing the effects of natural

hazards” (DMA 2000). In order to assure an all-encompassing plan, it is required that all communities within Clark County as well as local and regional agencies in the county be involved in the assessment and planning stages. Further, business owners, private and non-profit agencies, stakeholders, and the general public are required to be allowed to have an input opportunity.

### Guidelines

The Disaster Mitigation Act of 2000 did not provide a tutorial or step-by-step process that planning teams are required to follow. Instead, guidelines have been provided and communities are allowed some choice in the means by which they will produce the necessary final product. By allowing localities the freedom to choose the process or model that best fit their particular community and resources, the federal government has provided localities with ownership of their assessment and planning process. Guidelines state that the plan must include documentation of who was involved (public and private) in the planning process and the process undergone to develop the plan. A risk assessment, identifying and prioritizing hazards that pose a risk to Clark County, is the first required step. This assessment (also referred to as vulnerability assessment) is to include a summary of each hazard identified and the potential impact of each particular hazard. Clark County, due to its political make-up, opted to create a multi-jurisdictional plan. Therefore, risk assessment is required to identify risks to the entire county. Following the risk assessment step, a mitigation strategy is required to be decided upon based on reducing the risks of hazards identified

during risk assessment. The strategy section must to include a description of mitigation goals to reduce vulnerabilities, identification and analysis of mitigation policy in place or in the works, and an action plan prioritizing and explaining implementation and administration actions. Once the plan is completed, a maintenance plan must also be established to assure monitoring, evaluating, and updating the mitigation plan every five years (Code of Federal Regulations, Title 44).

Upon completion of the risk assessment and mitigation plan, the entire document will be submitted first to the state and then to the FEMA Regional Office for review and approval.

#### Steps taken by Clark County

Clark County managers stepped up to face the task of complying with DMA 2000. Jim O'Brien, Manager of the Clark County Office of Emergency Management, recognized that accomplishing the assessment portion of the act would be the most straightforward if a tutorial were followed. After reviewing several available plans and tutorials specific to risk assessment on the internet, Mr. O'Brien chose to model Clark County's vulnerability assessment after the North Carolina Vulnerability Assessment Tutorial (the tutorial). The Department of Commerce's National Oceanic and Atmospheric Administration (NOAA) Coastal Services Center developed this tutorial's methodology. This operational template was chosen in part because it implemented and relied upon the use of a Geographic Information System (GIS) to store, map, and analyze data. The GIS

Department of Clark County, offering a mature collection of data to assist in the completion of the tutorial, became an influential participant in the assessment and planning process.

The NOAA tutorial outlines seven steps in a vulnerability assessment. The steps are hazard identification, hazard analysis, critical facilities analysis, societal analysis, economic analysis, environmental analysis, and mitigation opportunities analysis. Within each of the seven steps exist sub-steps to be completed sequentially and build upon each other. Steps and sub-steps are displayed below.

#### Step 1-Hazard Identification

- 1a: Identify Hazards
- 1b: Establish relative priorities for your hazards

#### Step 2-Hazard Analysis

- 2a: Map risk consideration areas for hazards.
- 2b: Assign scores within risk consideration areas, where possible.

#### Step 3-Critical Facilities Analysis

- 3a: Identify critical facilities categories.
- 3b: Complete a critical facilities inventory.
- 3c: Identify intersections of critical facilities with high-risk areas.
- 3d: Conduct vulnerability assessment on all critical facilities.

#### Step 4-Societal Analysis

- 4a: Identify areas of special consideration.
- 4b: Identify intersections of special consideration areas with high-risk areas.
- 4c: Conduct a general inventory of special consideration/high-risk locations.

#### Step 5-Economic Analysis

- 5a: Identify primary economic sectors and locate economic centers.
- 5b: Identify intersection of economic centers and high-risk areas.
- 5c: Conduct general inventory of high-risk economic centers.
- 5d: Identify large employers and their intersection with hazard risk areas.
- 5e: Conduct vulnerability analysis on structures of large employers as critical facilities.

