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Mexico's drug networks: Modeling the smuggling routes towards the United States

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ABSTRACT

Drug smuggling routes are chosen to maximize profit while minimizing costs. Routes with the least drug transportation costs and the lowest risk for drug confiscation and gang fight are most preferred. This study attempts to predict the ground trafficking corridors for transporting marijuana and opium derivatives from Mexico to the United States border. The cost surface, representing impedance to transport illicit drugs, is modeled by considering physical, socio-demographic, and drug violence factors. The impedance is then transferred to the road network to represent the cost for moving drugs along the roads, which becomes the main input for network analysis. The results from the routes simulation confirm largely the known territory divisions and the drug trafficking routes of the major Mexican drug organizations. The findings help us understand the development of drug trafficking routes in Mexico, which can potentially enhance our capability to predict the dynamics of drug smuggling routes.

Introduction

Mexico has been a major producer of illegal drugs for more than a century. Over the last few decades, the country's production has steadily increased and diversified, so much so that Mexico now has become the main supplier of illicit narcotics to the United States (BINLEA, 2009, 2010). The drug smuggling business in Mexico has largely been controlled by a few local groups that dominate the entire chain of production: cultivation, distribution, and commercialization. Traditionally, the areas along Mexico's northern border have been most sought-after by drug gangs when looking to establish their headquarters and dominate lucrative smuggling corridors for moving narcotics into the United States (Astorga, 2005) (See Fig. 1). The networks of roads and highways, and other traditional hubs of infrastructure – such as maritime ports and airports – are frequently used to move drugs north, shaping the patterns of drug violence (NDIC, 2011).

However, the introduction of cocaine and synthetic drugs in Mexico has led to the rise of a rash of new and ruthless drug gangs, which have begun battling traditional Mexican cartels for a share of the smuggling business (Medel & Thoumi, 2014). Moreover, the collapse of Mexican state-sponsored protection rackets for drug trafficking in the 1990s and early 2000s (Astorga, 2005; Snyder & Duran-Martinez, 2009) has fermented the breaking-down of the balance between historically entrenched and powerful drug organizations. New competitors for the drug business started emerging and redefining the landscape of drug activities. The fight for drug business and control of key smuggling routes to the United States generated a huge spike in drug violence, claiming more than 50,000 lives between 2007 and 2011 (Cave, 2012).

Many drug violence studies in Mexico have centered on the causes and patterns of it (Beittel, 2010; Friman, 2009; Shirk, 2010; Snyder & Duran-Martinez, 2009). Others attempted to understand the history of drug gangs and smuggling (Astorga, 2003, 2005; Grillo, 2011). Most research on drug trafficking in Mexico examined the policy implications for the U.S.–Mexico relationship (Andreas, 2012; Astorga & Shirk, 2010; Tullis, 1995). Very few have focused on the geographical routes that are used for drug smuggling. To the authors' knowledge, Dell's (2011) study on Mexico's drug trafficking networks is the only such investigation. The study found that political-affiliation shifts in the administration of different municipalities had an effect on controlling drug violence and diverging drug smuggling to alternative routes.

The study reported in this paper aims at predicting the smuggling routes used by the Mexican traffickers to move marijuana and opium poppy derivatives from Mexico to the United States. Because drug trafficking calls for strategic business operation, kingpins act

