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Evaluating deterrents of illegal behaviour in conservation: Carnivore killing in rural Taiwan

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ABSTRACT

Rules restricting resource use are ubiquitous to conservation. Recent increases in poaching of iconic species such as African elephant and rhino have triggered high-profile interest in enforcement. Previous studies have used economic models to explore how the probability and severity of sanctions influence poacher-behaviour. Yet despite evidence that compliance can be substantial when the threat of state-imposed sanctions is low and profits high, few have explored other factors deterring rule-breaking. We use the randomised response technique (RRT) and direct questions to estimate the proportion of rural residents in north-western Taiwan illegally killing wildlife. We then model how potential sources of deterrence: perceived probabilities of detection and punishment, social norms and self-imposed guilt, relate to non-compliant behaviour (reported via RRT). The perceived likelihood of being punished and two types of social norms (injunctive and descriptive) predict behaviour and deter rule-breaking. Harnessing social norms that encourage compliance offers potential for reducing the persecution of threatened species.

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1. Introduction

Effective conservation depends on understanding human behaviours, particularly those that threaten biodiversity such as illegal logging (Laurance, 2008), fishing (Hilborn, 2007) and hunting (Milner-Gulland and Bennett, 2003). Positive incentives, such as the provision of resources to those behaving in a pro-conservation manner, is one way of encouraging behaviour change (Milner-Gulland and Rowcliffe, 2007). However, conservation and natural resource management are widely dependent upon negative incentives, principally the making and enforcing of rules that restrict access and use of resources (St. John et al., 2013). As a result, successful management demands an understanding of factors deterring rule-breaking so that compliance can be encouraged.

Recent increases in wildlife crime including the poaching of iconic, commercially valuable species such as African elephant (Burn et al., 2011) and white rhino (Biggs et al., 2013; Smith et al., 2013) have triggered increased interest in enforcement (Goldenberg, 2013; The White House, 2013) which typically involves the use of patrols to detect infractions (Keane et al., 2008) and the application

of state-imposed legal sanctions to punish violators. By increasing the severity of sanctions, criminal justice policies aim to increase deterrence (Kennedy, 1997). Rational choice theories of crime assume that individuals weigh up potential costs (probability of being detected and likelihood and severity of penalties), rewards and preferences when deciding how to act (Becker, 1968; Garoupa, 1997). The rational actor therefore should comply when fairly certain of capture and punishment. The physical distribution or 'ecology' of crimes suggests that offenders do make rational choices: by committing crimes against poorly protected targets (e.g. houses, public property or people) in familiar locations, offenders reduce risk, effort, and inconvenience (Clarke and Cornish, 1985). However, the assumption that offenders act as rational utility maximizers who respond to the threat of sanctions in a predictable fashion has been challenged (Akers and Sellers, 2009; Paternoster, 1987). Evidence suggests that, constrained by availability of time, ability and information, human behaviour is only boundedly rational (Simon, 1955): rather than assessing the pros and cons of alternative courses of action, people employ 'shortcuts' or rules-of-thumb (also referred to as heuristics) when processing information and opt for satisfactory rather than optimal solutions (Clarke and Cornish, 1985; Cornish and Clarke, 1986; Milner-Gulland, 2012). Further, social–psychological factors also influence people's behaviour. With respect to pro-environmental behaviours, attitude, social norms, behavioural control and moral norms influence the

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decisions that people make (Bamberg and Möser, 2007; Mastrangelo et al., 2013; Williams et al., 2012), whilst people's feelings (Van Gelder, 2012), perceptions of informal social control (Felson, 1986), self-control (Pratt and Cullen, 2000) and an ability to manage fears, moral scruples and guilt influence criminal decision making (Cornish and Clarke, 1986).

There is evidence that investment in conservation law enforcement is effective. For example, anti-poaching patrols were a determining factor in the recovery of African buffalo and elephant in Serengeti National Park, Tanzania (Hilborn et al., 2006) and increased effectiveness of anti-poaching patrols reduced poaching of wildlife in Ghana's protected areas (Jachmann, 2008). Enforcement however is costly and studies investigating illegal behaviour have reported mixed results concerning the influence that probabilities of capture and punishment have on actors (Kroneberg et al., 2010). For example, compliance in some fisheries was found to be high despite low probabilities of detection and illegal profits in excess of fines (Sutinen and Kuperan, 1999), the threat of detection failed to deter drink-driving (Berger and Snortum, 1986) and the expectations of capture and punishment were unrelated to people's intention to commit tax fraud or shop-lift (Kroneberg et al., 2010). In addition, industry characteristics more strongly deterred corporate crime compared to formal sanction risk (Simpson and Koper, 1992). This raises questions about what other factors encourage compliance and whether they can be harnessed to supplement or even reduce reliance on conventional and costly enforcement.