#### Step 6-Environmental Analysis

- 6a: Identify secondary hazard risk consideration sites and key environmental resource sites.
- 6b: Identify intersections of secondary risk sites, environmentally sensitive areas, and natural hazard risk consideration areas.
- 6c: Identify key environmental resource locations and their proximity to secondary risk sites.
- 6d: Conduct vulnerability analysis on priority secondary risk sites as critical facilities.

#### Step 7-Mitigation Opportunities Analysis

- 7a: Identify areas of undeveloped land and their intersection with high-risk areas.
- 7b: Inventory high-risk undeveloped land.
- 7c: Assess the status of your existing flood insurance program participation.

The first step was to identify the hazards posing a threat to Clark County.

The first sub-step of the hazard identification process consisted of introductory and brainstorming sessions held on July 15<sup>th</sup> and August 12<sup>th</sup>, 2002 during which participants defined vulnerability (susceptible to physical or emotional injury) and created a comprehensive list of threats and vulnerabilities within Clark County.

Officials representing Clark County, Boulder City, North Las Vegas, the University of Nevada, Las Vegas, City of Las Vegas, City of Mesquite, and City of Henderson attended this meeting. This meeting resulted in two lists, natural and human (man-made) risks.

## Natural

Wind (dust, high wind, traffic)  
Flood (Dam failure and river flood)  
Flash Floods  
Tornado  
Earthquake  
Drought  
Wildfire  
Severe Weather (Microburst?, Lightning, Heat)  
Avalanche and Slides  
Volcanic Ash  
Natural Epidemic  
Invasive Species

## Human (Man-made)

Aircraft Crash  
Civil Disturbance  
Dam Failure  
Explosives  
Fire  
Fuel Storage  
Utility Failure  
Hazmat Disaster  
Radiologic (High and low level)  
Water System Failure  
Transportation System  
Terrorism  
Pipelines  
Communication  
Mines  
Landfill

Recognizing that the meeting did not include complete representation, a follow-up memo was sent to “partners in public safety” inviting further input and providing information on the process.

Once hazards presenting threat to Clark County were identified, the next step was to prioritize risks in order to decide which hazards posed the greatest



threat and should be focused upon as a part of the mitigation plan. In order to weigh each hazard against the others, the tutorial provided a formula to apply to each hazard. This formula took into account the frequency at which the hazard has occurred in the past, the area impacted when the disaster does occur, and the magnitude. Frequency was scored in terms of time, area of impact categorized as either the entire county, a township/range block, census tract, block group, or site (x,y coordinate), and magnitude ranged from federal disaster to a specific, insured loss. Below is the formula followed and scoring rubric.

$$\text{(Frequency + Area of Impact) x Magnitude} = \text{Total Score}$$

	<b>Frequency</b>	<b>Area of Impact</b>	<b>Magnitude</b>
Score			
<b>1</b>	10+ years	Site (x,y)	Insured Loss
<b>2</b>	6-9 years	Block Group	Local
<b>3</b>	1-5 years	Census Tract	State
<b>4</b>	2-12 months	Township, Range	Federal Emergency
<b>5</b>	0-30 days	County	Federal Disaster

Decisions were made by the collaborating group as to what score to assign each hazard in each category. The group referred to Office of Emergency Management historical records to determine frequency and magnitude scores. After each hazard was assessed, the formula produced the following scores.

<b>Natural Hazards</b>	<b>Score</b>
Avalanche/Slides	8
Drought	<b>28</b>
Earthquake	<b>25</b>
Epidemic	<b>40</b>
Flash Flood	<b>32</b>
Flood	<b>25</b>
Invasive Species	18
Severe Weather	18
Tornado	14
Volcanic Ash	18
Wildfire	<b>32</b>
Wind	18

<b>Human Hazards</b>	<b>Score</b>
Aircraft Crash	12
Civil Disturbance	20
Communications Infrastructure	16
Dam Failure	<b>30</b>
Epidemic (Bio-Terror)	<b>25</b>
Explosives	10
Fuel Storage Disruption	24
Gang Activity	14
Hazardous Materials (HazMat)	14
Mines	8
Pipelines	18
Radiologic (Low-level waste)	<b>28</b>
Structural Fire	6
Terrorism Threats	12
Transportation Systems	24
Utility Failure	<b>27</b>
Waste Treatment	21
Water System Failure	<b>28</b>

