



## Managing mosquito spaces: Citizen self-governance of disease vectors in a desert landscape



Nicolena vonHedemann<sup>a,\*</sup>, Paul Robbins<sup>a,b</sup>, Melinda K. Butterworth<sup>a,c</sup>, Katheryn Landau<sup>a,d</sup>, Cory W. Morin<sup>a,e</sup>

<sup>a</sup> School of Geography and Development, University of Arizona, 1064 E Lowell St., Tucson, AZ 85721, USA

<sup>b</sup> Nelson Institute for Environmental Studies, University of Wisconsin, 550 North Park Street, 122 Science Hall, Madison, WI 53706, USA

<sup>c</sup> Environmental and Earth Sciences, Willamette University, 900 State Street, Salem, OR 97301, USA

<sup>d</sup> Division of Water Rights, State Water Resources Control Board, 1001 I St., Sacramento, CA 95814, USA

<sup>e</sup> Department of Global Health, University of Washington, 4225 Roosevelt Way NE #100, Seattle, WA 98105, USA

### ARTICLE INFO

#### Keywords:

West Nile virus  
Environmental  
Arizona  
Political ecology  
Biopower

### ABSTRACT

Public health agencies' strategies to control disease vectors have increasingly included "soft" mosquito management programs that depend on citizen education and changing homeowner behaviors. In an effort to understand public responses to such campaigns, this research assesses the case of Tucson, Arizona, where West Nile virus presents a serious health risk and where management efforts have focused on public responsibility for mosquito control. Using surveys, interviews, and focus groups, we conclude that citizens have internalized responsibilities for mosquito management but also expect public management of parks and waterways while tending to reject the state's interference with privately owned parcels. Resident preferences for individualized mosquito management hinge on the belief that mosquito-borne diseases are not a large threat, a pervasive distrust of state management, and a fear of the assumed use of aerial pesticides by state managers. Opinions on who is responsible for mosquitoes hinge on both perceptions of mosquito ecology and territorial boundaries, with implications for future disease outbreaks.

### 1. Introduction

Managing public health in the early 21st century is often a matter of influencing or controlling public behavior (Lantz et al., 1998). This can be seen across a wide array of health concerns, such as raising awareness about certain illnesses (Petrovici and Ritson, 2006), increasing voluntary inoculations (Poland, 2010), or encouraging the public to wash their hands (Embry, 2002). Collectively, these examples are part of the New Public Health, where preventative strategies are directed towards the individual's responsibility for their personal health and also encourage a broader accountability to society (Petersen and Lupton, 1997). In an era of declining state revenues and capacity and highly contested public perceptions about key health issues, it therefore becomes important to ask: *what kinds of responses do people have to such efforts and what kinds of citizens do such approaches produce?*

Few cases are as emblematic as West Nile virus (WNV) in this regard. The emergence of WNV as a public health concern in the United States since 1999 caused a resurgence in the perception of

mosquitoes as domestic disease vectors, particularly in the western United States, where mosquitoes had previously ceased being a major health issue. In addition to WNV, dengue fever has re-emerged in outbreaks seen in Florida, Texas, and Hawaii in the past 20 years, and the Zika virus was locally transmitted in Florida and Puerto Rico in 2016, prompting additional concern for mosquito-borne diseases (Alvarez and Belluck, 2016; Bouri et al., 2012; CDC, 2016a). Health authorities and citizens in areas where mosquitoes were previously mostly a "nuisance" faced a steep learning curve with the spread of WNV. Confronted with a more serious hazard, health agencies were forced to improvise, quickly learning about the disease and implementing new methods of mosquito control that varied widely across jurisdictions (Robbins et al., 2008). Some municipalities and control districts favored large-scale adulticiding with aerial spraying of pesticides. Others selected more decentralized efforts such as treating mosquito breeding sites with larvicides and implementing information campaigns to induce homeowners to manage their properties to prevent mosquito breeding (Shaw et al., 2010).

