



THE ROLE OF CARGO BICYCLES IN DISASTER PLANNING AND EMERGENCY MANAGEMENT

An Evaluation of the Disaster Relief Trials

Abstract

Bicycles are not typically emphasized as a disaster response tool. However, some recent hurricanes and earthquakes have highlighted the effectiveness of bicycles in disasters. Bicycles can be more nimble than automobiles, effective in gas shortages, and can even be adapted to become human-powered generators. Cargo bicycles also retain these functions, while adding a heavy payload capacity. Recently, some community events in the Pacific Northwest have demonstrated the use of cargo bicycles for disaster response and preparedness through competitive races.

This report is the result of an examination of the planning framework and is an evaluation of the effectiveness of Disaster Relief Trials (DRT). DRTs are innovative, empowering, accessible, grassroots organized events that build community. These events highlight the specific uses of bicycles during a disaster situation for citizens and agencies alike. Additionally, DRTs reframe preparedness education and introduce new concepts and tools for emergency managers. The basic model of these community preparedness education events support informal response networks and community resilience goals.

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Presented to the Planning, Public Policy and Management Department at the University of Oregon in partial fulfillment for the degree of Master of Community and Regional Planning

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Acknowledgements

I would like to acknowledge my exit project committee, Dr. Marc Schlossberg and Josh Bruce, for their guidance, support, and willingness to let me sink or swim. I chose to swim.

I could not have completed this without the love of my family: Mitchell, Gail, Rebbie, Juliet, Ruby, Huck, Dov, Nash and Gloria.

Thanks to Jeanie Kirk, Dr. Gerardo Sandoval, Bethany Steiner, Jess Neff, Nick Meltzer, Catherine Fox, LiveMove and Wandering Goat who all work to make the world a better place and who have supported me in their own special ways during this journey.

For Janette and Laurence Dailey.

Introduction

Disasters can occur through natural or manmade situations. Hurricanes, earthquakes, floods, terrorism, wildfires, and biohazards are just a few, but are common emergencies to which communities must respond. In the Pacific Northwest, emergency managers are preparing for a major earthquake that geologists predict occurs every 500 years, and has a one in ten chance of slipping in the next 50 years (Thompson 2011). While emergency managers prepare for the gamut of disaster scenarios, communities on the West Coast are generally more concerned with ground-shaking events because of their unpredictable, widespread, and secondary effects.

Several recent disasters have highlighted the bicycle as an effective, but often overlooked tool in the aftermath of a disaster. Hurricane Sandy victims in 2012 turned to bicycles en masse to travel in and out of Manhattan during the days after the hurricane shut down bridges and caused gas shortages in New Jersey (Goodyear 2012). In Japan, after the 2011 Tōhoku earthquake that caused the Fukushima nuclear meltdown, bicycle shops reported selling their entire stock so that people could get home when the roads were impassable by automobile (Schwartz 2011). And in Kobe, Japan during the 1995 Hanshin earthquake, emergency responders were deployed by bicycle outside the city limits and rode through the rubble-strewn streets treating people who were otherwise unreachable by emergency vehicles (Masoner 2013). Because it can be days before formal mobilization efforts can provide relief, community response can be a critical element in providing immediate disaster relief assistance. Exploring how bicycle transportation fits into the disaster recovery model is a potentially transformational component of emergency management. This report is based on observing the Eugene DRT and interviewing many of the

organizers of the DRTs in Portland and Eugene in order to understand event structure, best practices thus far, and opportunities for other cities to successfully adopt similar events.

The Disaster Relief Trials

The first Disaster Relief Trials (DRT) was held in Portland, Oregon in 2012. Mike Cobb, a Portland-based bicycle enthusiast, fabricator, and designer, watched the aftermath of the 2010 Haitian earthquake unfold thinking more could have been done to provide immediate relief for the people. A major contribution to the 159,000 person death toll was inadequate response and access to relief supplies, potable water, and shelter (Kolbe 2010). When a fellow activist and artist created a project called Domes for Haiti, Cobb asked himself: “What are other novel additions and solutions that could prevent another Haiti?” Cobb quickly made the connection between cargo bicycles and providing relief supplies and conceived of a race that would simulate a disaster situation and give participants a chance to demonstrate their bicycle’s resourceful capabilities (M. Cobb, personal interview, April 18, 2014).

DRTs are bicycle races with the backdrop of a simulated post-disaster scenario. The event mimics “alley cat” races, which originated as informally organized events by bicycle messengers. Typical alley cat races include checkpoints, tasks, and point accumulation to determine the finishing order. The DRTs are based on the



Image 1: A tsunami simulation in Seaside, Oregon, in August 2007. The wooden blocks represent residential dwellings, single-story commercial buildings, and multi-story condominiums or hotels. (Omni Film Productions Ltd./ Scott Spiker) Source: <http://www.cascadiasfault.com/p/history.html>

concept that these checkpoints and tasks could have potential benefits to the community during disaster situations.

The original DRT took place in Portland, OR in 2012 and received moderate coverage from the bike-related blogosphere and local news media outlets. After the inaugural DRT in Portland, the event also quickly spread to Eugene, Oregon and Seattle, Washington in 2013.¹ For all three of these cities, the participants simulate a recovery from a Cascadia subduction zone earthquake.

The Cascadia subduction zone is the intersection of the Juan de Fuca and North America tectonic plates believed to slip approximately every 500 years, and currently the Pacific Northwest is due for such a temblor (Cascadia Region Earthquake Workgroup, 2013). In addition to a massive quake, it is believed that a tsunami will follow shortly after (see Image 1), much like the 2011 Tōhoku quake in Japan. The Cascadia subduction zone earthquake will be catastrophic to many coastal communities, flatten buildings, and disrupt communications, transportation, and services for days, if not weeks or months (Cascadia Region Earthquake Workgroup, 2013). It is the intent of the DRTs to promote the use of bicycles as an important tool and resource for this critical, and immediate disaster aftermath.

Structure of the DRTs

Participants must complete a course and a series of tasks to finish the race. Racers are unaware of the route, checkpoints and many tasks until the hour before the race starts. At certain checkpoints, there are unannounced tasks to simulate the unpredictable nature of a post-disaster scene. Certain tasks must be completed to have a qualifying finish, others simply add minutes to

¹ Advocates in San Francisco, CA and Boulder, CO also attempted to organize events in 2013, but were not successful in their efforts. Boulder experienced a 100-year flood during the event, and San Francisco organizers were unable to complete the logistics to host a successful event.

a racer's overall time if s/he fails to complete it. Riders must obey all traffic laws, wear a helmet, and be self-sufficient (i.e. they must fix all their mechanical problems throughout the race).

Riders are expected to carry up to 100 pounds of cargo and precious supplies, all while navigating certain obstacles to simulate broken road infrastructure. These usually include obstacles like: a 3 foot tall barrier, an 18 inch flood, and stairs. The participants start and finish at the same place. The organizers encourage riders to embody the spirit of the simulation and assist others as needed.

Coinciding Events

Eugene's inaugural event was also dubbed a "cargo bike fair," in the hopes that even those who did not participate would share their bicycles with the spectators and build excitement for these resourceful vehicles (A. McKimmey, personal interview, April 02, 2014; S. MacRhodes, personal interview, April 02, 2014). In Eugene, while participants were on the course, organizers of a local "Kidical Mass" event also held a "Fiets of Parenthood" event in which participants maneuvered through a short obstacle course and teeter-totter with children as cargo. This model of coordinating another bicycle event to coincide with the Disaster Relief Trial is popular.

Interviews showed that organizers in both Portland and Eugene want to maximize this aspect in future events. Although Eugene attempted this their first year, there were problems with keeping people in attendance after the riders left. Observational evidence supported this concern from the organizers. Although the kids' fair and Fiets of Parenthood kept people busy at the start/finish line, the course lacked the sporadic excitement of seeing racers pass throughout the event. Event organizers and partners are looking for ways to expand the audience of the event, often through simultaneous events.

Event Planning

DRTs are organized entirely at the grassroots level. Planning committees are formed in each city and seek to integrate private and public sector participation through partnerships and sponsorships. There has been consistent branding as a result of intentional and direct communication between the Portland event and the satellite cities that have organized their own. In addition, Eugene organizers have tried to stay as true to the original event as possible, in part to pay homage, but also maintain consistency from one city to the next (S.



Image 2: Eugene DRT Logo
(Credit: Stickeen Brand Services)



Image 3: San Francisco DRT Logo
(Credit: Stickeen Brand Services)

MacRhodes, personal interview, April 02, 2014). All event logos were created by Ethan Jewett in a more obvious method to keep consistency amongst the spreading DRT events (see Images 2 and 3). Finances for each event are handled differently, but all are intended to be non-profit events. Organizers' time is given on a voluntary basis. Duties and tasks are dispersed as much as possible, and generally speaking, planning committees are democratic in structure (E. Jewett, personal interview, April 18, 2014).

