Covid-19 lockdown sets wildlife free but increases poaching threats in Nepal

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Abstract

To contain transmission of COVID-19, lockdown or strict restriction of people's mobility outside their residence was imposed worldwide. In Nepal, the first phase of nationwide lockdown was observed from March 24 to July 21, 2020. This sudden halt in human activities brought positive and negative impacts on forests and wildlife. We undertook a study was undertaken to know the impact of the CoViD-19 lockdown on wildlife and forests in the protected areas (PAs) of Nepal. The study was carried in July and September 2020, data of illegal activities recorded by the PAs and also those reported by media were obtained and analyzed. Key Informant Interview (KII) was done with the park officers and security personnel by virtual communication that included telephone, messenger app, and ZOOM video meeting to collect detailed information and for verification. The collected data were categorized into four groups: i) wildlife killed, ii) wildlife injured, iii) arrest incidents related to forest crime, and iv) arrest incidents related to wildlife crime. Data from the fiscal year 2019-2020 were analyzed, comparing before lockdown and after. The study found trends of substantial increases in. wildlife death in two PAs, Banke National Park and Bardia National Park out of 20 during the lockdown. Similarly, Chitwan National Park (CNP) and Shivapuri Nagarjun National Park (SNNP) witnessed a rise in wildlife poaching. CNP and SNNP are located close to highly populated cities and also having human settlements in their peripheries. Interestingly, wildlife was easily sighted inside PAs during the lockdown, presumably because the absence of visitors and human activities during the lockdown decreased disturbance. Thus, a paradoxical situation was observed with the wildlife enjoying

35 the freedom of movement on the one hand, but with poachers, many of them laid off from
36 other activities, taking advantage of the lapse in security.

37 **Keywords:** Biodiversity, Poaching, Security, Wildlife crime, SARSCoV-2

38

39 Introduction
40 . The first infection with SARS-CoV-2 virus was detected on 2019 December 31 in Wuhan,
41 China. The World Health Organization (WHO) mission to China stated on January 22
42 explaining that there was evidence of human-to-human transmission of SARS-COV-2 in
43 Wuhan (WHO, 2020a), and the WHO declared the outbreak a Public Health Emergency of
44 International Concern on 30 January 2020, and the situation to pandemic on 11 March 2020
45 (WHO, 2020a, 2020b). After the epidemic in China was upgraded to the pandemic, many
46 countries around the world instituted lockdowns to control the spread of COVID-19. Rutz et
47 al. (2020) used the term 'Anthropause' or 'the Great Pause,' and noted improvement in the
48 quality of air, cleaner rivers, less noise pollution, undisturbed natural habitats and calmer
49 wildlife (Bulbulia et al., 2020; Rutz et al., 2020).

50 The first SARSCOV-2 Case in Nepal was recorded on February 21, 2020, followed by a
51 second case on March 23 (Bastola et al., 2020; Sah et al., 2020; Shrestha, Shrestha, Khanal,
52 & KC, 2020). Nepal initiated a lockdown from March 24, 2020 (Ministry of Health and
53 Population, 2020), and strict lockdown continue for three months (March 24 to June 21) with
54 restrictions open partially for an additional month (June 22 to July 21) (Ministry of Health
55 and Population, 2020). All types of social, economic, tourism, transportation, industrial, and
56 urbanization activities decreased almost to the point of complete shut off. In most polluted
57 cities like Kathmandu, Delhi, and Beijing, skies were cleaner and clearer than they had been
58 in many years Mahato, Pal, and Ghosh (2020). Huang et al. (2020) reported that there were
59 huge decreases in NO_x emissions in China after the strict lockdown in transportation. It also
60 increased ozone and nighttime NO_3 radical formation, and these increases in atmospheric
61 oxidizing capacity, in turn, facilitated the formation of secondary particulate matter. When
62 human activities are comprehensively decreased and humans locked themselves inside their