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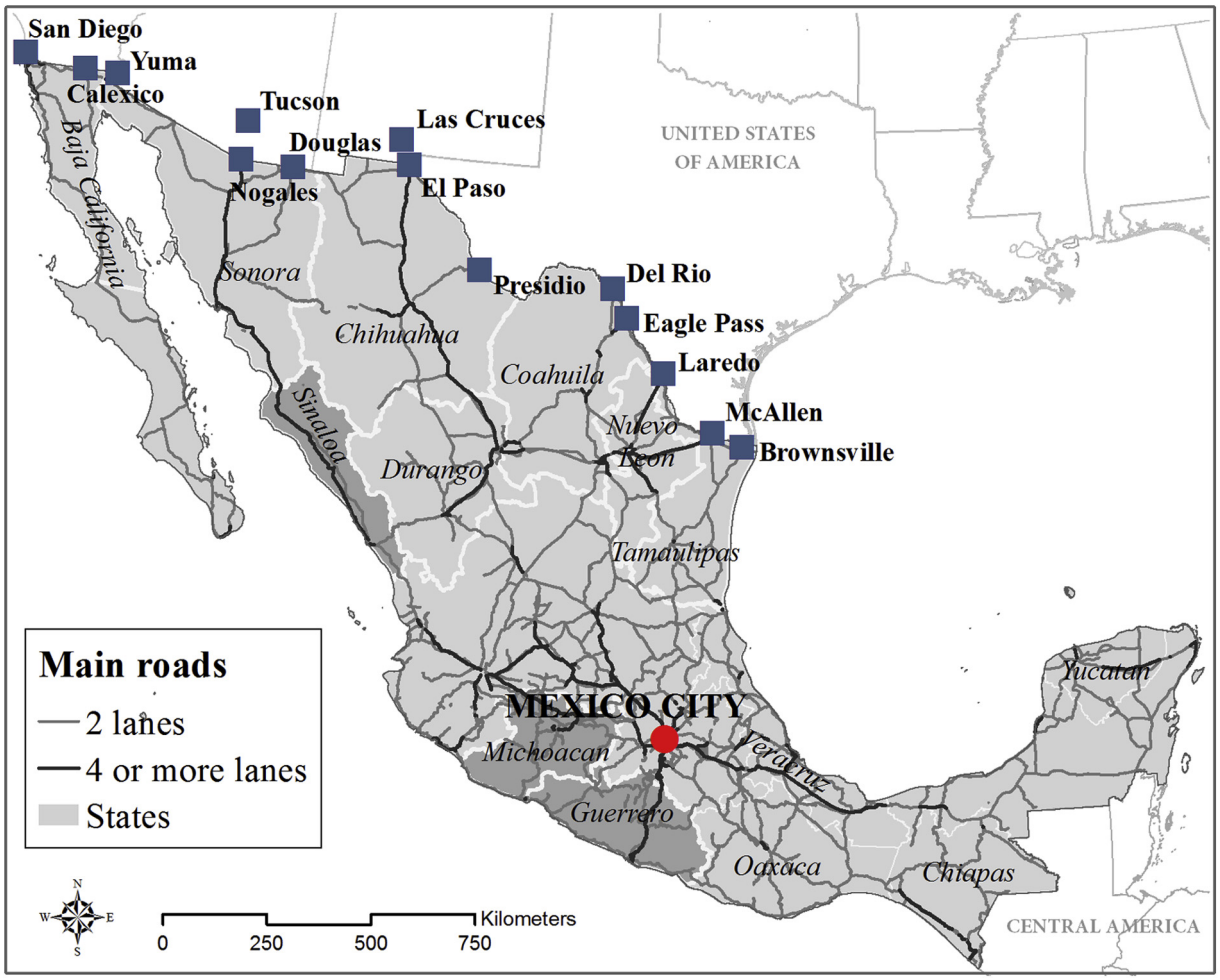

Fig. 1. Study area: Mexico road network.

in a very rational manner, seeking to maximize their returns while minimizing costs and risks. By accounting for the restrictions and costs for transporting drugs, this study estimates the possible drug trafficking routes that connect the Mexican drug production areas to the American cities along the U.S.–Mexico border. Restrictions to traverse include both social and political aspects, such as effective law enforcement, presence of local policy regimes less tolerant to drug smuggling, and elevated risks for drug-related killing and drug confiscation. The least-cost routes for drug trafficking are simulated for the years 2007–2010. A quality prediction of the drug trafficking routes is essential for effective allocation of resources and for necessary implementation of regional policies and practices in order to crack down drug smuggling and drug violence. The study contributes to understanding the dynamics of drug trafficking routes in Mexico.

Related literature on Mexico drug crime and criminology theories

According to the U.S. National Drug Threat Assessment (NDIC, 2011), most of the cocaine, heroin, foreign-produced marijuana, and foreign-produced methamphetamine available on American soil are moved into the U.S. through the land border along Arizona, California, New Mexico, and Texas. Different drug shipment methods are employed, ranging from small amounts that can be transported by car, SUV or pickup truck, to loads of one ton or more that are packed into commercial and non-commercial vehicles. Smugglers are believed to have a certain set of preferred routes for moving the different types of drugs. According to the NDIC (2011), seizures at and between the points of entry in Arizona represent roughly half of the marijuana confiscated at the border; the Rio Grande Valley in South Texas is another primary crossing point for the drug; heroin is smuggled across the border most frequently into California.

Most of the existing studies on Mexico drug offenses examined the causes, patterns, and history of drug violence (e.g. Astorga, 2003, 2005; Beittel, 2010; Friman, 2009; Grillo, 2011; Shirk, 2010; Snyder & Duran-Martinez, 2009). Among the small numbers of studies that discussed the topic of drug smuggling, the attention was on the possible policy implications on the U.S.–Mexico relationship (e.g. Andreas, 2012; Astorga & Shirk, 2010; Tullis, 1995). The only study known to the authors of this paper that analyzed the selection of drug smuggling routes connecting Mexico to the U.S. was conducted by Dell (2011). In this investigation, Dell pointed out that political changes in the municipal administration have an impact on the levels of violence linked to drug smuggling while also have the effect of deviating drug routes toward other regions.

According to crime theories, criminals do not make random movements, neither do crimes occur randomly at places. Rational choice theory (Clarke & Cornish, 1985) believes that an offender makes spatial decisions on offenses to maximize the potential benefit from committing crime and minimize the possible risk. An

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