After scores were assigned to each disaster, the team used the scores as a tool to prioritize risks and decide which risks would be focused upon during the vulnerability and mitigation planning process. Scores ranged from a total score of six in the case of structural fires to 40 in the case of a natural epidemic. Statistical analysis resulted in the following scores:

	<b>Natural Hazards</b>	<b>Human Caused Disasters</b>
<b>Mean</b>	23	18
<b>Median</b>	21.5	17
<b>Mode</b>	18	12

Because time limitations prevented the option of analyzing each hazard, the team decided upon a cut-off score of 25. Hazards scoring 25 or higher would be assessed and included in planning, and hazards scoring 24 or lower would not be focused upon during this process. The final selection included drought,

earthquake, natural epidemic, flash flood, flood, and wildfire in the natural hazard category and dam failure, bio-terror epidemic, utility failure, and water system failure in the human-caused category. The creation of this list satisfied step 1b, establishment of priorities for identified hazards and thus completed step 1.

Analysis of the identified hazards was the goal of step two. This step included GIS as a major component as the first sub-step was mapping the risk consideration areas. The purpose of this step was to target the priority *areas* on which to focus. Existing county GIS files as well as data acquired from appropriate agencies were utilized in order to map hazards as they had historically occurred within Clark County. An attempt was made to collect data that best represented historical disaster occurrence and damage. In some cases, and as was noted in the tutorial, there were limitations to existing data and analysis was forced to be based upon what data was available. Several data files were outdated or were originally created for an independent project and then forgotten. For example, a file of earthquake faults included only those faults in the central portion of the Las Vegas Valley and did not include the outlying, but potentially vulnerable, areas. Because this is ultimately a Clark County project, access to Clark County GIS data is unlimited, but data from other entities depends on their cooperation and the quality of their data. In creating maps, it became a case of the maps being only as accurate or current as the information provided. Data collection involved communicating with officials from such agencies as the Bureau of Land Management, Bureau of Reclamation, and

Regional Flood Control and relied heavily upon communication and making the correct contacts.

Once data was compiled and ready to be mapped, it became necessary to create region boundaries. Boundary options discussed included township/range blocks, commission districts, and regions created solely for the purpose of risk mapping. Ultimately, five regions dividing the county were created using existing and practical boundaries (see Appendix A). Interstates 15 and 95 as well as Highway 93 served as boundary lines as did state and county lines. Gaps in boundaries were resolved by extending existing lines to close each region. This process was completed using GIS, resulting in a shapefile, a GIS map file, displaying five regions dividing Clark County.

Following the mapping of hazards and the creation of a power point presentation to allow analysis and scoring, a meeting was held to attempt to assign scores to each consideration area (region). A copy of this presentation, including maps, can be found in Appendix B. This meeting, held February 11<sup>th</sup>, 2003, was attended by individuals representing the City of Las Vegas Emergency Management and GIS departments, the State of Nevada Division of Emergency Management, Boulder City Emergency Management, Clark County Emergency Management and GIS Management Office (GISMO), North Las Vegas Emergency Management, the Las Vegas Fire Department, and the University of Nevada, Las Vegas (UNLV) Environmental Studies Program. Representation by other agencies and individuals had been encouraged as well.

Two scoring rubrics were presented following the presentation of mapped hazards in an attempt to assign scores, per hazard, to each region (see Appendix C and D). The goal of this step was to identify which regions obtained the greatest risk for each hazard and where to focus assessment and mitigation efforts. Discussion included what factors to consider, as the tutorial did not specify an exact scoring process. This meeting did not result in assigned scores, as there was confusion as to the most appropriate method to use. It became evident that it was difficult to consider hazards independent of their locations or the populations affected by an event. Questions also arose in regards to whether or not an area that did not cause loss of life or structure or economic damage should be considered priority. An example of this was the difficulty in comparing an area of extreme flood danger that was not populated to a heavily populated area with low or moderate flood danger. Attendees could not find sense in assigning the unpopulated area a higher score, yet the particular step of the tutorial did not consider such situations. The meeting adjourned with the understanding that further analysis would need to occur prior to scores being assigned.