Context

In order to understand the roles bicycles might play in disaster response, we must first know the context of both bicycle utility and emergency management protocols. The following section describes current and popular use of cargo bicycles, as well as emergency management practices.

Utilitarian Bicycling

Cargo bicycles are high-capacity bikes used to transport various types of goods. There are many different styles of these bikes, but almost all carry loads in the front or rear. While some have built in boxes (see Image 4), others use an improved rear-rack carrying system (see Image 5). The types of cargo people carry is only constrained by physics. People have incredible imaginations for the use of cargo bikes, including but certainly not limited to the images on pages 12 and 13. In essence, the cargo bicycle is probably the most efficient, independent, and utilitarian mode for local transport. While some cargo bicycles have integrated new technologies such as electrical assist motors, the majority of them are solely human-powered vehicles, making them extra resilient in the chaotic and disrupted infrastructure in the aftermath of disaster. The



*Image 4: Front loading cargo bicycle
Source: Soren Solkaer Starbird*

cargo bicycle is a common sight in northern European countries, but in the United States they have only recently become more popular for everyday use (Pennybacker 2009). Bicycle taxis are also a common sight in many Southeast Asian countries particularly, but all over the world as well. In the last ten years, cargo

bicycle sales figures have risen from effectively 0% to 10%, according estimates from representatives of Xtracycle™ (Robert A., personal communication, May 13, 2014).

A number of factors have contributed to the rise of bicycle transportation in the last decade. With the rise of cyclists on city streets, a positive feedback loop occurs when cycling rates increase by influencing potential cyclists who become safer with larger



*Image 5: Rear loading cargo bicycle
Source: Madsen Cargo Bicycles*

numbers and join the existing ranks (Jacobsen 2003). Furthermore, growing numbers of cyclists and advocates push policies, programs, and infrastructure to encourage yet even more riders (Pucher, et al 2010).

For those who describe themselves as bicyclists, they can tell you that both publicity and technology around bicycles have expanded greatly in the last decade. People have turned their cargo bicycles into innovative machines such as blenders, food carts, cell chargers, and even generators for P.A. systems and amplifiers. Innovation and experimentation with bicycles continues to impress the general public, see pages 12 and 13 for a few fun examples of non-traditional and secondary functionality of bicycles.

Examples of Cargo Bike Uses



Image 6: Ice cream tricycle (source: cargobikesystem.com)



Image 7: Telephone repair unit



Image 8: Mobile bar by Metrofiet (Portland)



Image 9: Ethan Jewett's mobile communications unit



Image 10: Produce can be delivered by bicycle (Credit: Richard Masoner)



Image 11: A bicycle powering a cell phone charging station (Source: Rock The Bike).

Community and Disasters

The fun and inclusive atmosphere around bicycle innovations and feats encourages even further inspiration. The Disaster Relief Trials (DRT) are certainly a byproduct of innovation. Through my observations and experience, it became clear that this novel event builds strong foundations in the community that may serve to strengthen the local response to disaster.

Disaster Response Framework

Community is often thought of as an organic social network that is built through common ideologies and proximity. However, communities are also dynamic – they respond to politics, changes in population, environmental concerns, and economics. The inherent adaptability of communities indicates that they can be intentionally built to become resilient to disasters. The conceptual framework of disaster response relies heavily on the correlation between disaster resilience and community resilience (National Research Council 2011). This means that a community is prepared for disaster much in the same way it's prepared to adapt to a wide scope of changing conditions.

However, disaster planning is primarily a top-down planning effort, and response strategies mimic militarized structures to maintain order during the chaos of an emergency situation. The Incident Command System (ICS) is a federal and state planning and management system that coordinates a systematic approach to communication and resources during disaster. ICS was created in the 1970s after a series of California wildfires showed that duplication of efforts, lack of coordination and communication can hinder response time, quality, and efficiency. There are multiple functions of the ICS, including the use of common terminology, integrated communications, a unified command structure, resource management, and action planning. The

system is designed to be used in single jurisdictions, multiple jurisdictions, and both single or multi-jurisdictional with multi-agency support. Furthermore, there are five major management systems within any ICS structure: command, operations, planning, logistics, and finance. These separate sections allow for an efficient handling of public, private and political risks in the face of emergencies (Haddow and Bullock 2003).

Emergency Management Protocol

Formal response begins at the local level first. Police, fire, and emergency medical personnel attend to injuries, rescues, fires, and general dangerous conditions. Emergency management and government officials assist in the response as well. If the local jurisdiction is overwhelmed and response begins to exceed their financial and resource capabilities, protocol exists such that government officials will alert the state governor. If the state feels that the emergency is beyond their capacity as well, the President of the United States is notified and asked to declare a federal emergency by the request of state officials in collaboration with regional Federal Emergency Management Agency (FEMA) staff (Haddow and Bullock 2003).

Collaboration

The National Research Council is the operating arm of the National Academy of Sciences and the National Academy of Engineering. The National Research Council's mission is to “improve government decision making and public policy, increase public understanding, and promote the acquisition and dissemination of knowledge in matters involving science, engineering, technology, and health. The Council’s independent, expert reports and other scientific activities inform policies and actions that have the power to improve the lives of people in the U.S. and around the world” (National Research Council 2014). This council has published several reports

regarding community disaster resilience and public-private collaboration in preparing for disasters.

As can be deduced from the basic understanding of response framework, public and private collaboration is essential in responding to disaster situations. Response requires partnerships from local to federal levels in order to respond and recover from a large scale disaster. In terms of disaster management, it is critical for the full fabric of the community to be engaged, including on an ad hoc basis to help bolster a surge in capacity.

Collaborative relationships often begin with local organizers who have identified specific community needs. The process continues by mobilizing key leaders and relevant stakeholders in the community. Communication strategies and mechanisms that enable information sharing are critical to expanding collaboration to the broader community. Training programs in the use of communication tools may be useful to the organizers, as well as training on how to facilitate communitywide collaboration (National Research Council, 2011, p. 39).

Essentially, the most effective resiliency comes from identifying vulnerabilities and working with all the various stakeholders to create strong partnerships. These partnerships can have other benefits in addition to disaster relief management. For example, successful partnerships can lead to a more sustainable and stable community. Communities that have the greatest potential for collaborative efforts to achieve disaster resilience are those that unite people around values and purpose (National Research Council 2011). The information in the National Research Council's publications around community resilience demonstrates that there is a close bond between

resilient communities, and sustainable social, economic, and environmental practices. Although disasters can have broad impacts that require the assistance of public agencies, community resilience stems from the ground up, consists of public and private collaboration, and engages the full fabric of the community (National Research Council 2011). While professional practitioners are necessary to engage citizens and mitigate disaster at the community level, citizens must assess and address their own vulnerabilities to hazards, identify and invest in resources, networks, and communication to enhance their communities' capacities to recover from disaster (Coles and Buckle 2004; Norris et al 2008).

In this vein, and also borne out of California disasters, was the idea of the Community Emergency Response Team (CERT) model, which is the most localized form of public-private collaboration for disaster resilience that exists today in the United States. The principle of the CERT program, which may vary in name by jurisdiction (Portland refers to them as Neighborhood Emergency Teams; San Francisco calls them Neighborhood Emergency Response Teams), is to train and prepare individuals for emergencies. It provides the skills necessary for local residents to provide the first wave of response. They participate in drills, exercises and specialized trainings to be effective first responders in any emergency situation. (Homeland Security 2013)

Community Resilience

The Stockholm Resilience Centre (2014) has established seven principles for resilience thinking in socio-ecological systems. The ability for a community to persevere through natural disasters is dependent upon the promotion of these principles (see Figure 1). At the local level, citizens can get involved with making their community more resilient by increasing diversity and redundancy

for emergency preparedness. That means, a community should have multiple plans in place for stabilizing after a natural disaster. Locals can maintain a high level of connectivity with each other, their surroundings and resources. Communities may also encourage learning and use education to broaden participation. These principles are easily encouraged through grassroots efforts.

