

1 Title: Conservation enforcement: Insights from people incarcerated for wildlife crimes in Nepal

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3 Kumar Paudel, Greenhood Nepal, Kathmandu, Nepal; [kmrpaudel@gmail.com](mailto:kmrpaudel@gmail.com)

4 Gary R. Potter, Law School, Lancaster University, United Kingdom; [g.potter2@lancaster.ac.uk](mailto:g.potter2@lancaster.ac.uk)

5 Jacob Phelps, Lancaster Environment Centre, Lancaster University; [jacob.phelps@gmail.com](mailto:jacob.phelps@gmail.com)

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11 Target audience for the paper: Our target audience includes conservation agencies, decision-  
12 makers, enforcement practitioners who are working to curb illegal wildlife harvest and trade  
13 globally using enforcement-based interventions, as well as academics (from conservation,  
14 ecology, biology and criminology backgrounds, among others) who are debating interventions to  
15 address illegal wildlife trade.

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21 Corresponding authors: Kumar Paudel, Greenhood Nepal, Kathmandu, Nepal;

22 [kmrpaudel@gmail.com](mailto:kmrpaudel@gmail.com), +977-1-5244333, +977-9851127608; Jacob Phelps, Lancaster

23 Environment Centre, Lancaster University; [jacob.phelps@gmail.com](mailto:jacob.phelps@gmail.com)

24 Abstract

25

26 There are long-standing debates about the effectiveness and social impacts of enforcement-based  
27 conservation, particularly as investments into enforcement increase in response to growing alarm  
28 about Illegal Wildlife Trade (IWT). However, there is little data on the people subject to this  
29 enforcement, including prison sentences, species targeted, what motivates and deters them, and  
30 the social impacts of enforcement. This study identified 384 individuals across Nepal who were  
31 in prison for IWT offences in late 2016, and involved interviews (n=116) focused on  
32 respondents' trade practices, economic circumstances and motivations. IWT prisoners  
33 represented 10-20% of the total prison populations in two regions and often received stiff  
34 sanctions, with a range of downstream impacts on respondents' families. Most respondents were  
35 arrested for their involvement in the rhinoceros trade (61%). Most were poor (56%) and from  
36 indigenous communities (75%), highlighting potentially inequitable impacts of enforcement.  
37 Despite common assumptions about the links between IWT, poverty and organised crime, most  
38 respondents were motivated by the desire to earn extra income and by the ease of IWT compared  
39 to other employment. IWT was neither a primary livelihood strategy, nor had the attributes for  
40 formal organised crime. Respondents, particularly poor respondents, seemed to underestimate  
41 the risks of detection and incompletely understood the scale of sanctions. Improved public  
42 awareness about the scale and social impacts of sanctions could help increase deterrence effects  
43 while reducing unintended social harms of enforcement.

44

45 Keywords: conservation criminology; deterrence; enforcement; wildlife trade

## 46 **1. Introduction**

47 Hundreds of millions of dollars have been recently invested to address Illegal Wildlife Trade  
48 (IWT) globally, heavily focused on enforcement-based approaches to conservation in developing  
49 countries (Duffy and Humphrey 2014; WB, 2016; Biggs et al., 2017). This has included  
50 investments to arm, train and support park rangers; introduction of “shoot on sight” policies in  
51 several countries; military and private security deployments to monitor threatened wildlife;  
52 efforts to increase fines and prison sentences; and the introduction of new monitoring  
53 technologies such as drones and automatic cameras (Biggs et al., 2017; e.g., Hanoi Statement,  
54 2016; WCS, 2016; TRAPS, 2017).

55  
56 These trends have spurred global debate over enforcement-based and militarized conservation  
57 (e.g., Challender et al., 2014; Biggs et al., 2017; McCann, 2017; Gray and Gountlet, 2017;  
58 Büscher, 2018), including their purported effectiveness at protecting biodiversity, and the  
59 potential for negative social repercussions, such as the criminalisation of local resource users,  
60 including poor and indigenous communities (Duffy, 2014; Cooney et al., 2016; Milner-Gulland  
61 et al., 2018). There is also mounting interest in the relative benefits of enforcement-based  
62 strategies versus alternatives, such as demand reduction, incentives and alternative livelihood  
63 development (e.g., Challender et al., 2014; Veríssimo and Wan, 2018; Holden et al., 2018).

64 While there is uncertainty over the long-term social and environmental outcomes of increased  
65 enforcement spending, IWT rates have often remained high even in the context of increased  
66 enforcement (e.g., see Biggs et al., 2013; Challender et al., 2014). Evidence from other sectors,  
67 notably drug enforcement, highlights the limitations of enforcement-focused approaches,  
68 particularly given growing focus on reducing the unintended social impacts of drug enforcement

69 among both producers and consumers (e.g., Poret, 2002; Stevens, 2013; Blaustein et al., 2017).