In an effort to understand the most effective means of scoring, the input of Dr. David Hassenzahl, an assistant professor in Environmental Studies at UNLV and active participant in the planning process, was requested. During a meeting with Dr. Hassenzahl, discussion suggested that criteria be developed per hazard to allow scoring each hazard independently, rather than attempting to rank hazards using identical criteria. Two options were discussed. The first was

creating criteria specific to each hazard, such as flooding. Regions might be placed in categories such as falls within 500-year flood zone, falls within 100-year flood zone, region does not contain flood zones. The second option, which Dr. Hassenzahl presented in a paper titled “White Paper for the Clark County GIS Vulnerability Assessment Project: Looking Ahead, Designing Mitigation, and Managing Uncertainty,” utilized the FEMA threshold for assistance, which states that a disaster must incur a cost of \$2.50 per person in an impacted area in order to justify federal assistance. Using this method would result in evaluating costs based on assessments of land and structure value and assessing damage by the cost incurred to respond and repair. Regions with a higher assessed value would then be considered more at risk and be focused on as priority.

<b>Cost per person</b>	<b>Score</b>
\$2.50+	5
\$2.01-2.49	4
\$1.51-2.00	3
\$1.01-1.50	2
\$0-1.00	1

While agreeing that the FEMA threshold was the best-fit scoring rubric to use, hazards have not been scored using this method to date. Time limitations and the lack of individuals with risk management expertise or experience has put this step temporary on hold. In order to best utilize current resources, efforts have instead been focused on step three, with an intention of and need to return to step two.

Step three, creating an inventory and maps of critical facilities, is currently underway. Facilities being considered critical include those facilities providing services necessary for responding to a disaster and allowing for the continued operation of infrastructure. Completing this step has involved referring to the tutorial, creating a comprehensive list of critical facilities within Clark County, collecting the necessary information regarding each facility, and mapping critical facilities using GIS in order to identify their intersections with high-risk areas. Information has been gathered through accessing county records and consulting with individuals from the agencies representing the particular facilities. An inventory consisting of all critical facilities, their facility type, name, address, owner or operator, phone number(s), and contacts will serve as an important and required product of the vulnerability assessment (see Appendix E for a sample inventory).

Upon completion of the inventory and mapping, representatives from participating agencies will once again be brought together to conduct a vulnerability assessment on all critical facilities. This will allow for the identification of critical facilities that may be poorly located (in harm's way) or may require measures to be taken to lessen the effects of a disaster on the critical facility and its ability to provide services. Beyond allowing for a vulnerability assessment though, this step also produces an important resource to be utilized in the event of disaster. To date, this is as far as the process has progressed in the tutorial. It is expected that step three will be completed in May 2003, allowing officials to continue on to steps four through seven.

## Structural and Non-Structural Mitigation in Place

While assessing vulnerability has been a goal thus far, another step of the process has also been underway. Prior to the development of a mitigation plan, current policy must be analyzed. In an effort to understand current mitigation policies in place as well as identify mitigation opportunity in Clark County, a spreadsheet was created for each hazard being evaluated. This spreadsheet includes several measures in both the structural and non-structural categories. Structural mitigation measures include action taken to strengthen structures, containment of hazard, and relocation of facilities in harm's way. Non-structural mitigation measures include statutes and ordinances, regulatory actions, and capital improvement programs. Representatives from the agencies most related to each hazard were contacted and provided information specific to their agency. Existing documentation, including existing in-house vulnerability assessments, were reviewed and referenced. This process is on going and will result in a comprehensive narrative of mitigation policy currently in place in Clark County. Individuals working on the process hope to use this document to identify opportunities for further mitigation measures in Clark County. Once gaps in policy and opportunities are identified, the appropriate agencies may increase or implement policy in the necessary areas.



**Research Findings:**  
**Challenges Facing Implementation of DMA 2000 in Clark County, Nevada**

Implementing a new policy is not a simple task. Review of existing literature and research suggested that the process of implementing the Disaster Mitigation Act of 2000 and its provisions would meet the predicted challenges of policy implementation in the intergovernmental arena. These challenges included communication issues, time restraints, budget constraints, and conflict of priority and agenda. Further, the classic issues surrounding federalism have appeared during this process. Because this is an intergovernmental effort, agencies and departments are expected to work together. However, it was the Office of Emergency Management that was charged with the task, resulting of course in this agency being the most concerned with the completion of the task. The agencies not directly charged with the project, yet expected to provide necessary input and man hours, are naturally not as motivated.