Economic models of law enforcement in conservation and natural resource management have incorporated probabilities of detection and punishment based upon information including enforcement data and legal proceedings (Milner-Gulland and Leader-Williams, 1992; Sumaila et al., 2006). However, would-be-violators do not know the actual probability of being caught or punished, rather their behaviour is influenced by their perceived threat of enforcement action (Grasmick and Bryjak, 1980; Grasmick and Green, 1980). Studies investigating the links between perceived sanction risk and severity generally find that criminality is lower amongst those perceiving higher risks of detection and severity of punishment (Nagin, 1998). There is evidence in conservation that rule-breakers adjust their perceptions of the risks of sanctions. For example, following an initial market inspection, trade in the North Sulewesi endemic babirusa (*babyrousa celebensis*) halted for one year. However, by the third inspection trade only stopped for one month as traders refined their perceptions of the threat of capture from high to the true level of virtually zero (Milner-Gulland and Clayton, 2002). However, none have investigated how an individual's compliance behaviour relates to their reports of the perceived probabilities of detection and punishment.

Any factor that reduces the expected utility of a crime may encourage compliance and empirical evidence suggests that sources of social control may play a greater role in shaping compliance compared to the certainty and severity of punishment (Paternoster, 1987). In addition to regulations enforced by formal institutions, social norms (obligatory, shared or forbidden behaviours) mediate the way in which people in societies behave (Ostrom, 2000). Peers may reward individuals for following social norms by conferring status or material resources towards them, or punish transgressions through ostracism or the withholding of favours or goods (Posner, 1997). Social norms have been found to deter a range of antisocial behaviours including drink-driving (Berger and Snortum, 1986), illegal gambling (Grasmick and Green, 1980) and environmental theft (Cialdini, 2003). Further, enforcement within some fisheries appears to stem largely from social influences (Gezelius, 2002; Sutinen and Gauvin, 1989). For example, Norwegian fishers comply for fear of being labelled dishonourable by gossiping peers (Gezelius, 2002). Evidence from social psychology suggests that two types of social norm influence behaviour: injunctive norms (what people typically approve of) and descriptive norms (what people typically do) (Cialdini et al., 1991). To date, the role of these two types of social norm in encouraging compliance with conservation rules has not been explored in a quantitative manner.

The behaviour of individuals is also regulated by internal feelings such as guilt, shame and self-esteem. Anticipated or actual guilt may be felt by an individual when they consider performing, or actually execute a behaviour that defies their morals, values or social norms (Vining and Ebreo, 2002). The immediate response may be felt in the form or physiological discomfort, however, long-term impacts may include anxiety or depression impeding personal performance (Grasmick and Bursik, 1990). Whilst acts that trigger guilt may differ between cultures (Scollon et al., 2004), feelings of guilt have been shown to influence a range of behaviours including willingness to help others (Freedman et al., 1967), participate in extra-curricular activities (Boster et al., 1999) and engage in pro-environmental behaviours (Ahn et al., 2013). With respect to compliance, guilt has been found to have a stronger influence on behaviour compared to the threat of capture in the case of tax fraud and drunk-driving (Grasmick and Bursik, 1990; Wenzel, 2004). Whilst fishers have reported feeling 'morally uncomfortable' when breaking the law (Gezelius, 2002; Sutinen and Kuperan, 1999), the utility of self-imposed guilt as a deterrent has not been investigated within a conservation and natural resource management context.

Understanding the potential value of such factors as deterrents requires that they be linked to reports of people's compliance behaviour. Innovative developments in the analysis of randomised response data (van den Hout et al., 2007) recently applied in conservation (St. John et al., 2012) support such an approach. The randomised response technique (RRT) (Warner, 1965) has improved estimates of rule-breaking in conservation producing higher estimates of non-compliance compared to direct questions (Razafimanahaka et al., 2012; Solomon et al., 2007; St. John et al., 2010a). By using a randomising device such as dice, RRT provides respondents with levels of protection greater than a simple guarantee of anonymity. For example, provided with a beaker and a die, respondents may be instructed to: answer a sensitive question truthfully choosing 'yes' or 'no' if the die lands on one through to four (probability = 0.66); select 'yes' if the die lands on five (probability = 0.167); or select 'no' if the die lands on six (probability = 0.167) (St. John et al., 2010a). The result of the die is never revealed to the interviewer so a truthful response can never be distinguished from a prescribed one. By adapting the logistic regression model to account for answers forced by the randomising device (van den Hout et al., 2007), characteristics of respondents (e.g. attitudes) can be linked to behaviours of interest such as killing of protected carnivores (St. John et al., 2012).

In this study we use both RRT and direct questions (DQ) to estimate the proportion of rural residents in north-western Taiwan killing four species as well as asking someone else to hunt a legally protected endangered species on their behalf. We then use an adapted form of logistic regression (St. John et al., 2012; van den Hout et al., 2007) to investigate the potential deterrent effects of the perceived probabilities of detection and punishment, injunctive and descriptive norms, and self-imposed guilt on wildlife persecution reported via RRT (Fig. 1). By linking reports of rule-breaking behaviour to potential sources of deterrence, this study makes a novel contribution to the study of conservation enforcement, a neglected area of research (Keane et al., 2012; Robinson et al., 2010).