70 Yet, traditional enforcement remains an important part of conservation that is unlikely to be  
71 replaced by other interventions (Phelps et al., 2014), although there is a clear need to explore  
72 strategies through which to increase its effectiveness and efficiency while also reducing  
73 unintentional social harms.

74

75 Despite widespread investment effort, data on the people subject to enforcement—including  
76 arrest, prosecution and sentencing rates—are often scattered, inaccessible and unanalysed (if  
77 collected at all), while data on demographics, types of offences and motivations are infrequently  
78 collected (see Kahler and Gore, 2012; Duffy et al., 2016). These data are not only important to  
79 empirically grounding the growing body of scholarship on social dimensions of conservation, but  
80 also to designing more nuanced enforcement strategies that target specific drivers and  
81 motivations behind participation in IWT (see Phelps et al., 2016).

82

83 Nepal exemplifies enforcement-based approaches to IWT (McLean and Straede, 2003). Widely  
84 recognised for its collaboratively-managed community forests, Nepal also has strong  
85 enforcement-based responses to IWT of charismatic species (Yonzon, 2006; Sinha, 2010). This  
86 includes nearly 7,000 military personnel monitoring protected areas (Nepal Army, 2018),  
87 automatic cameras to monitor wildlife (BBC, 2015), and a wave of IWT operations by its Central  
88 Investigation Bureau and Wildlife Crime Control Bureaus. Between 2009 and 2014, the number  
89 of wildlife seizures increased 10 fold, and IWT arrests increased 8.6 fold (Paudel, 2015).  
90 Nepalese law also stipulates high prison sentences and fines for people convicted of IWT  
91 offences, and recently increased sanctions for involvement in illegal international trade

92 (summary of legislation in Supplementary Table 1). These strategies have reportedly improved  
93 conservation outcomes, resulting in a "zero poaching year" in Chitwan National Park (Aryal et  
94 al., 2017).

95

96 These investments demonstrate Nepal's commitment to criminal justice responses to wildlife  
97 crime, yet ongoing incidences of domestic and international IWT demonstrate failings in their  
98 effectiveness. While punishment is an important part of the overall approach, conservation also  
99 relies on preventing offences from happening in the first place. Prevention is partially addressed  
100 by situational crime prevention techniques aimed at making it harder for potential motivated  
101 offenders to commit crimes in the first place, and this approach has been explored within the  
102 context of IWT (e.g., Lemieux, 2014; Moreto & Pires, 2018; Pires & Moreto 2011). However,  
103 prevention also depends on reducing the numbers of potential motivated offenders through the  
104 deterrence effect of criminal justice sanctions, which is the focus of this paper. Deterrence  
105 theory suggests that the effectiveness of criminalisation and enforcement as a deterrent depends  
106 on the severity, celerity (swiftness) and certainty of punishment outweighing the motivations for  
107 participating in crime. This is also dependent on would-be offenders being aware of the law and  
108 the accompanying risk of penalty (Beccaria, 1764; see Nagin et al., 2018 for a thorough  
109 discussion of contemporary deterrence theory).

110

111 This study considers why people commit IWT, despite the increases in law enforcement activity  
112 and criminal sentences in the Nepali context. It draws on in-depth interviews with prisoners  
113 (n=116) across seven jails in Nepal. It describes (1) the people subject to enforcement  
114 (demographics, roles within IWT); (2) their offences and sentences, including broader social

115 impacts of their imprisonment, and (3) the reasons behind their involvement in IWT (self-  
116 reported motivations, knowledge of sanctions, perceptions of risk). It is, to our knowledge, the  
117 first large sample study with people jailed for IWT (although see Hariohay et al. 2019). We  
118 believe that it is also the first large study interviewing people imprisoned for environmental  
119 crimes in a developing country (cf. Forsyth & Marckese, 1993; Muth & Bowe, 1998; Eliason,  
120 2004).

121

## 122 **2. Methods**

123 With permission granted by the Department of National Parks and Wildlife Conservation and the  
124 Department for Prison Management in Nepal, we contacted the information officers of all  
125 prisons in Nepal (74) via telephone to identify the number of people currently incarcerated for  
126 faunal IWT (Oct. 2016; Supplementary Table 2; a small number of arrests for rosewood trade  
127 were not included as these offenders are categorised differently within the Nepalese prison  
128 system and it was not possible to easily identify and gain access to these offenders within the  
129 research period. As such, we focused on offenders involved in trade in fauna for this project). Of  
130 the 74 prisons, 38 sites held people for wildlife crimes, and we conducted interviews with  
131 prisoners (n=116) across 7 of these during 2016-2017. For purposes of convenience, we targeted  
132 the 5 prisons with the largest IWT prisoner populations and the 2 prisons in closest proximity to  
133 Kathmandu (see Supplementary Figure 1).