- | Principles of Resiliency | |
|--------------------------|--|
| 1. | Maintain diversity and redundancy |
| 2. | Manage connectivity |
| 3. | Manage slow variables and feedbacks |
| 4. | Foster complex adaptive systems thinking |
| 5. | Encourage learning |
| 6. | Broaden participation |
| 7. | Promote polycentric governance systems |

Figure 1: 7 Principles of Resiliency (Stockholm Resilience Centre)

CERTs are an excellent example of disaster resiliency. Governmental agencies often turn to CERTs as representatives of the local community, providing knowledge and networks generally untapped by larger institutional planning organizations. Community resilience is a nascent term in the planning profession; yet, as a component of disaster planning, “resilience” has become a buzzword and popular framework for disaster mitigation. The term resilience is closely tied to principles of sustainability, in that to be resilient a system must be able to sustain itself through change by adapting or transforming (Magis 2010). “Community resilience” applies the principles of resiliency to the complex system that is a community of people. Thus, when a community can easily withstand a shock, such as a manmade or natural disaster, it can be considered resilient:

Resilient communities minimize any disaster’s disruption to everyday life and their local economies. Resilient communities are not only prepared to help prevent or minimize the loss or damage to life, property, and the environment, but they also have the ability to quickly return citizens to work, reopen businesses,

and restore other essential services needed for a full and timely economic recovery (CARRI 2014).

“Local knowledge” is extremely important in disaster resilience planning. ICS employs bureaucratic principles that do not account for detailed knowledge, but are meant to control masses, restore normalcy, and provide extensive aid and supplies. We need not look any further than Hurricane Katrina in 2005 to understand that massive disasters can incapacitate bureaucratic organization and response. As a result, we can see the critical nature of lay knowledge as a complement to formal planning efforts:

Seeking out and explicitly incorporating local and lay knowledge is essential to achieving robust and well-informed policy and resilience in society (Innes and Booher, 2010, p. 12).

The literature makes it clear that resilience and preparation are not to be confused. Resiliency in a community captures the three “P”s of sustainability theory: people, planet, prosperity (see Figure 2). Preparation deals with personal items such as first aid kits, fire extinguishers, cash, tools, camping gear, and water (Cope 1993). Preparedness manuals focus on self-dependency, ignoring the larger societal framework that people can harness for survival (Cope 1993). If a community is to bounce back from disaster, it must act like the social network it represents, not as isolated individuals.

Theoretical Framework of Sustainability

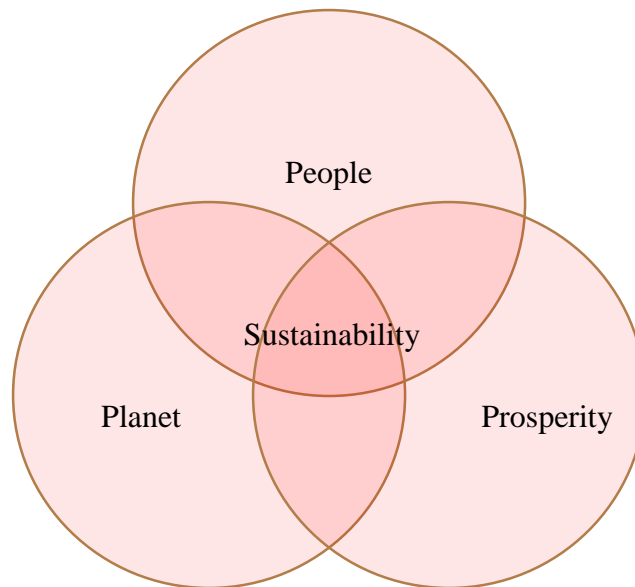


Figure 2: Sustainability is achieved when economic (prosperity), social equity (people), and environment (planet) can be in balance.

I don't mean to suggest that individual preparedness is not critical to survival, but it is unrealistic (and inefficient) to expect everyone to buy a generator, an extensive first aid kit, and heavy duty tools. The United Nations' International Strategy for Disaster Risk Reduction demonstrates a broader understanding of disaster response frameworks when they recommend that emergency managers "focus on people-to-people communication; involve children and youth in hands-on learning activities; use credible and influential spokespersons to serve as safety and disaster risk reduction advocates" (United Nations 2012). This explanation of preparedness education begins to align itself with a more networked form of community response and resiliency.

The Myth of Looting and Riots

Much of where individual disaster preparation stems from is a mythological view of human behavior during response. This was highlighted in 2005 during the aftermath of Hurricane Katrina. The mythological view that rioting and looting will always follow after a disaster is a

subject worth discussing at length, but many factors were at play in the 2005 disaster in New Orleans, including the disparity between concepts of looting and appropriation of supplies for disaster relief:

Looting occurred after Katrina. In some instances it may be argued that inadequate preparation of housing evacuees in the Super Dome and the Convention Center, coupled with a slow response to their needs in the aftermath, literally caused the 'looting' which may be more accurately characterized as 'appropriation of property to support life.' When responders used property in such a manner the term 'appropriation' was self-applied (Fischer, 2008, p. 71).

In actuality, the best human characteristics are usually exhibited in disaster situations and their aftermath. We become more altruistic and share resources, such as food, water, shelter, and tools. However, problems begin to occur in the breakdown between actual and perceived behavior when local authorities plan for the worst case scenario: the mythology of panic, riots and looting. If emergency managers plan for this, they end up unprepared for the actual citizen response (Fischer 2008). Little practitioner behavior embraces community organized response and/or networks, an area the DRTs attempt to explore through both its purpose and structure.

However, previous research has suggested that it is neither emergency managers at the top level of the ICS model, nor the grassroots community that makes the greatest impact at the local level. Inam (2005) suggests that it is the middle managers, the local disaster planners that are the key actors in planning institutions. Inam (2005) states:

They knew exactly what procedures to use and who to contact – they were successful go-betweens between national government and grassroots community

groups. They could take shortcuts, such as appropriately modifying routines due to the urgent nature of the crises (p. 3).

This would also suggest, as noted before, that collaboration between and within planning frameworks is essential to community resilience. It is through partnerships, formal and informal networks, the cross-education of citizens and planners, and the common vision of resiliency to disaster that creates an effective community response. These factors all contribute to the promotion of resiliency through principles 1, 5, and 6 (see Figure 1, page 18) (Stockholm Resilience Centre 2014). Now put that aside for a minute, and let's investigate the parallel track of how bicycles are currently used and evaluated in disaster planning and emergency management.

Emergency Response by Bicycle

While CERT programs focus on localized emergency response to provide immediate assistance and assessment information for appropriate resource allocation, the CERT program refers only to automobiles, making the assumption that fuel shortages will not affect first responders and that road infrastructure will be passable by car. However, the Woodlawn neighborhood in Portland has taken it upon themselves to mobilize their individual Neighborhood Emergency Team (NET) members by bicycle (Maus 2012). Clever Portland residents are not the only people to have considered the bicycle as an emergency vehicle. Gaston County, North Carolina produced a number of Bicycle Emergency Response Team members in the late 1990s (Bicycle Emergency Response Team Brochure, Appendix A).

Internationally, studies and programs exist to provide aid by bicycle. Research published in the Malawi Journal of Medicine evaluated the use of bicycle ambulances in Malawi. Response times

were interestingly equivalent to automobiles due to unpredictable road conditions, dispatch time, and even mechanical failures. The research focused on pregnant women in labor, and although the data suggests that bicycles are the most appropriate use of transportation, cultural barriers exist for their use for transporting women in labor (Lungu et al 2001).

Such is the case in Zambia, where an organization called Transaid launched and evaluated a bicycle ambulance program. Because of the rough terrain and economic barriers to automobile transportation, Transaid conducted this program to provide better medical access for patients. The data collected suggests that 86 percent of the trips taken in the four month period were life-saving. Moreover, distance was not a major barrier for bicycles as the average trip, depending on location, was between 6 and 16 kilometers. Response times improved for patients who utilized the bicycle ambulance as well. Transaid also made recommendations based off user feedback and collected data to operate more efficiently, including the provision of lights, brightly colored vests, bike repair tools, and a narrower gurney design to accommodate small and irregular door frames (Transaid 2009).

Anecdotal Evidence

Though one could extrapolate that if a bicycle worked in a medical emergency it should work during disaster, there are fundamental differences between an isolated personal emergency and the mobilization efforts of local, state, and federal emergency management. As discussed, bicycles have only been used in an ad hoc manner for disaster response.

On the other hand, experience informs us about the potential utility of bicycles in a disaster scenario. As mentioned earlier, recent disasters such as Hurricane Sandy, the 1995 earthquake in

Kobe, Japan, and the Tōhoku earthquake in Japan have highlighted different communities turning to bicycles as a form of transportation or aid. In post-Sandy New York City, as gas rationing lasted for days and the subways were still inoperable in many areas, citizens turned to bicycles as a form of transportation. Furthermore, in the days after the storm, 40 citizens partnered with a local bike shop to deliver supplies to disaster victims in Far Rockaway, Queens by bicycle (Goodyear, 2012).

Lessons from Japan

Evaluations of emergency response during the 1995 Hanshin quake of Japan provide direct evidence of the necessity of bicycles in a post-disaster situation. Criticism of emergency management during the crisis identified problems in disbursing medical supplies from collection centers and communication channels between government agencies that needed to coordinate emergency response efforts. The final assessment concluded that bicycles and motorcycles were the most effective mode of transportation in the aftermath of the devastating quake. The authors ultimately recommended that a bank of bicycles and motorcycles be made available for emergency use (Baba and Hiroshi 1996).