The federal government has wielded its power over the state and threatened the loss of federal dollars if localities do not comply. The agencies and individuals attempting this process have clearly needed a motivating factor to complete implementation considering the commitment required. However, the question arises as to whether or not the threat of lost resources is enough to entice compliance or if another factor is resulting in compliance. Throughout the process, skepticism has existed as to whether or not the federal government would really withhold post-disaster funding if Clark County did not meet the requirements of DMA 2000 in time. It is difficult to believe that the federal government would not provide funding in the event of a natural disaster that

caused loss of human life or a large level of property damage. This suggests that the system of federal incentives may not be effective standing alone and that greater underlying motivators must be present.

Regardless of the incentive and Clark County's response to the potential loss of funds, Clark County has shown obvious intent to comply in that the process is moving forward. Time, money, and personnel have been dedicated to this project for a year and documentation of progress exists. While the federal mandate can be attributed to some level of compliance, other factors are motivating compliance as well. Discussion at meetings has revealed not only gaps in current mitigation policy, but also a desire for the existence of a more comprehensive document. Local decision makers recognize that specific areas in Clark County lack policy to protect them from historically occurring hazards. An example of this exists in the case of Mt. Charleston, a rural community in a heavily wooded area of the county. Mt. Charleston is vulnerable to wildfire and yet very few regulatory measures are in place to prevent the start or spread of wildfire. Further, only one route exists as a means of escape from the area in the event of a disaster. Perhaps these gaps in policy and measures are due to a conflict of priorities or a lack of resources. Regardless, bringing individuals together and analyzing policy as a team has resulted in a greater awareness and has been a step forward in making Clark County a safer place to live. Thus, the desire to safeguard our communities and residents may in fact be considered a motivator for compliance. An additional motivating factor is professional reputation. Those charged with leading the project, specifically the director of the

Clark County Office of Emergency Management, have a reputation to uphold in completing the assigned and expected tasks of their position.

In order for progress towards successful implementation to occur, those involved in the process are required to possess a clear understanding of the objectives. One challenge in effectively implementing the provisions of DMA 2000 has been confusion in regards to the objectives. A clear format to follow does not exist and the steps are not outlined. In the case of Clark County, the individual assigned the task of advancing the project did not have an emergency management or mitigation background, making the learning curve steep. Without an initial understanding of the objectives, it became difficult to move forward as a lack of sense of direction existed. As the task of completing the necessary steps has made its way from the mandate itself through the layers of government and into the hands of those responsible for the specific steps, confusion has occurred as to how to carry out the process. DMA 2000 provides a purpose, but lacks specific methodology. While there is some benefit to a lack of mandated methodology (freedom and utilizing a means that best fits a particular community), the lack of guidelines have made the process at times frustrating for individuals not possessing experience in such a project. A large amount of literature and policy in the area of disaster mitigation exists, making concrete interpretation and understanding of expectations difficult. Because the planning was assigned to existing agencies in lieu of creating an agency specific to mitigation planning, the assessment and plan became an additional responsibility for agencies possessing and focused on their own priorities. A lack

of time and personnel as well as agency-related objectives taking precedence over DMA 2000 objectives has made the process of implementation slow.

As described in the literature review, priorities stifle implementation. Several agencies on federal, state, county, and city levels have been involved in Clark County's vulnerability assessment. Naturally, individuals representing their agency tend to prioritize their specific agency's mission. An example of this has occurred when state mitigation planning meetings have centered on earthquake mitigation as a result of the Earthquake Safety agency having large representation. Over representation (or over zealous representation) in one area and under representation (or non-enthusiastic representation) in another area may result in misrepresentation of the risk of specific disaster. Clark County has been very careful in assuring that all hazards are considered and each hazard has appropriate representation.