134 Respondents at the largest prison (Bharatpur prison, Chitwan) were selected from a list of people  
135 arrested for IWT in that prison, using the “randomise” function in Excel (31.4% of the  
136 population). Where a potential respondent opted not to participate, the next person on the list was  
137 approached. At the other sites, we sought to interview all prisoners, which was feasible due to

138 the small populations. Of the 109 people approached in the first round of interviews at Chitwan,  
139 Kathmandu Central, Kathmandu Jagannath, Bardiya and Parsa prisons (October 2016 to  
140 February 2017), 88 participated (19.3% refusal rate). We then conducted a second round of  
141 interviews to increase our sample size at Lalitpur, Rasuwa and Chitwan prisons (June-August  
142 2017). In this round 45 people were approached and 28 participated, with the refusal rate  
143 (37.8%) climbing following reports that the government was further charging prisoners for their  
144 historic involvement in IWT. This happens as new information comes to light, and was not  
145 connected to this research, of which we reassured participants prior to gaining consent.

146 Interviews were conducted in Nepali by the lead author, a male who grew up in rural Nepal and  
147 has a personal understanding of wild resource harvest and prior experience conducting  
148 interviews in prison setting (Paduel, 2015). Prior to interviews, we obtained informed oral  
149 consent, following established ethical standards for criminological research (BSC, 2006) and  
150 institutional review (Lancaster University FST REC 16045), including explanation that  
151 participation was voluntary, anonymous, and would not affect respondents' sentences.

152 Interviews lasted approximately 1 hour, having been granted national permission for extended  
153 visiting times (usually 20 minutes), and were conducted in private. As audio-recording was  
154 forbidden under prison rules, responses were recorded manually on the research instrument, with  
155 more detailed notes written up after each interview.

156 Interviews were structured (full interview schedule in English and Nepali available in  
157 Supplementary Materials) and primarily involved closed questions, including multiple response,  
158 ranking, Likert-scale and short-answer questions, split into 8 sections: (1) respondent  
159 demographics; (2) employment and income, including household income, economic situation  
160 and food security; (3) involvement in IWT, including age and year of first involvement, roles

161 participated in, species hunted and traded; (4) current crime and sentence; (5) motives for  
162 participating in IWT; (6) knowledge of IWT laws and regulation; (7) perception of deterrence,  
163 including perceptions of the risk of being caught, and; (8) social impacts of their incarceration,  
164 including impacts on family. Our questions about their knowledge of IWT laws and penalties  
165 were informed by a review of wildlife legislation in Nepal and the associated species-wise  
166 sanctions (Supplementary Table 1). We included some open questions throughout the interview  
167 to follow up on responses to closed questions, including further exploration of respondents'  
168 experiences with imprisonment as a result of IWT and the impacts this had on their families.

169 Data from closed questions were coded and analysed using SPSS v.24 to generate descriptive  
170 statistics and, using Spearman's Rho correlations, to explore the relationships among variables.  
171 We specifically looked at what variables would help us understand variation in respondents'  
172 awareness of the laws. For this, three interview questions about knowledge of IWT regulations  
173 were combined into a single ordinal variable, "Overall awareness of laws" (range 0-4, using the  
174 first three variables in Table 4). We then tested what variables might be explanatory, expecting  
175 age, education and economic status to be potential predictors of variation in their knowledge of  
176 regulations (Supplementary Table 3). We also explored the relationships between reported  
177 motives for participating in IWT and demographic variables, again expecting that factors such as  
178 economic status would correlate with motivations such as nutritional and basic economic need  
179 (Supplementary Table 4). However, quantitative analyses options were limited by the sample  
180 size and heterogeneity within the dataset (e.g., Chi Square results not valid, sample too small for  
181 meaningful Latent Class Analysis), and those that we could conduct revealed few significant  
182 relationships. Qualitative data from our open questions was subject to simple, manual thematic  
183 analysis that involved generating initial codes and collecting illustrative quotes, and then

184 searching, reviewing and reducing themes (Braun & Clarke, 2019). For this paper, the only  
185 qualitative data we draw on are examples of social impacts of imprisonment (see section 3.2).

## 186 **2.1 Collecting data on illegal activity**

187 Researching illegal resource activities can be challenging due to issues such as sensitivity and  
188 social desirability (Ruggiero & Khan, 2006; Keane et al., 2008). However, this study employed  
189 direct questioning, the validity of which is increasingly recognised in research on illegal drugs  
190 (MKG, 2007) and on illegal natural resource use (Gavin et al., 2010; Hinsley et al., 2017). Our  
191 interviews occurred in the prison context, which potentially presents fewer concerns about  
192 respondent integrity and fewer ethical issues, when compared with research on active offenders.  
193 Our sample is not representative of all IWT offenders in Nepal. The sample has geographic bias  
194 (e.g., towards lowlands with the largest IWT prison populations), which may have affected data  
195 on species, such as the underrepresentation of high elevation species (e.g., snow leopards). The  
196 sample only includes IWT participants who were arrested and jailed for their offences, so  
197 excludes IWT participants who were not caught, avoided jail time and/or committed offences not  
198 deemed severe enough to receive prison sentences. Our sample likely includes a disproportionate  
199 number of respondents serving longer sentences. While it is not possible to be sure of the reasons  
200 individuals refused to participate, we anticipate that refusals were more likely among offenders  
201 involved in organised crime roles. Taken together, our sample is best interpreted as illustrative of  
202 people involved in domestic harvest and trade roles who have been subject to arrest and  
203 imprisonment and who were willing to participate in interviews.