Decentralized efforts of the latter kind are widespread, owing to the

\* Corresponding author.

E-mail addresses: [nvonhedemann@email.arizona.edu](mailto:nvonhedemann@email.arizona.edu) (N. vonHedemann), [director@nelson.wisc.edu](mailto:director@nelson.wisc.edu) (P. Robbins), [mkbutterworth@willamette.edu](mailto:mkbutterworth@willamette.edu) (M.K. Butterworth), [klandau@email.arizona.edu](mailto:klandau@email.arizona.edu) (K. Landau), [cwmorin@uw.edu](mailto:cwmorin@uw.edu) (C.W. Morin).

<http://dx.doi.org/10.1016/j.healthplace.2016.11.004>

Received 25 January 2013; Received in revised form 24 August 2016; Accepted 11 November 2016  
1353-8292/ © 2016 Elsevier Ltd. All rights reserved.

meager budgets of many health authorities and a general acknowledgment that exposure to mosquitoes is most likely in and around people's homes. In essence, these latter approaches, represented by "Fight the Bite" campaigns and other public information strategies, are efforts to make citizens responsible for what has often historically been a state obligation to control a mobile disease vector through restructuring landscapes and large-scale chemical use. Therefore, such a change represents an alteration of the relationships between the state and the public more generally and an undertaking to produce different kinds of health citizens.

Additionally, this shift in focus has been influenced by research that illustrates that community-based mosquito management efforts are essential to reduce mosquito populations and disease transmission (McNaughton et al., 2010; Winch et al., 1992). Aerial insecticides sprayed from vehicles can be ineffective for drastic reductions of populations, particularly for *Aedes aegypti* (a species that is present in Tucson and is the carrier of dengue and Zika) (Gubler, 1989; Winch et al., 1992). Education of residents on the elimination of habitat for larvae and pupae has the potential to curb mosquito populations at their source rather than allowing residents to become dependent on the state to stop disease transmission (Gubler, 1989). Gubler (1989) argues that these "bottom-up," community-based approaches are more cost effective and longer-lasting, yet will not achieve eradication as a "top-down" approach may for a limited period of time, and thus both tactics must be combined with an emphasis on community-based source reduction. Best strategies for successful community-based programs remain debated, however. Effective educational changes connected with actual behavioral shifts and larvae reductions vary from place to place and can be difficult to prove (Heintze et al., 2007; Winch et al., 2002).

### 1.1. State, citizen, mosquito

Like many nuisance insects and vermin, mosquitoes have long been both a challenge and an opportunity for state authority (Berenbaum, 1996; Biehler, 2009; Spielman and D'Antonio, 2001). Historically, efforts to control insects and other hazards and nuisances represent extensions of state power over citizens or territories, as where the militarization of insect control during and after the Second World War mobilized significant human and chemical resources and rolled out many forms of state power (Mitchell, 2002; Russell, 2001). In this sense, invasive controls over mosquitoes by direct state intervention, including dredging swamps, spraying pesticides, and managing water bodies (Patterson, 2009), are an extension of state ways of "seeing" and solving problems through simplified forms of legible control (Scott, 1998). Research in the area of disease and state power has repeatedly demonstrated that states tend towards invasive controls and that such approaches come to dictate the relationship between states and citizens in disease management (Carter, 2008).

Less is known about the implications and workings of governance in less invasive state control efforts, or "soft" forms of management. Citizen-focused, education-heavy campaigns defy the image of strong and direct state controls. Rather, this approach resembles the creation and implementation of *biopower*, "the set of mechanisms through which the basic biological features of the human species became the object of a political strategy, of a general strategy of power" (Foucault, 2007, p. 1). "Soft" mosquito management efforts like citizen-focused campaigns reflect biopower insofar as they seek to influence homeowner behaviors, and they intend to make local people in part responsible for mosquitoes' presence and the exposure of their own bodies to harm.