Richard Masoner of Japan in his first person account about the Great Hanshin Quake where he was dispatched by his employer, Crisis Management Response Team, from Tokyo to Osaka describes delivering special frequency cellular phones to various government agencies:

Obviously the advantages of having a cargo bicycle are paramount after a major quake, volcano eruption or other natural disaster. Our team selected the heavy duty industrial grade cargo bikes that were designed to transport food cases, small propane tanks, and other food stuffs. Without commercial transportation,

rail, subway etc., the cargo bikes saved us four days travel in and out of the quake's epicenters because we could traverse the narrow streets, use the foot paths and bypass obstructions, debris and obvious danger zones. We chose paths of least resistance. Remarkably, the greenbelts, designated bike paths and river walks were usable in most cases. Falling buildings [were] a major concern. (R. Masoner, personal communication, April 10, 2014)

DRTs seemingly bridge the gap between bicycle transportation and disaster preparedness. DRTs blend grassroots preparedness with the formalized structure that Baba and Hiroshi (1996) recommend for overcoming breaks in the transportation and communication systems. The literature suggests that DRTs are well-aligned with community resilience ideals of adapting to changing conditions and minimizing the shock to the community. After all, the intent of a DRT is to demonstrate the capabilities and resources available to a community for ad hoc response. DRTs are organized in a grassroots manner, yet rely heavily on public-private collaboration to put on an event.

Methods

Overview

To effectively understand the role that bicycles play in disaster planning and emergency response, a case study evaluation was used to provide an in-depth analysis of the impact Disaster Relief Trials (DRT) have on emergency management. Case study analysis is regarded as an effective method for scrutinizing collaboration in a real-world setting. It is in essence, “an empirical inquiry that investigates a contemporary situation within its real life context, addressing a situation where the boundaries between phenomenon and context are not clearly evident.” (Yin, 1993, p. xi)

For this qualitative research, I used direct observation and semi-structured interviews to answer the question: What is the role of bicycles in disaster planning and emergency management? The DRTs in Portland and Eugene were studied. The Eugene case study provided the opportunity for direct observation, while Portland added context, history, and a comparable case study since the Eugene DRT was an iteration of the inaugural event in Portland.

Direct Observation

The planning committee meetings of the Eugene DRT began in March of 2013. Meetings were held monthly until September 2013, at which point the frequency of the meetings increased, but was not always consistent. I participated solely as an observer and remained a neutral party in the planning process. The intent of direct observation was to understand the group dynamics of the planning committee, interactions with sponsors and partners, and the effectiveness of an ad hoc and grassroots organization.

Semi-structured Interviews

To assess the relative effectiveness of DRT events in preparing a community for disaster, research was gathered through 13 interviews across DRT events in both Portland and Eugene. The subjects of the interviews were chosen for their close affiliation with a DRT planning process. To access this population, key informants were used to initiate contact with potential interview subjects. Some were interviewed for their partnership with the event, and others for their expertise in disaster preparedness. While all subjects were close to the DRT organization, subjects interviewed represent a diverse set of stakeholders. Interviews were conducted with city staff, bicycle advocates, disaster response experts, and community leaders. Over an hour period, these stakeholders were asked eight long-answer questions (see Appendix A) about their perceptions of the DRT event and the formalization of such planning efforts. Following the recommended process for semi-structured interviews, clarifying and follow-up questions were asked of subjects depending upon their answers, but all interviewees were asked the same eight questions. All interviews were recorded and conducted over a 1-month period in April 2014. Due to distance, some interviews were conducted by phone. Notes were taken throughout the interview to simplify the analysis post-interviews. Using memory, notes, and referring to the recorded interviews, emerging patterns in ideologies and reflections on the role bicycles can play in disaster situations were identified. Analysis was not limited to similar key phrases, but general ideas of community, response and bicycle utility. Professional judgment and interpretation was also used to link common themes across the many qualitative datasets, subjects, and varying professional expertise.

Synthesis

Interviews and direct observation revealed common themes. Of these, the findings section is grouped to focus on (a) bicycle uses, (b) preparedness and education, (c) partnerships, (d) simulations and trainings, and (e) ad hoc response.

Limitations

An important limitation is that as of May 2014, these events have not been tested by an actual disaster—they are simply exercises and trainings for interested parties.

Boulder, CO planned to host a DRT event, but it was canceled days before the event due to an actual disaster: an intense 100-year flood in September 2013. Despite the cancelled event, Boulder DRT organizers discovered through real experiences what role bicycles can play in a disasters on an ad hoc basis:

The disaster brought the neighborhoods and community as a whole, closer together, and we wanted our “event” to model that behavior even more. We ditched the LeMans style start, and the obstacles were [already] there because of the flood, un-staged. Instead of trivia questions or tasks like repairing a flat, we started pumps in basements, and checked on friends’ homes (R. Rowe, personal communication, April 12, 2014).

Another limitation is that direct observation was only conducted for Eugene’s DRT committee and that only two events were evaluated through the semi-structured interviews.

Findings

The following section describes five key findings from the research conducted on the Disaster Relief Trials (DRT) in both Eugene and Portland. These conclusions may require further study, however, they are important themes indicating the effectiveness of the DRT events:

1. Bicycle Use
2. Preparedness and Education
3. Partnerships
4. Simulations and Trainings
5. Ad Hoc Response



Image 12: Riders collaborate before the Eugene DRT race on the best routes to each checkpoint.

I. Bicycle Use

Bicycles are seen by many simply as toys, but bicycles can be an effective tool and resource in disaster planning, both at the individual level and for city-wide disaster response systems. An analysis of survey data estimates that about half of all households owns at least one bicycle (Maness, 2011). Bicycles can play an important role in the distribution of supplies, communication networks, damage assessment, first-aid, and personal transportation. This fundamental repositioning of bicycle capabilities was alluded to in several interviews:

[The DRTs] will shift the really unfortunate paradigm that bikes are toys. They become really important tools when gas is rationed, infrastructure is broken, and communication is spotty. It's just a no brainer that a bike in a garage is better than walking and I can carry something with it. That's going to happen in a disaster. Why not take the low cost preparations to make the inevitability easier? They might as well make your community more resilient (M. Cobb, personal interview, April 18, 2014).



Image 13: Cascadian Courier Collective delivers barriers for the race course in Eugene.

Some emergency planners showed a strong desire to formalize the use of bicycles, and not just specifically cargo bikes, into disaster plans (C. Merlo, personal interview, April 19, 2014). All emergency managers that were interviewed expressed enthusiasm about learning the capabilities of cargo bicycles, such as weight capacity, nimbleness, and speed (Ward and Ike, personal

interview, May 16, 2014; J. Partridge, personal interview, April 18, 2014).

The race included tasks for riders that tested the carrying capacity of the participant by carrying an “unwieldy” object (a red cone), dropping 20 cans of food at a checkpoint, carrying eggs throughout the race (to simulate precious medical supplies), picking-up and carrying five gallons of water and five



Image 14: A DRT rider lifts his bike over a 3-foot barrier as a part of the course challenges.

gallons of dirt from a local community garden (to simulate fruits and vegetables) across the finish line to be redistributed at the Point of Distribution (POD). Furthermore, the bicyclists’ endurance, speed, and road knowledge impressed many of the participants and organizers (M. McRae, personal interview, May 20, 2014). The course was fairly long for Eugene, close to 30 miles, which informed all parties involved about the endurance and strength of those operating the bicycles in the first place.



Image 15: Austin McKimney delivers a pop-up tent, and registration supplies

Additionally, the varied designs and innovations were informative for emergency managers. Observational study of the Eugene event revealed participants using a bicycle as a generator to power a computer and a satellite-connected wireless internet device at one of the checkpoints. This checkpoint task formed through a partnership between Feeney Wireless and Pedal Power

Music. Cyclists also delivered many of the race supplies as pictured in Images 13 and 15. It should also be noted that several vendors in attendance brought their supplies by bicycles.

2. Preparedness and Education

The DRTs seemed to be effective forums to educate and prepare residents for disaster through established practices, such as having a ready-to-go 72-hour kit and family emergency plans. Most importantly, subjects all agreed that these events engage and empower citizens in a way that traditional disaster preparation programs do not. The DRTs are also useful to build community and educate citizens and emergency managers about the resourcefulness and ubiquity of bicycles during a disaster recovery.

What I appreciate about the event is that it's a calmer, more user-friendly way to get people to think about disasters. Rather than scaring people, [the DRT] is an accessible way to think about how you would get around, how you would get supplies during an emergency. It's empowering the community to think about emergencies [in a way] that is not alarming. It's also a family event, and gets people active and healthy through exercise. We value the partnership and collaboration with the DRT planners to broaden and train the people in the community (C. Merlo, personal interview, April 19, 2014).