## 204 **3. Results**

### 205 **3.1 Respondent IWT roles and demographics**

206 Out of 74 prisons across Nepal, 38 prisons hosted a total of 384 IWT prisoners during the start of  
207 research in late 2016 (Figure 1, Supplementary Table 2), although no historical baseline has been  
208 compiled to enable comparison. People convicted for IWT represented a small part of the prison  
209 population at most sites (0.1-3.3%), but formed 21.1% of the total prison populations in Chitwan  
210 District Prison, 9.6% in Bardia District Prison and 6.4% in Rasuwa District Prison.

211

212 Respondents participated in a range of roles across IWT market chains, including harvest,  
213 transport and retail. Harvest was the most common role reported, and only a small number of  
214 respondents were involved in international transport (12%, Table 1). Nearly one third of  
215 respondents reported involvement in only one role (31.9%), 39.7% participated in two or three  
216 different IWT activities and 15.5% reported having participated in four or more different roles,  
217 while 12.9% (n=15) did not respond to this question. Involvement in IWT was usually part of a  
218 group (54.3%) and often in response to a request from a specific customer (47.4%).

219

220 [Table 1 here]

221

222 The respondents were overwhelmingly male (99.1%), with an average age of 36 at time of arrest  
223 (range 17-70). The vast majority 75%, were from the Janajati group of castes (75%), which are  
224 largely marginalised indigenous communities from the Tamang, Chaudhary and Chepang/Praja  
225 castes. Educational levels varied, including numerous illiterate respondents (31.9%; Table 2).

226

227 [Table 2 here]

228

229 Most respondents self-reported as ‘poor’ across several metrics (Table 3). Self-reported  
230 household income at the time of arrest placed most respondents’ households under the World  
231 Bank defined poverty line for Nepal (56.0%; approx. US \$ 1.9/person/day). Most respondents  
232 also reported that their household income was not enough on which to survive (36.2%) or only  
233 enough to cover the day-to-day costs of living (47.4%), with >80% of respondents responsible  
234 for at least one dependent (Table 2).

235  
236 Participation in IWT was an additional source of income for the vast majority of our respondents,  
237 with only 10.3% reporting IWT as their primary occupation before arrest. Respondents reported  
238 primary employment across a range of other sectors, but often in insecure jobs within the  
239 informal sector, including agriculture (28.4%), informal wage labour (14.7%), transport (8.6%),  
240 skilled trades (8.6%) and mobile traders (e.g., of crops, carpets, 8.6%). Many held jobs that  
241 involved moving from place-to-place. Notable others included two military officials, two  
242 politicians and three secondary school students.

243 [Table 3 here]

244

### 245 **3.2 Offences, penalties and social impacts**

246 Most respondents were convicted for the harvest and trade of a small number of species:  
247 *Rhinoceros unicornis* (Greater One-horned Rhinoceros) (61.2%), *Panthera tigris tigris* (Royal  
248 Bengal Tiger) (13.8%) and *Ailurus fulgens* (Red Panda) (12.1%), and were focused in lowland  
249 protected areas (Chitwan and Bardia National Parks). Fines and prison sentences varied across  
250 cases and taxa (Figure 1; see Supplementary Table 1). Maximum sanctions were imposed in  
251 some cases, notably for rhinoceros, including approx. US\$960 fine and >10 years imprisonment.

252

253 [Figure 1 Here]

254

255 Nearly half of respondents described additional negative impacts on their families' livelihoods or  
256 children's education as a result of their imprisonment, with 14.5% reporting both. Respondents  
257 also described other social impacts, including divorce or estrangement from their wife (n=12);  
258 family members having to work harder (n=11, including 2 reports of family members having to  
259 take jobs in other countries); having to sell property or close businesses (n=8), and stigma or loss  
260 of prestige (n=7, including 1 parental suicide, 1 family changing religion, and 1 daughter unable  
261 to marry).