Communication has posed another hurdle to implementation. Due to the nature of the information required to be documented, agencies are skeptical to share sensitive or protected information. For example, the Las Vegas Valley Water District complied with a request for information, but was unable to share specific details of their operations for security reasons. Many details relating to hazard mitigation include secure information and, considering the current state of our nation and recent breaches in security, officials are reluctant to share sensitive or secure information. The Clark County Disaster Mitigation Plan will be published by FEMA upon completion. While sensitive material will only be referenced and not published, the number of individuals involved in planning

makes sharing sensitive material a risk in itself. The intergovernmental nature of this project in itself has stifled communication. Different entities work different schedules making coordination of communication difficult. Often times messages were not replied to, perhaps due to miscommunication, failure to relay messages, or returning a call in regards to mitigation a low priority.

Ownership of risk had to be alleviated while mapping hazards. The tutorial followed suggested using township/range blocks for mapping purposes. However, the size of Clark County and the large number of township/range blocks made this method impractical. Other options considered were mapping using current incorporated boundaries and the unincorporated land of Clark County or commission districts. Choosing either of these methods would have resulted in political ownership of hazards, potentially creating animosity or skewed policy. Instead, officials chose to create five non-political regions that did not follow any political boundaries.

The size of government in Clark County has presented a challenge as well. Clark County consists of several cities as well as a government of its own. Further, state and federal agencies have jurisdiction in the county and their land and policies must be considered. A comprehensive collection of data has been required and the number of agencies to contact and include have made this process difficult. Again, each of these agencies and offices has their own missions and responding to requests for mitigation policy has proven to not be priority. Agencies also compete for funding and naturally consider their mission

to take precedence over the missions of others, causing communication and representation issues.

The deadline for compliance has also been a factor influencing progress. The original deadline was extended a year, perhaps creating the idea that ample time existed to complete the plan and allowing more urgent tasks to become priority. Therefore, planning efforts have been to be slowed, removing momentum from the process.

Perhaps the largest obstacle or roadblock to smooth implementation has been the fact that local governments are expected to work together. While an incentive was offered and funding provided for the planning process, these factors are not influential to all parties expected to participate. While the community as a whole will benefit from vulnerability assessment and mitigation planning (through less damage during a disastrous event), a tangible reason to become involved or offer resources does not exist. Agencies approached and asked to make a commitment naturally see this process as another task being added to an already busy schedule. Some agencies have jumped on the bandwagon, enthusiastically offering input and providing resources, while others have failed to participate or offer input. This has resulted in over representation in some cases and under representation in others, preventing a truly comprehensive plan from emerging from the process. As is typical, those with an agenda are more apt to become involved for the advancement of their cause, leaving those issues less represented (but perhaps just as urgent) left out. As discussed by Mazmanian and Sabatier, the product resulting from

implementation is dependant on those involved and may vary drastically depending on which agencies are represented. This fact reiterates the importance of inviting input from stakeholders at all levels in order to ensure an equal opportunity for representation as well as a comprehensive document.

Clark County is encountering typical hurdles as they attempt to assess vulnerability and implement the Disaster Mitigation Act of 2000. Progress is being made and a greater understanding of objectives is occurring, but issues of policy implementation and intergovernmental relations will continue to surface as the mitigation planning process advances.

## **Conclusion**

Much work still remains in the completion of a disaster mitigation plan for Clark County. While this research has focused on the vulnerability assessment and beginning steps of planning, several steps are yet to be taken. Further research and work will include continuing through the steps outlined by the tutorial and collecting existing mitigation policy. Research opportunities include analyzing maps as well as gaps in existing policy and opportunities to improve policy and reduce risks. During this process, Clark County may choose to refer to the planning process followed by other localities as models and incorporate their own method as well.

Having not analyzed the progress of other counties or localities, it is impossible to state where in the process Clark County is compared to other areas. Clark County has continued to make progress, regardless of the challenges and obstacles being met. Considering the desires of the leadership in the Clark County Office of Emergency Management, GISMO, and the Emergency Management offices of the individual cities, it is predicted that a plan will be completed as mandated. While compliance will result in a guarantee of federal dollars to assist in response to disaster, the more valued outcomes may be increased communication and the existence of a comprehensive mitigation document. Overall, Clark County residents will benefit in that their lives and property will be more protected in the event of a disaster.



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