And the empowerment is not just for the community, it can be useful for the traditional disaster preparedness and education programs.

Events like the DRT are very effective because they are uncomplicated and make accessible the idea that any one person can be prepared for the worst and doesn't

have to be vulnerable in that terrible moment. (E. Stocker, personal interview, April 02, 2014)

All subjects expressed pleasure in the wide scope of community members involved. Emergency managers praised the ability of the DRT events to help educate and prepare citizens for disasters (E. Stocker, personal interview, April 2, 2014; C. Merlo, personal



Image 16: University of Oregon Emergency Management and Continuity Program staffed a booth at the DRT in Eugene.

interview, April 19, 2014; J. Partridge, personal interview, April 18, 2014). The expanded message to different audiences and additional opportunity for reinforcing individual and household preparation proved valuable for emergency management personnel. Demonstrating the creativity and resourcefulness of a common machine that does not require fuel was especially exciting for disaster planners and emergency managers because of the relative novelty of this approach. The shared educational experiences across the board garnered lots of praise from the subjects interviewed. For all the respondents, whether it was disaster preparation or bicycle carrying capacities, learning about the other was an important aspect of the events.

Community-building events are important to creating resilient communities. The social networks we form, the physical interactions with neighbors, and the resourcefulness of community members are key to building resilience and seemed to be the underlying sentiment of most subjects interviewed.

3. Partnerships

Public-private collaboration is essential for a DRT to continue to be an effective educational forum. The partnerships formed with agencies, advocates, and local business are key to engaging a wider audience and building community resilience.

All subjects indicated that success relied upon the strong partnerships formed in the planning stages. The cross-collaboration facilitated a widened scope of educational opportunities from citizens learning about disaster preparedness and response, to becoming aware of more sustainable transportation options for families (A. McKimmey, personal interview, April 02, 2014; S. MacRhodes, personal interview, April 02, 2014). All emergency managers interviewed praised the opportunity for their agencies to reach a wider audience and educate more people about disaster preparedness. They also indicated that it has been helpful to discover innovative ways in which citizens are using bicycles as a resource (E. Stocker, personal interview, April 02, 2014; J. York, personal interview, April 09, 2014; C. Merlo, personal interview, April 19, 2014; Ward and Ike, personal interview, May 16, 2014). Other business partnerships were formed as sponsors of the event came together for a joint promotional venture with Pedal Power Music and Feeney Wireless, both locally-owned businesses in Eugene. Together, they staffed a checkpoint that demonstrated communication links that can be powered by bicycle if there are massive power outages. Another partnership that has reached across multiple DRT events is also probably the most important to their long term viability: DRT and FEMA.

Federal Emergency Management Agency (FEMA)

An informal partnership between these grassroots DRT events and the federal agency strengthened due to the high level of interest and relevance to their respective missions. FEMA managers in the Region X (AK, ID, OR, WA) office learned of the event through informal channels. Erin Ward's (Public Relations, FEMA Region X) interest in the event spurred her to ask the Seattle DRT organizers how FEMA could help with the event. Although they were not able to provide financial support without a formal grant process, they were able to assist with staff, tabling, and resource materials (Ward and Ike, personal interview, May 16, 2014).

Communities could apply for a grant, but by showcasing and walking it up the chain, it also helps to strengthen what works better for communities. I would love to continue to support in a staff level. We don't want to change it, modify it, or anything. We want them to own it. (R. Ike, personal interview, May 16, 2014).

FEMA representatives affiliated with the DRTs supported the second Portland DRT after partnering with the Seattle DRT. As agency staff tracked these events and anecdotes of bicycle use during disaster, they realized the extent and impressive scope of their impact. Even the top FEMA administrator began asking about the impacts of DRTs (Ward and Ike, personal interview, May 16, 2014). This high-level curiosity shows the enormous potential DRT-like events have in building a resilient community. FEMA employees interviewed for this research suggested that even communities without a strong bicycle culture could take the bottom-up model of community building and preparedness and apply it in other innovative ways. As Erin Ward puts it: "That's the challenge. What works for your community?" (Ward and Ike, personal interview, May 16, 2014).

4. Simulations and Trainings

Simulations helped both partners and participants better understand the formal and informal response networks. These exercises increased readiness amongst a wider audience and awareness of both organized and ad hoc disaster response resources.

I thought it was a good chance to bring in community members that aren't necessarily tied to emergency response or a normal volunteer base, and see how they could be utilized. And I also saw it as an opportunity to utilize our CERTs to test some of their abilities and to get them more involved in the emergency processes. (J. York, personal interview, April 9, 2014)

For all organizers, participants, and partners, integrating the format of the race with a realistic exercise was an important aspect to pursue further. The one change that Eugene organizers are making for 2014 is to simulate how bicycles would best be used and incorporated into the local disaster response framework. This will include modifying the structure of the race. In 2013, organizers chose South Eugene High for because it is designated as a POD, but organizers and city staff all felt that the model of only starting and finishing the race at the POD impacted the effectiveness and excitement of the fair location, and also did not simulate a realistic response model for bicycle-mobilized response.



Image 17: CERT volunteers hosted a booth at the event to help educate and prepare households.

Eugene CERTs used the opportunity as a simulation event and interfaced with the event planners as if they were on assignment (J. York, personal interview, April 9, 2014). They carried out duties such as loading the bicycles with canned food, setting up the race course, and overseeing safety checks. Within their membership, they performed as if the situation was real.

HAM radio operators also gained valuable simulation experience by acting as timekeepers at each checkpoint and relaying riders' statuses back to the race headquarters. Early on, organizers carefully integrated the radio

operators into the event planning process. Their view all along was to use this event as training for the HAM radio operators.



Image 18: HAM radio volunteers in Eugene get briefed before being dispatched to checkpoints.

The Portland Bureau of

Emergency Management (PBEM) has supported and sponsored their local event each year. They provided a mobile communications trailer and radio operators to help staff the event, also allowing them an opportunity to conduct exercises as a unit. However, PBEM also wants to try utilizing the points of distribution, which are called Basic Earthquake Emergency

Communication Nodes (BEECNs) in Portland (C. Merlo, personal interview, April 19, 2014).

Many subjects in both Eugene and Portland expressed desire to have the race format mimic a realistic scenario surrounding PODs or BEECNs (E. Stocker, personal interview, April 2, 2014; C. Merlo, personal interview, April 19, 2014; A. McKimmey, personal interview, April 2, 2014).

Incident Action Plan

Event planning took an interesting turn after the 2013 DRT events. Eugene DRT planning committee members all spoke of modeling the upcoming event planning and day-of organization after the controlling objectives of the National Incident Management System (NIMS), called the Incident Action Plan (IAP) (United States, 2008). The intent is two-fold: to educate and train staff in the national model of disaster planning, and structure the roles and responsibilities of the DRT event planning. It also serves the purpose of simulating high-level organized response for resourceful lay citizens. The plan identifies and clarifies the roles, responsibilities, and communication lines for any event, and is becoming more common place in non-disaster event planning, like festivals and fairs. DRT organizers identified all of these areas as needs for improvement (E. Stocker, personal interview, April 02, 2014; S. MacRhodes, personal interview, April 02, 2014). Simulation of the IAP communication framework facilitates efficient event planning, and demystifies disaster response systems.

5. Ad Hoc Response

All emergency planners stressed the importance of neighborhood-level response as being extremely important in a disaster. In addition, there is a place for ad hoc and hyper-local response in formal disaster response planning. The DRTs work well because they are bottom-up efforts. They tap into “local knowledge” which also promotes community resilience (Innes and Booher, 2010). There is a strong network of grassroots support that surrounds these events, that is replicated across satellite events.

Ad hoc, neighborhood level response is the first wave of relief for people, and it is the fastest and often most effective response (C. Merlo, personal interview, April 19, 2014). This type of

neighborly support during emergencies and disasters is an indicator of strong community resilience. While emergency managers tap into community support through CERT programs, there is untapped potential in supporting more grassroots events like the DRT to help bolster community resilience for the purposes of providing needed support and ultimately bouncing back when disaster strikes.

Carmen Merlo, Director of Portland Bureau of Emergency Management, described the importance of planning, preparation and communication within your social network:

Preparedness isn't just about having stuff. And preparedness is not just a line you cross. It is an ongoing process. What is just as, or more important, is to be resourceful and having plans in place. How to communicate with family. Where will you go when you can't get to your home? (C. Merlo, personal interview, April 19, 2014).