### 262 3.3 Awareness of law and perceived risk

263 Most respondents reported that they were aware, prior to their arrest, that IWT was illegal  
264 (93.1%), although few knew the scale of related fines and imprisonment (Table 4), and only one  
265 third stated concern about the possibility of arrest (34.5%). More than half (52.6%) were  
266 convicted within one year of their first reported involvement with IWT. Only a minority (8.6%)  
267 were repeat offenders, and 16.4% of respondents planned to return to IWT post-release  
268 (including 4 of the existing repeat offenders).

269

270 Respondent awareness of laws correlated moderately with household economic status ( $r=0.425$ ;  
271  $p<0.01$ , see Table 3) and household food situation ( $r=0.318$ ;  $p<0.01$ ), suggesting that poorer  
272 respondents were less likely to be aware of the risks of penalty (although direct economic  
273 measures of poverty, such as reported household income, were not significantly related to overall  
274 awareness of laws; see Supplementary Table 3).

275 [Table 4 here]

276

### 277 **3.4 Motives for participating in IWT**

278 Respondents reported diverse motivations for participation in IWT (Table 5). Few relied on it as  
279 a primary livelihood, and direct household need was not a leading reported motivation (e.g.,  
280 money to meet basic needs, 11.2%; IWT to meet nutritional needs, 6.0%). Instead, IWT served  
281 primarily to earn extra money (87.9%) and represented a less tiring job than alternative sources  
282 of income (37.1%). Family food situation was weakly correlated to the motivation of nutritional  
283 need ( $r=0.249$ ;  $p<0.01$ ) and moderately correlated to the motivation of needing money to meet  
284 basic household needs, and household economic status was moderately related to needing money  
285 to meet basic household needs ( $r=.452$ ;  $p<0.01$ ). We also identified a weak correlation between  
286 age of first involvement in IWT and the motivation of finding IWT easier than other work  
287 options ( $r=.286$ ;  $p<0.01$ ). No significant relationships were found between reported motivations  
288 and demographic variables (Supplementary Table 4).

289

290 [Table 5 here]

291

## 292 **4. Discussion**

293 Amidst widespread calls for strengthened enforcement to protect biodiversity from IWT, we  
294 know very little about the people being imprisoned for these crimes. This study provides unique  
295 demographic and motivational data necessary for developing effective and equitable  
296 conservation policies. There were clear patterns in respondent demographics, and our sample  
297 was principally poor, illiterate, with 75% coming from historically-marginalised indigenous

298 communities (Table 2), although these groups make up only 35.8% of Nepal's population (CBS,  
299 2011). However, when considering other variables (e.g. awareness of rules, employment,  
300 motivations), our sample was very heterogeneous. The sample size, while large by the standards  
301 of prison interview research, was too small to make meaningful attempts at using statistical  
302 analysis techniques to develop a typology based on cluster analysis (e.g., via Latent Class  
303 Analysis). Nevertheless, the descriptive data illustrates the diversity of IWT involvement.

304

305 Our findings highlight robust conservation enforcement, particularly for charismatic species  
306 (tigers, rhinoceros) around lowland protected areas, where as much as 10-20% of the overall  
307 local prison populations were people convicted for wildlife crimes. These imprisonment rates  
308 illustrate not only the scale of enforcement, but also the scope for additional interventions that  
309 aim to help reduce offence rates. On the one hand, penal sanctions can play an important role in  
310 individual and general deterrence. On the other hand, high numbers of incarcerated offenders,  
311 particularly at the local scale in regions such as Chitwan, suggests that the deterrence role could  
312 be more effective. This is especially true given our findings about the lack of awareness of  
313 penalties and the risk of arrest associated with IWT among our sample. While punishment and  
314 other enforcement activity shows a strong response to IWT, that so many people are still ending  
315 up in prison leads us to ask why these people have remained undeterred from participating in  
316 IWT offences.

317

318 Criminology offers insights into how to increase the effectiveness of enforcement-based  
319 conservation approaches in ways that also help to address social equity. In particular, rational  
320 actor perspectives posit that the decision whether or not to commit a crime will depend on the

321 balance between the perceived associated risks and rewards. Classic theory argues that the  
322 deterrence effect of a punishment depends on the severity, celerity (swiftness of enforcement)  
323 and certainty of punishment following a crime, weighed against the motivation to commit the  
324 crime in the first place (Nagin et al. 2018). In the context of this sample, punishment turned out  
325 to be certain, severe and swift. All of our respondents were convicted offenders who were  
326 imprisoned (certainty) and experienced considerable sanctions (severity): not only were there  
327 384 people identified as imprisoned for IWT, but we found significant fines and imprisonment  
328 (often >5 years, Figure 1). Moreover, verdicts indicated the use of judicial discretion to apply  
329 high sanctions, particularly for rhinoceros trade (Figure 1). The results also highlighted a range  
330 of downstream social impacts on respondents and respondents' families. In addition, most  
331 respondents were arrested shortly after their first involvement in IWT (high celerity). The  
332 persistence of IWT under this enforcement context suggest failing in its deterrence effects, which  
333 may be explained perpetrators' motives for participating in IWT and the associated risk-reward  
334 calculations.