Insofar as "soft" efforts serve to develop decentralized institutions for self-governance and local collective governance, it might further be predicted that citizens will internalize such responsibilities so they become second nature, or intuitive. It is possible to predict that such an arrangement might result in the development of a type of "environ-

mentality," a condition where concern and responsibility for the environment direct subjects to regulate their own environmental behaviors (Agrawal, 2005). Moreover, the emergence of personal responsibility might be expected to have a strong influence over how citizens relate to the state itself and to their management activities on surrounding landscapes beyond issues of vector control. The creation of mosquito environmentality raises basic questions about the implications of citizen-oriented mosquito control. What do people, in areas where such "soft" strategies prevail, think about their own health responsibilities vis-à-vis those of the state? How might these responses be differentiated among over space and territory?

### 1.2. The case of Tucson, Arizona

The desert Southwest provides an excellent case study for questions of mosquito governance because the developing attitudes of state actors and citizens can be observed in "real time" as they tackle the recent emergence of mosquitoes as a significant health hazard. This is not to say that mosquitoes themselves are new to the region, despite its aridity. Records from the Spanish occupation of southern Arizona indicate the fatal presence of malaria in the region, which persisted among pioneer populations (Dobyns, 1976; Fink, 1998; Teeple, 1929). Mosquito numbers decreased in the mid-twentieth century as water resources came under increasing pressure and DDT was widely used until its ban in the late 1960s (Karpiscak et al., 2004; Reiter and Gubler, 1997; Russell, 2001). However, this trend began to reverse in the late 20th century as metropolitan Tucson grew, creating more complex urban landscapes and increasing the availability of potential breeding sites (Fink et al., 1998; Karpiscak et al., 2004; Willott, 2004).

This increase in mosquito populations was of little cause for concern until the introduction of WNV to Arizona in 2003, with a substantial outbreak in 2004 [391 cases, or 6.83 cases per 100,000 in Arizona (CDC, 2016b; Robbins et al., 2008; Robbins and Miller, 2012; see Table 1 in vonHedemann and Butterworth et al., 2015)]. Arizona remains one of the states with the highest number of WNV cases in the country (CDC, 2016b). WNV is currently the most commonly observed mosquito-borne disease in Arizona (AZDHS, 2016). Longer mosquito breeding seasons and changes in monsoon patterns due to climate change have the potential to increase the occurrence of sporadic disease outbreaks in the future, making effective mosquito management imperative (Morin and Comrie, 2013).

The rapid outbreak of WNV led to a quick proliferation of mosquito management strategies in a short period of time. In the city of Tucson, Arizona the responsibility for mitigating mosquito-borne disease falls to the Pima County Health Department (PCHD), whose longstanding obligation has been to manage public health through food safety, animal control, and personal health campaigns. As such, PCHD's responsibilities extend far beyond mosquito management (in contrast to other mosquito control authorities whose sole focus is mosquito abatement), and they operate with severe resource constraints (Robbins et al., 2008). Like other authorities nationwide (see especially Tedesco et al., 2010), Pima County adopted a "soft" management strategy that relies heavily on public education and pesticides targeted at mosquito larvae (larvicides). Through leaflets, pamphlets, television, radio, and neighborhood association meetings, PCHD tries to inculcate Tucson residents with personal responsibility for mosquito management. Recommended actions for citizens include removing standing water, wearing protective clothing, using mosquito repellents, and maintaining screens on windows and doors (PCHD, 2016). Managers also administer larvicides locally in response to their own mosquito monitoring and complaints from a WNV hotline. PCHD managers in Tucson have a disdain for fogging areas for adult mosquitoes (adulticides), because they believe this technique avoids the root causes of anthropogenic breeding habitats and removes responsibility for vector management from the public who create larvae sources (Shaw et al., 2010). Therefore, the management strategy in Tucson is a paradigma-

Download English Version:

<https://daneshyari.com/en/article/5114868>

Download Persian Version:

<https://daneshyari.com/article/5114868>

[Daneshyari.com](https://daneshyari.com)