To this end, Merlo echoes the core philosophy of community resilience, and that which author Eric Klinenberg summarizes about his research of the deadly 1995 heat wave in Chicago: “Efforts to build strong, durable connections among neighbors, local organizations, businesses and government agencies will help improve community resilience in crises of all kinds” (Klinenberg 2008).

Implications

The DRT events seem to be beneficial to a wide range of community stakeholders, including the participants, partners, and public. Participants can learn how the emergency response works in their community, and allow it to influence their level of preparedness or inform their ad hoc response as a citizen in the aftermath of disaster.

Partners such as government agencies, local businesses, and community non-profits learn about the utility of bicycles through the DRTs, and specifically the capability of cargo bicycles for hauling both emergency supplies and simple everyday items as well. This can influence use of sustainable transportation for personal or business reasons as bicycles are cheaper to own and operate than an automobile.

Interviews with FEMA indicated that cost efficiency is a high priority for community level preparedness and federal efforts are aimed at, “getting the most bang for [their] buck” (Ward and Ike, personal interview, May 16, 2014). It is unlikely that federal funding will be available for small events like these, but organizers can likely depend upon an increased interest and presence from FEMA. The agency also displays its recognition of community resilience values by not co-opting the event. This suggests that an effective DRT event is reliant on strong local grassroots organization, and not traditional top-down planning efforts.

The findings also suggest that a CERT-based model may be appropriate for a group of cargo cyclists who would show interest in organizing and maintaining a Bicycle Emergency Response Team (BERT).

The findings surrounding the simulations and training exercises that coincided with the event structure suggest that making these accessible for citizens increases the understanding of formalized disaster response systems amongst the general public. The DRT events also demonstrated an additional forum for disaster education and outreach that reaches a wide audience and makes preparing for disaster a little more fun than the more traditional “gloom and doom” model.

Results from the interviews also indicated that the use, education, and role of bicycles has thus far largely been untapped by emergency responders. Individuals have harnessed the tool for personal uses, but the reemerging demonstrations of bicycles for distribution of supplies, communication, and human-powered generators has sparked interests amongst community members. There is no doubt there is much further research to be done regarding the effectiveness of bicycle response during disaster. This also indicates the need for an organized bicycle response program, in order to robustly conduct this evaluation.

The interviews also revealed that there are modifications needed to update the structure of the event to best serve all stakeholders. The competition model is not strictly adhered to by participants, and has influenced the race model for both Eugene and Portland. Eugene DRT planning committee members want to have the race format integrate more realistically into the emergency management protocols of the city.

There's been two community responses that call for tweaking the model. The competition which pits individuals against each other is thematically divergent from a disaster response. It's really appropriate to have a buddy system. To promote heroic behavior is a little bit off the mark. In the second year, people

started to help each other over the one meter barrier, and people started to form alliances, which made it more fun and less daunting. And it made it more realistic! To go at it alone in a disaster might be something you would have to face, but it's not preferred (M. Cobb, personal interview, April 18, 2014).

This demonstrates a strong tie with the public and private partners in this community event. The shared understanding of simulations, education, and preparation to be mutually beneficial and increase community resilience is apparent in the continued and growing partnerships between both Eugene and Portland DRT organizers and their respective local emergency management.

There are also implications for sustainable transportation infrastructure. Richard Masoner highlighted the incredible transportation asset that recreational multi-use paths were after the Hanshin quake. With tall buildings usually not built along these routes, and no automobiles to obstruct the path, cyclists were free and able to move where help was needed most (R. Masoner, personal interview, April 10, 2014). Advocates and planners will soon, if they do not already, see the value in separated bicycle infrastructure, aligning itself with the first principle of resiliency: diversity and redundancy. Multiple access routes for multiple modes can be an incredible asset for a community.

Recommendations

The following section outlines some recommendations for emergency managers and bicycle advocates to consider before collaborating on their own Disaster Relief Team. Table 1 summarizes key findings and recommendations. Table 2 outlines some considerations for those looking to explore the use of bicycles in emergency management or organize a DRT in a new community.

Bicycles as a Resource

Because of the varied models of disaster and emergency management, bicycles could be integrated into formalized emergency management through a range of uses. Organization of bicycle integration can be tailored to your current local response plan. The “hub and spoke” model is not merely appropriately named, but often mimics response scenarios better than a circuit as relief supplies tend to be centralized. Movement in this model returns riders back to the “hub” for additional tasks, instead of first assigning all the tasks and having riders complete each one before returning to the hub for resupply.

A low cost solution is to tap into the current cargo bicycle owners in your community and train volunteers for a CERT-like team that could report to points of distribution for deliveries, damage assessment, and first aid. They could be used for miscellaneous tasks that are simple enough to not need an automobile, yet too unwieldy or complex to be completed on foot.

Another approach to integrate cargo bicycles efficiently could be a looser method with government funded supplies, radios, and tools for a cargo bicyclist to carry with them after a

disaster and perform pre-planned geographic sweeps of their community. This would not fit in the ICS structure, though, it would allow greater freedom for these fleets.

A more rigorous integration would require the purchase and storage of new cargo bicycles and supplies that could be distributed at secured locations around the community. These fleets could be dedicated for emergency response, with several riders authorized to perform the duties of a bicycle emergency responder during a disaster.

A bicycle fleet for emergencies, as recommended by Baba and Hiroshi (1996) in Japan, and based on a CERT-like model, could prove useful in most communities to deliver critical supplies, act as a communication link, conduct damage assessment, and provide first aid and personal transportation. Local jurisdictions should consider the long and short term economics of having a small fleet of cargo bicycles rather than an extra city fleet vehicle.

A well-equipped cargo bicycle can cost \$2,730-\$3,200², compared to a standard truck, such as the Ford F-150, which has an MSRP of \$25,930 - \$54,120³. Furthermore, the annual operating cost of a bicycle will be far cheaper since it does not require insurance, fuel, or expensive parts. A cargo bicycle fleet would not only expand community resilience capacity, but reduce both vehicle emissions, if used regularly by staff, and city vehicle operating costs. At the very least, emergency managers would benefit from adding bicycles to their preparation literature and programs to highlight the importance of this efficient and sustainable vehicle sitting in the majority of garages everywhere.

² Based on build variations with Eugene bicycle fabricator Human Powered Machines. Retrieved from: http://hpm.catoregon.org/?page_id=7

³ Based on 2014 MSRP. Retrieved from <http://www.edmunds.com>

Table 1: Findings and Recommendations

Research Findings for Disaster Relief Trials			
Subject	Findings	Implications	Recommendations
Bicycle Use	Bicycles can be used for the local distribution of essential supplies, communication links, damage assessment, providing first aid, and personal transportation.	Bicycles are under-utilized in formal disaster response systems. Bicycles are primarily used in ad hoc response at the citizen level, indicating that there is room to expand the use of bicycles in disaster planning.	Disaster planners and emergency managers should incorporate or involve motivated cyclists into local disaster response models. Consider forming specialized teams that could receive proper training and report to PODs in the event of a disaster.
Preparedness and Education	DRTs proved to be excellent forums to help educate and prepare citizens for disaster through non-traditional messaging.	There are opportunities beyond traditional emergency planning to prepare households for disasters, such as creating 72-hour kits and emergency family plans.	Repeat messaging should not be overlooked. Emergency managers should use the DRT and other grassroots events as an opportunity to engage citizens in disaster preparedness.
Partnerships	Public-private collaboration is key to a successful DRT event.	DRTs are effective because they are grassroots organized, but supported by institutional structure which gives them legitimacy.	Planning for a DRT must include local emergency managers and provide them with the opportunity to participate in the planning process.
Simulations	Simulations helped partners and participants better understand the formal and informal response networks.	Accessible citizen-involved exercises can increase the readiness and awareness amongst the general public of both organized and ad hoc disaster response resources.	Integrate training exercises into the DRT structure, such as HAM radio operators, CERT volunteers, or Fire/EMS responders.
Ad Hoc Response	There is room for ad-hoc response to be supported by formalized disaster planning.	Formal disaster planning can incorporate other grassroots efforts that support community resilience and disaster preparedness and education.	Stress the capabilities of citizen-led response, resources, and strong community ties with the DRT as a forum.

Pedaling Forward

The city of Seaside, Oregon has a series of supply caches above the tsunami zone to help with response efforts in the event of a Cascadia subduction zone quake. A thoughtful integration with communities like these could stash cargo bicycles with the dispersed supplies to help with immediate distribution since many vehicles will be washed away and roads impassable.

Local municipalities could even consider the use of tax rebates for the purchase of a cargo bicycle. Promoting a more sustainable form of transportation promotes resiliency, but could have additional benefits of improved air and water quality locally.

Bicycle specific emergency kits could expand established preparedness programs. Making a direct connection between bicycles and disaster readiness could have sweeping repercussions on ad hoc response by local citizens. Panniers outfitted with extensive first aid kits and simple communication devices could empower whole communities to respond to disaster rather than fall victim to one.