335

#### 336 **4.1 Motives for IWT participation**

337 A range of economic and non-economic factors shape evaluations of the costs and benefits  
338 associated with IWT participation (Cooney et al., 2016). The results demonstrate the role of  
339 poverty in driving some offenders into IWT, as indicated by the relationship between reported  
340 indicators of poverty (food situation, household economic status) and motivations associated  
341 with basic household economic and nutritional needs. Yet, despite high poverty rates among  
342 respondents, most did not report basic household needs—either economic or nutritional—as their  
343 primary motivations for participating in IWT (Table 5). Making *extra* money was

344 overwhelmingly the most common primary motive, followed by the perception that IWT is a less  
345 tiring job than its alternatives. This mirrors our finding that IWT was not pursued as a primary  
346 employment by the vast majority of respondents, and that often aspiration (rather than  
347 desperation) may be an important IWT driver in some contexts. Peer pressure was also a  
348 commonly reported motive (36.2%), which mirrors findings elsewhere that IWT crimes were  
349 associated with belonging to a particular social or cultural group (e.g., Nurse, 2011, 2013;  
350 Rytterstedt, 2016). Other anticipated motivations such as IWT in response to human-wildlife  
351 conflict, for cultural reasons, and for household use were little reported by the respondents.

352

353 These findings reflect growing awareness of the diversity and complexity of IWT motives  
354 (Kahler and Gore, 2012; Duffy et al., 2016; Cooney et al., 2016), and the need for more specific  
355 terminology to distinguish among the diverse roles in and motivations for IWT participants (e.g.,  
356 Table 1, 5; cf. Phelps et al., 2016). These findings also suggest the need to further interrogate the  
357 types and perceptions of need, even within poor communities, and in the context of how  
358 respondents view themselves (e.g., Mbeti et al., 2011; see Duffy et al., 2016). It supports  
359 existing research arguing that poverty reduction alone is unlikely to reduce IWT (TRAFFIC  
360 2008), and suggests the need for a more nuanced understanding of motives, so that targeted  
361 interventions can respond to specific drivers.

362

363 Significantly, reported motives were not explicitly linked to organised crime, which is a leading  
364 narrative in some parts of the conservation community (e.g., London Conference, 2018). In fact,  
365 while respondents reported that IWT was often coordinated with others (54.3%), this seems to  
366 more closely resemble “crime that is organised”, rather than participation in organised crime as

367 popularly conceptualised (see Pires et al., 2016). Nevertheless, some respondents were involved  
368 in international trafficking (12%) and nearly half were responding to requests from specific  
369 customers for high-value wildlife products in demand by international markets, which suggests  
370 possible involvement with formal networks. While these individuals may represent bottlenecks  
371 for strategic conservation interventions to disrupt organised networks (see Phelps et al., 2016),  
372 efforts to curb IWT should avoid blindly following logical, but weakly supported narratives, and  
373 ensure that they reflect the diversity of reported motivations. Importantly, while there are clearly  
374 motivations to participate in IWT, these alone do a poor job at explaining the high rates observed  
375 in our dataset.

376

#### 377 **4.2 Low awareness of rules, risks and consequences**

378 The conditions laid out by classical criminological theory have been largely met for most  
379 respondents in our sample, the results suggest that other, important underlying conditions were  
380 not met. Notably, deterrence relies not only on the intensity of conservation enforcement (see  
381 Holden et al., 2018), but also relies on people's awareness of the rules and the consequences of  
382 noncompliance, and the resulting sense of risk. There was a minority of respondents who, by  
383 virtue of their imprisonment, understood these risks, but who were nevertheless repeat offenders  
384 and/or reported an intention to return to IWT after their release. For these individuals, existing  
385 enforcement strategies, combined with their risk/reward ratios and underlying motivations, were  
386 inadequate to shift behaviour. However, this was the exception among the respondents.

387

388 For most respondents, our results suggest information asymmetries in perpetrators' knowledge  
389 about rules, and possible miscalculations in their perceptions of risk (Table 4). Despite high

390 sanctions (Figure 1, Supplementary Table 1), respondents reported low understanding of these  
391 rules (Table 4) and limited concern that they might be arrested, alongside low economic reliance  
392 on IWT (Table 2). As most respondents were arrested shortly after their reported first  
393 participation in IWT, their involvement was also unlikely deeply informed by prior experience or  
394 involvement in professionalised IWT and organised crime. This suggests skewed risk-reward  
395 calculations among many IWT perpetrators, (although this interpretation does not apply to the  
396 minority of repeat offenders). Despite critiques of the “knowledge deficit model” (e.g.,  
397 Heberlein, 2012), it is clear that people can only comply with rules about which they have  
398 knowledge (cf. Ostrom, 1990), and can only evaluate them if they understand the risk associated  
399 with detection, prosecution and sanctions.