63 homes, factories, automobiles, and transportation movement were reduced and even the
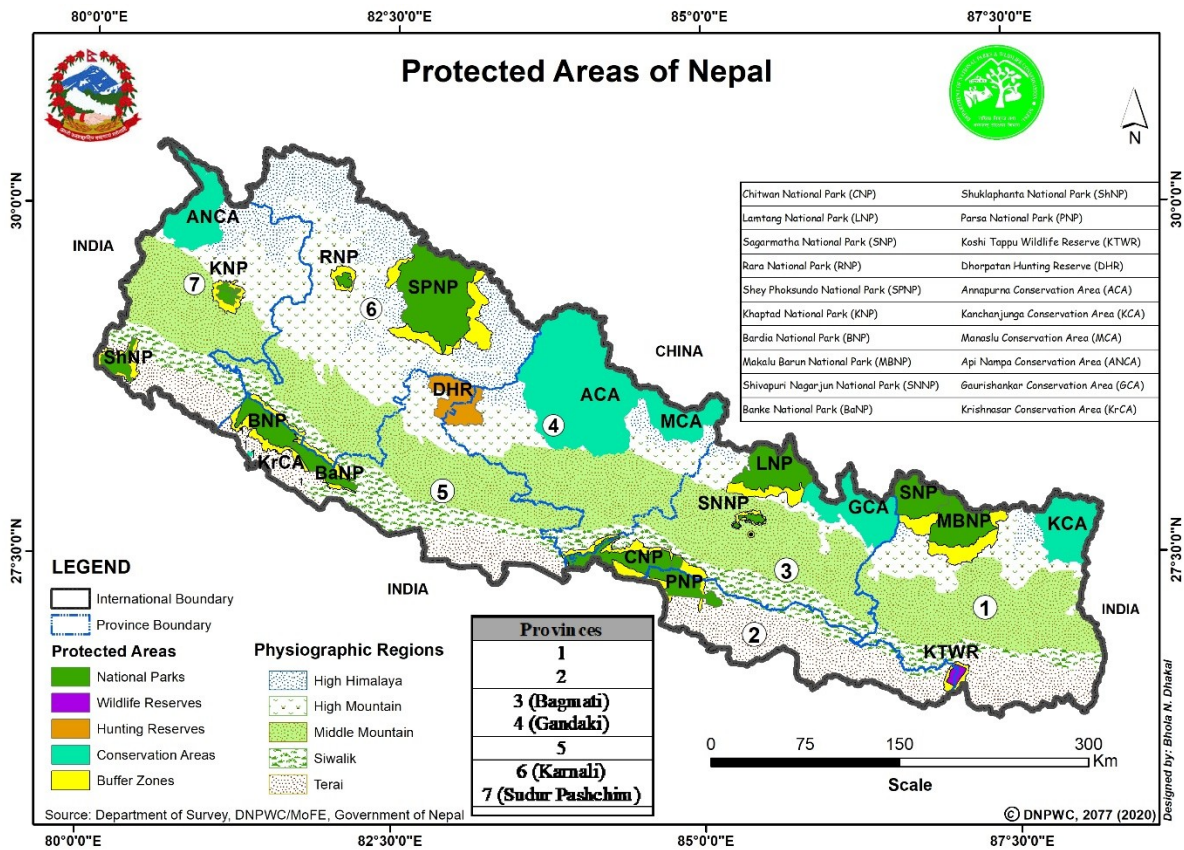64 vibration of the Earth was reduced too (Grodsinsky & Whorton, 2000).

65 Lockdown in Nepal, as in the Northern hemisphere of the globe coincided with the early
66 spring season, which is the reproductive season for many wild animals from insects to large
67 mammals (Chemineau et al., 2008; Chemineau, Malpaux, Brillard, & Fostier, 2007). Spring
68 is also a peak season for animals to engage in migratory activities. Chemineau et al. (2007)
69 observed that birth peak in mammals and birds generally occur at the end of winter−early
70 spring, the most favorable period for the progeny to survive. Most species show seasonal
71 variations in their ovulation frequency (presence or absence of ovulation), spermatogenic
72 activity (from moderate decrease to complete absence of sperm production), gamete quality
73 (variations in fertilization rates and embryo survival), and also sexual behavior.
74 'Anthropause' due to lockdown in spring may help these animals providing less disturbed
75 places for reproduction and mating (Rutz et al., 2020).