Promoting Ad Hoc Response

Using the DRT engagement strategy, a public-private collaboration with a grassroots base, can activate an untapped resource in the community and be molded to fit the social fabric. This type of community-building and collaborative planning can increase resiliency in the community itself. Local emergency managers should explore ways to tap into existing informal networks within the community that could harness unutilized energy. If you live in rural community, consider an ERT, Equestrian Response Trials. These events do not have to surround the use of

bicycles, but should learn to join informal community response with formal disaster planning efforts.

Table 2: Planning your Own DRT

5 Considerations for Planning a Disaster Relief Trial		
Factors	Description	Consideration
Format/Structure	Disaster Relief Trials have been branded by the original creators in Portland. While these events are not trademarked, there has been strong efforts from all the satellite cities to stay true to the original purpose, structure, obstacles, and branding. Each organizing committee caters to their community fabric and has unique qualities about them. However, organizers communicate with each other about their events throughout the planning stage.	Connect with the Portland organizers and other cities planning DRTs. They have strategies, experience, and documents that will help you with many of the logistics. They will also help with promotion and partnerships.
Partners	Local community organizations, businesses and governments are all stakeholders. Disasters effect everyone in the community. Each group may have a different interest (e.g. conveying the message of preparedness, promoting sustainable transportation, business, marketing, etc)	Meet with your local emergency manager. Request a description/summary of the event and photos from other events showing the capability of cargo bicycles. Talk to your local bike shops about cargo bikes and how to reach car-free residents and bicycle advocates. Contact local businesses and offer sponsorship packages or other support like in-kind contributions.

Factors	Description	Consideration
Local Bike Culture	The DRT events emerged in places with strong bike culture, but that is not a prerequisite.	While you may perceive a strong lack of bike enthusiasts, you'd be surprised by the excitement that exists around cargo bicycles everywhere. Before you make a decision about how engaged your community might be around this event, talk to local cargo bike owners; they are tight knit and can help you build your audience with interested parties.
Disaster Vulnerability	There are many disasters that can affect the supply chain and transportation system. Earthquakes, tsunamis, tornadoes, hurricanes and floods can devastate infrastructure. Every geography, even at the local level, can make a community vulnerable to specific risks.	Know what disaster is most likely to affect your community. Talk with local emergency managers and planners. There are maps, data, and forecasts that can help you understand localized vulnerability to disaster, plans for response, and existing partnerships for an emergency.
CERT Program	CERT programs are not found in every community, but many. CERT members are already on board with the mission to make a community more resilient. They have specific skills, supplies, and responsibilities that are great assets for disaster response.	Find out if you have a local CERT program. Communicate your goals to the CERT manager and find out if they want to run a simulation for their members. Give them plenty of notice and involve them in the event planning process. They are logistically-oriented, so be clear about the structure of the race and what the CERTs will be responsible for during the event.

Conclusion

There is no reason to leave a potentially useful tool out of your disaster planning toolkit.

Bicycles are an efficient, sustainable, and accessible resource that can benefit individuals and communities in a disaster. In larger numbers, with greater cargo capacity, bicycles can be an effective transportation option at a larger scale as well.

Those that ride a bicycle regularly know the benefits and independence it provides. The bicycle has a romantic quality about it and connotations of free-spiritedness. Yet the beauty of the bicycle extends beyond one's own idealistic vision, it is a cultural norm to love the idea of the bicycle. In practice, few consistently take advantage of the freedom and practicality of this everyday tool.

Convenience and gluttony have rendered it merely romantic to the masses, but many still explore the liberty of two-wheels. Innovators continue to experiment with materials, designs, and technology. While bicycles will not be the dominant paradigm of transportation anytime soon, they have a role to play in many people's lives. When disaster strikes, conditions can converge in a community that renders the automobile useless for some, or all. In its place, the bicycle can often reign as nurse to the injured, courier of life-saving supplies, and king of the road.

Appendix A

Semi-structured Interview Questions

1. What were your expectations for the DRT event when you first heard about it?
2. How did the event meet your expectations?
3. How did the event or planning of the event relate to disaster response protocols or systems of the city?
4. What has come about since the event?
5. What would you do differently for the next event?
6. What advice would you give to another city hoping to explore the role of bicycles in disaster response?
7. What, realistically, is the role of bicycles in emergency and disaster response?
8. How important are events like the DRT in bicycle and disaster awareness, both separately and collectively? Would different events be more effective? Why?

Research Subjects

Mike Cobb – Designer/Fabricator, Creator of DRTs (Portland, OR)
Ryan Ike – Director of External Affairs, FEMA Region X (Bothell, WA)
Ethan Jewett – Brand Marketing Consultant; Photographer; DRT Organizer (Portland, OR)
Shane MacRhodes – Safe Routes to Schools Coordinator; DRT Organizer (Eugene, OR)
Richard Masoner – Alpine Snowshoe Guide (Japan)
Matt McRae – Climate and Energy Analyst; DRT Participant (Eugene, OR)
Austin McKimmey – Bicycle Mechanic; DRT Organizer (Eugene, OR)
Carmen Merlo – Director of Portland Bureau of Emergency Management (Portland, OR)
Joe Partridge – Emergency Management Consultant (Portland, OR)
Emma Stocker – Emergency Management Specialist (Eugene, OR)
Erin Ward – Public Relations, FEMA Region X (Bothell, WA)
Jason York – Emergency Management Program Manager (Eugene, OR)



County outfits EMS with bicycles

The annual Fish Camp Jam in Gaston County, N.C., regularly draws about 150,000 attendees for food, music and fun. But, like every large outdoor event, the annual fes-



Gaston County's BERT was on the scene at the Special Olympics in Cherryville, N.C., in 1998.

tival always claims a few injuries among its patrons. Since 1997, the Fish Camp Jam has had a "safety net" on the scene, thanks to the county's bicycle emergency response team (BERT). The paramedics on wheels provide medical support for special events, such as road races, festivals or concerts, where large crowds are expected.

In the event of an emergency, the bike team can provide immediate assistance. If transport is needed for a patient, the team notifies the communications center, and an ambulance is sent. The team also provides off-road medical assistance when access by conventional EMS personnel is hindered by rough terrain.

In the first year of the program, team members purchased their own mountain bikes, and Gaston County EMS purchased medical packs and equipment, helmets and uniforms. After a successful first year, the county has purchased additional bicycles for the BERT program.

Bikers carry medical kits that include medications, respiratory equipment, bandages, a cardiac monitor and oxygen. Each bike is fitted with rack packs and saddlebags that can be removed for patient contact.

In its first year, BERT consisted of 24 members, most of whom were EMTs. In 1998, the program was expanded to 35 members, including county volunteer rescue squads and "Explorers" — volunteers ages 14 to 21. Explorers are trained in First Aid and CPR and participate in all event coverage. At least one EMT paramedic and one or two additional BERT members accompany each Explorer team.

Last year, team members also began augmenting the Gaston County Emergency Management Urban Search and Rescue team.

For more information, contact Operations Supervisor/ EMT-P John Barrett at Gaston County EMS, P.O. Box 1578, Gastonia NC 28053; (704) 866-3210; e-mail, jbarrett@gastongov.org. ☆

BRIEFS

And the winner is...

San Diego has received a National Preservation Honor Award from



the National Trust for Historic Preservation for the restoration of its House of Hospitality in Balboa Park. The facility was constructed for the 1915 Panama California Exposition.

The National Council of Public-Private Partnerships has presented its 1998 Program Recognition Award to Library Systems & Services, Germantown, Md., for its man-

agement of the Riverside County (Calif.) Library System. Riverside was the first county government in the country to outsource its library management.

Tempe, Ariz., has received an Environmental Excellence Award from the Valley Forward Association for its Rio Salado Project. The project was designed to return vitality to

Establishing a Bike Medic Program

By DREW FRIED, EMT-B

The concept of using a bicycle as a means of transportation for emergency services workers dates back to the late 19th and early 20th centuries. After the invention of the automobile, this practice came to an end in the 1920s. In 1987, two Seattle police officers proved that bicycles could again be effective in emergency services. Approximately six years after the development of police patrol units, EMS agencies began to use bicycles for EMS operations. Today EMS agencies use bicycles for many different situations—including bike tours, congested urban city streets, busy parks, and visits by high-profile officials. In 1980, NYC*EMS used mopeds during the New York City Transit Strike. This proved that the traditional system of deploying EMS providers may not be the best way.

EMS bicycle units were developed to give mobility to the EMS provider. EMS personnel can get through congested urban areas with them and use them during special events, in amusement parks, and at sports arenas.