400

401 Amidst growing investments into IWT enforcement, public awareness campaigns about IWT  
402 enforcement might increase the deterrence effects of existing enforcement. Such efforts might  
403 address information deficits about regulations and sanctions, noting judicial discretion in  
404 imposing high fines and imprisonment terms, including for taxa that might not be widely  
405 considered conservation priorities likely to face stiff sanctions (e.g., common leopard, owl,  
406 pangolin; Figure 1).

407 Deterrence aims might also be served by publicising the broader non-legal, often unrecorded,  
408 social impacts of enforcement, including on children, marriages and family prestige. These types  
409 of elements have proven important to, for example, reducing driving under the influence of  
410 alcohol, including through highlighting social sanctions and stigma via media campaigns (Elder  
411 et al., 2004; Davey & Freeman, 2011). Such approaches would need to take account of relatively

412 low education levels in some target communities, but use of personal stories might be an  
413 effective alternative to simply communicating technical legal details.

414

415 Such expanded public engagement about IWT sanctions is particularly important in the context  
416 of new, often strengthened conservation rules, as are emerging in Nepal and some other countries  
417 (Supplementary Table 1). Awareness might increase not only the efficiency of existing  
418 enforcement investments but also their undesirable social impacts, where it reduces the  
419 imposition of severe sanctions on marginalised communities. Importantly, it is a comparatively  
420 affordable “add-on” to existing, often high-cost enforcement actions. In September 2019, the  
421 lead author used data from this project to inform a public awareness campaign in key IWT  
422 hotspots in Nepal. That effort used traditional folk music to communicate the severity of IWT  
423 sanctions and share stories about the downstream social impacts of IWT imprisonment  
424 (<http://www.greenhood.org.np/2019/09/03/bankokatha/>). There is a clear need to evaluate the  
425 costs and effectiveness of such education-based interventions targeting potential IWT  
426 participants, as has started to happen with education programmes that target consumers  
427 (Veríssimo and Wan, 2018; Holden et al., 2018).

428

### 429 **4.3 Unintended social impacts of enforcement**

430 Getting the balance between enforcement and deterrence right is important not only because for  
431 the effectiveness and efficiency of conservation, but also because our dataset highlights some  
432 key social equity outcomes. These are particularly salient in the context of this study, given the  
433 marginalised cultural, economic and educational status of many of the respondents. Moreover,  
434 poorer respondents were significantly less likely to know the rules. Indeed, IWT often involves

435 poor local residents, the “small fish and scapegoats” who are most easily subject to enforcement,  
436 while higher-level “intellectual actors” are infrequently arrested (Ghale, 2017; see Phelps et al.,  
437 2016).

438

439 While the results cannot explain why these populations are so disproportionately represented in  
440 our dataset, this skew has significant implications for social equity dimensions of enforcement-  
441 based conservation. This apparent targeting exemplifies the differentiated, inequitable social  
442 impacts that can arise from enforcement-based conservation (see West et al., 2006), which are  
443 not a mainstream part of conservation dialogues in Nepal (see Greenhood Nepal, 2018).

444 Moreover, the imprisonment of indigenous people around Chitwan District Prison overlaps with  
445 a region where thousands of people were previously resettled outside of Chitwan National Park  
446 (McLean and Straede, 2003); 16 respondents reported that they were born within the park—  
447 potentially highlighting how current IWT policies may compound the impacts of historical  
448 expropriation of indigenous lands.

449

450 While enforcement resulting in imprisonment does not appear to be heavily targeting traditional  
451 or subsistence IWT activities (e.g., bushmeat harvest), or trade driven primarily by basic  
452 household needs, enforcement burdens are still disproportionately borne by some of Nepal’s  
453 most marginalised people. Moreover, many appear to be systematically underestimating the risks  
454 associated with IWT, particularly in the context of increasingly enforcement-based responses to  
455 IWT. This has profound implications for the efficiency of conservation investments and for  
456 unintended social outcomes.

457

## 458 **5. Conclusion**

459 Much of the debate over enforcement-based conservation is occurring within a fairly data-poor  
460 context. Analyses of prison trends and prison-based interviews offer insights for conservation  
461 practice and research, and data on enforcement, arrests, sentences and perpetrator profiles (as  
462 well as supplementary data about species, roles, destinations, etc.) should become a routine part  
463 of interventions that promote conservation enforcement.

464  
465 This is meaningful not only because reducing imprisonment is important to individual  
466 perpetrators and their communities, but also because it reflects whether enforcement investments  
467 are resulting in meaningful change. Indeed, there is a need to better reflect on the intended  
468 outcomes that conservation agencies expect will arise from increased enforcement, and there is  
469 concern that many interventions may not be accounting for the causal chains linking actions to  
470 outcomes (see Biggs et al., 2017). In this case, conservation may best be achieved not through  
471 strengthened enforcement alone, but also by accounting for perpetrator knowledge, motives and  
472 perceptions of risk, as well as enforcement biases towards certain taxa and types of perpetrators.  
473 Strategic modifications might help ensure that enforcement actions are both more effective and  
474 equitable.