Organizing a Bicycle Unit

Prior to organizing a bicycle unit, you must gain the support of your administration. Without such support, the unit cannot succeed. It will be helpful to have some statistics available from other agencies, indicating their success rate. These stats include the improvement of response times and the ability to have greater access to patients. To benchmark and compare, you will need to be able to look at stats for at least the year prior to deployment of the bicycle unit. You should see a decrease in the response times and an increase in the ability to gain access to patients.

After you receive the needed support, appoint a Bicycle Program coordinator. This person is responsible for coordi-

nating day-to-day operations of the unit. His duties include but are not limited to the following:

- Maintain an inventory of the program's equipment, and order when necessary.
- Schedule maintenance.
- Coordinate the selection process of candidates.
- Coordinate special event activities.
- Prepare the unit's standard operating procedures.
- Conduct Quality Assurance/Quality Improvement.
- Ensure that all members are wearing safety equipment at all times while riding.

Selection Process

The selection process should be under the supervision of the coordinator. Most agencies find it useful to post the position and ask for volunteers. Make sure you are clear about all of the requirements of the selection process.

Selection requirements include the following:

1. Complete agency application.
2. Have at least one year of service providing prehospital care at either the CFR or EMT level.
3. Supply two letters of recommendations from agency supervisors.
4. Complete medical examination or provide a medical certificate from healthcare professional if last medical exam was within six months. Candidates should be in good physical condition with the understanding that portions of the training and unit activities are physically demanding.
5. Provide a short summary of what special skills the candidate could bring to the unit.
6. Complete interview process.

Policy Considerations

A policy provides a framework or guideline within which bike patrol units can work. If you have an established unit, you may not understand what the person who started your unit went through to write and develop the policies you take for granted. If you are starting a new unit, you must decide what policies you will need to develop. Some agencies choose to write different types of policies, such as one of the following:

- Rules and Regulations—set policy.
- Special Orders—usually expire after a short period of time.

DREW FRIED, EMT-B, has been an EMT for 22 years and a New York State EMT instructor for 10 years. He is also a retired New York State peace officer for a community police department in the Bronx, where he was the commanding officer of emergency services. This assignment included coordinating the bicycle unit.

★ PORTLAND **JULY 13 '13** ★

CASCADIA CARGO BIKE FAIR

BIKES FOR FAMILY **BIKES FOR CARGO**

REAL LOADS **REAL ROADS**

DISASTER RELIEF TRIALS 2015

HOSTED BY **OMSI** 10am-5pm

AFTER-TRIALS PARTY @ **VELO CULT** 7pm-10pm

xtracycle **yuba** **clever cycles** **Splendid** **Joe Bike**

PSEM **SLED CO**

INFO/SCHEDULE TRANSPORTLAND.ORG **BRING IT!** YOUR CARGO BIKE/TRAILER IS PART OF THE SHOW! ★

SATURDAY, OCT. 12
CARGO BIKE FAIR & DISASTER RELIEF TRIALS
+ FEITS OF PARENTHOOD

EUGENE OR
DISASTER RELIEF TRIALS
2013

START/FINISH
SOUTH EUGENE HIGH SCHOOL
11AM-4PM

PARTY/AWARDS
OAKSHIRE BREWING & PUBLIC HOUSE
5PM-10PM

eugenedrt.wordpress.com facebook.com/eugenedrt

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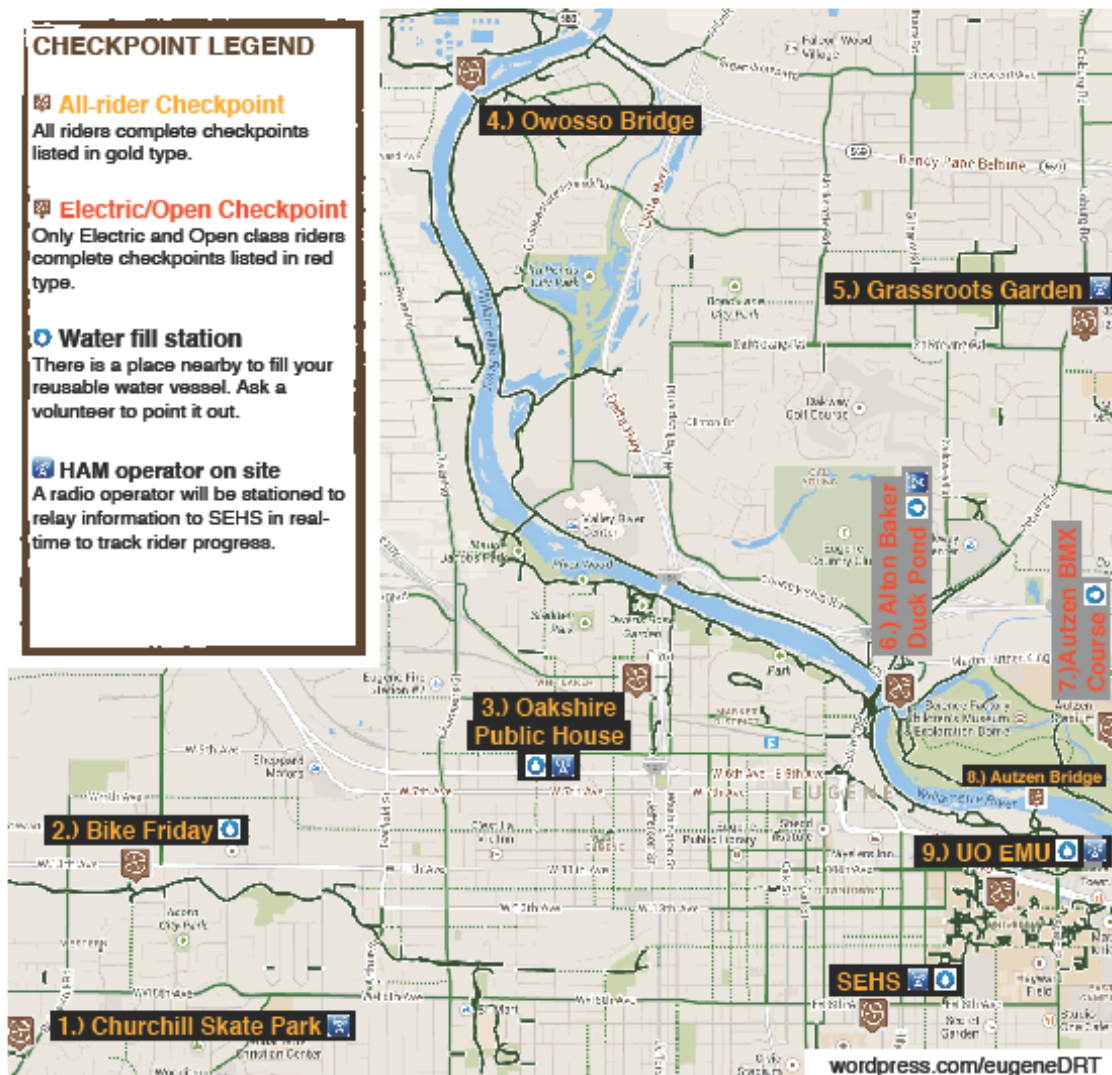
arriving by bike, TheEugene.com, RFD, EUGENE, OREGON, DIKE FRIENDS, Safe Routes, FW, Adult Wilderness Clinic, DLX, GERT

2013 EUGENE DRT RIDER MAP



CHECKPOINT LEGEND

- All-rider Checkpoint**
All riders complete checkpoints listed in gold type.
- Electric/Open Checkpoint**
Only Electric and Open class riders complete checkpoints listed in red type.
- Water fill station**
There is a place nearby to fill your reusable water vessel. Ask a volunteer to point it out.
- HAM operator on site**
A radio operator will be stationed to relay information to SEHS in real-time to track rider progress.



Rider Manifest: 2013 Eugene DRT



1.) Churchill Skate Park - DISTANCE
X _____



2.) Bike Friday - MECHANICAL
Note: Fern Ridge Path > W 11th Ave.
X _____



3.) Oakshire Public House - FOOD DROP/COMMS
X _____

4.) Owasso Bridge - MEDS
X _____

5.) Grass Roots Garden - FOOD PICKUP
Note: garden BEHIND CHURCH; enter from SOUTH DRIVEWAY
X _____



6.) Alton Baker Duck Pond - WATER PICKUP
Note: Open/Electric class ONLY
X _____



7.) Autzen BMX Park - DIRT
Note: Open/Electric class ONLY
X _____



8.) Autzen Bridge - HONOR
XNO SIGNATURE REQUIRED

9.) UO EMU - DEBRIS
X _____

FINISH @ South Eugene High School

EMERGENCY CONTACT INFO:
AUSTIN MCKIMMEY [REDACTED]
ALEXANDER HONGO [REDACTED]

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