475

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480 following ethical guidelines standard in the field of criminology (BSC, 2006) and an  
481 institutional review (Lancaster University FST REC 16045).

482

### 483 **7. Conflict of interest**

484 The authors declare there are no conflicts of interest associated with this publication.

485

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655  
656

657 **8. Figure and Table Captions**

658 Figure 1. Average fine and prison sentence by species (n=99; remaining cases were awaiting  
659 sentencing), compared with maximum allowable sanctions (Supplementary Table 1).

660

661 Table 1. Reported frequency of participation in different roles in illegal wildlife trade (n=116)

662 Table 2. Demographic characteristics of IWT prisoners (n=116)

663 Table 3. Respondents' self-reported economic status at the time of their arrest (n=116)

664 Table 4. Respondent awareness of sanctions for IWT crimes (n=116)

665 Table 5. Reported motivations for participating in IWT (n=116)

666

667 Table 1. Reported frequency of participation in different roles in illegal wildlife trade (n=116)

<b>Roles in wildlife trade chain</b>	<b>Respondents (%)</b>		
	<b>≥10 times</b>	<b>&lt;10</b>	<b>Never</b>
Harvesting	14.7	35.3	50.0
Transporting domestically	9.5	12.9	77.6
Informing other harvesters about wildlife habitat and movement	4.4	17.2	78.4
Consuming wildlife at household level	4.3	4.3	91.4
Retailing to intermediaries	3.4	30.2	66.4
Retailing to consumers	3.4	5.2	91.4
Informing other harvesters about conservation enforcement (patrolling, movement)	3.4	7.8	88.8
Transporting over an international border	1.7	10.3	87.9

Long-term storage of wildlife	0.9	17.2	81.9
Supplying wildlife to friends and neighbors (e.g., local exchange, gifts)	0	11.2	88.8

668

669

Table 2. Demographic characteristics of IWT prisoners (n=116)

<b>Characteristics</b>	<b>Number (%)</b>
<b>Gender</b>	
Male	115 (99.1)
<b>Education Status</b>	
Illiterate	37 (31.9)
Primary School	41 (35.3)
Secondary School	33 (28.4)
University	5 (4.3)
<b>Caste group</b>	
Janajati	87 (75)
Brahmin-Kshetri	18 (15.5)
Dalit	6 (5.2)
Indian and Chinese	5 (4.3)
<b>Number of dependents (aged &lt;16 or &gt;58)</b>	
0	22 (19.0)
1-2	62 (53.4)
3-5	32 (27.6)

670

671 Table 3. Respondents' self-reported economic status at the time of their arrest (n=116)

<b>Indicator</b>	<b>Number (%)</b>
<b>World Bank poverty line (&lt;US\$1.9 per person per day)</b>	
Households below poverty line (based on reported household income)	65 (56.0)
<b>Household economic status</b>	
Not enough to survive	42 (36.2)
Only enough to cover day-to-day costs	55 (47.4)
Comfortable	14 (12.1)
Well off	5 (4.3)
<b>Household food security</b>	
Sometimes children and adults in household do not have enough to eat	7 (6.4)
Sometimes adults in household do not have enough to eat	34 (31.2)
More than enough food to eat	68 (62.4)

672

673 Table 4. Respondent awareness of sanctions for IWT crimes (n=116)

<b>Prior to arrest, were respondents:</b>	<b>Responses (%)</b>	
	<b>Yes</b>	<b>No</b>
Aware that IWT is illegal?	93.1	6.9
Aware of the penalties connected to IWT?	30.2	69.8
Aware of species-wise provisions of those penalties?	86.2	13.8
All species-wise provisions:	10.3	
Some species-wise provisions:	75.9	

Concerned about the possibility of arrest?	34.5	65.5
Will you return to IWT after your release?	16.4	83.6

674

675

Table 5. Reported motivations for participating in IWT (n=116)

Motives	Responses (%)		
	Primary reason	Secondary reason	Not a reason
To make extra money	87.9	6.9	5.2
Less tiring job than alternatives	37.1	26.7	36.2
Money to meet basic household needs	11.2	26.7	62.1
Peer pressure	10.3	25.9	63.8
Household nutritional needs	6	6.9	87.1
For entertainment	4.3	3.4	92.2
Preference for wild meat	0	6	94.0
To show-off	0	5.2	94.8
In response to human-wildlife conflict	0.9	3.4	95.7
To rebel against government authority	0	1.7	98.3
For cultural & religious reasons	0	0.9	99.1
For ornamental household use	0	0.9	99.1

676