76 While there has been much more research on the psychological and economic impacts of
77 lockdown on human there is very little study on the impact of lockdown on wildlife and
78 biodiversity. This is an important aspect of topic for the future conservation of biodiversity
79 and maintenance of balanced ecosystems and ecosystem services It is also duty of human
80 kind to think about how COVID-19 pandemic will impact the world's biodiversity (Corlett et
81 al., 2020) This study aims to explore the impact of the Great Pause on wildlife in the
82 protected area of Nepal during the lockdown.

83 Methods
84 The study was carried out in July and September 2020. Information about various illegal
85 activities was collected respectively protected areas (PAs) and published reports in various
86 media, including incidents of poaching, hunting, trespassing, unauthorized collection of non-
87 forest timber products, fishing, and collection of fuel wood inside the PAs. Key Informant
88 Interviews (KII) were done with the park officers and security personals by telephone,
89 messenger app, and ZOOM video meting to collect detailed information and verify the
90 collected data. We contacted all 20 PAs in the country (Figure 1), and collected data were
91 categories into four groups: i) wildlife killed, ii) wildlife injured, iii) arrest incidents related
92 to forest crime, and iv) arrest incidents related to wildlife crime, all with in the fiscal year

93 2019/2020 were collected from the offices of the respective protected area. The collected
94 data and information were analyzed to compare two different periods: pre-lockdown and
95 during lockdown. T-tests were applied to check for statistical significance, with a threshold
96 of 0.05 for overall significance, using the Holm-Bonferroni correction to avoid p-value
97 inflation.

98

99 **Figure 1. Protected areas of Nepal (Source: DNPWC (2020)**

100 **Results and Discussion**

101 **Injured Wildlife**

102 Out of 20 protected areas, 13 had reported records of wildlife injuries not resulting in
103 immediate death in 2019/2020. Among them, seven PAs had records of wildlife injuries or
104 casualties both in lockdown period and before. The average number of wildlife injuries had
105 increased in Chitwan National Park (CNP) by 9.75%, Bardiya National Park (BNP)
106 (25.80%), Parsa National (PNP) (44.44%), and Banke National Park (BaNP) (53.84%). The

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average wildlife injury frequencies had decreased in Sukhlaphanta National Park (ShNP) (40.80%), Shivapuri Nagarjun National Park (SNNP) (11.8%), and Koshi Tappu Wildlife Reserve (KTWR) (27.59%). Makalu Barun National Park (MBNP) and Rara National Park (RNP) had recorded wildlife injuries only before lockdown but there was no report of casualties during the lockdown. Sagarmatha National Park (SNP), Khaptad National Park (KNP), Lamtang NP (LNP) and Api Nampa Conservation Area (ANCA) reported wildlife injuries only during the lockdown period. There was no significant difference in the number of injured wildlife comparing pre-lockdown and lockdown periods (Table 1).

Table 1. Record of wildlife injuries **(not including deaths)** in different Protected Areas during pre-lockdown and lockdown period in Nepal

S.N.	Location	Pre-lockdown (Mean per month, n =8)	Lockdown (Mean per month, n = 4)	p-value
1	Chitwan NP	9.25	10.25	0.83
2	Bardiya NP	5.75	7.75	0.46
3	Parsa NP	1.25	2.25	0.43
4	Sukhlaphanta NP	8.87	5.25	0.38
5	Shivapuri Nagarjun NP	3.12	2.75	0.92
6	Banke NP	1.50	3.25	0.36
7	Koshi Tappu WR	5.87	4.25	0.41
8	Lamtang NP	0	1.25	-
9	Makalu Barun NP	0.25	0	-
10	Sagarmatha NP	0	0.25	-
11	Rara NP	0.12	0	-
12	Khaptad NP	0	0.25	-
13	Api Nampa CA	0	0.25	-

Death of Wildlife

In total, 14 PAs recorded incidents of wildlife death in 2019/2020. Among them, only 11 had a record of the death of wildlife both on pre-lockdown and during the lockdown period. Among them, a large differences were observed in the number of wildlife casualties in the case of BNP and BaNP (p = 0.030 and 0.079 respectively). SNP had no records of death during pre-lockdown but recorded 16 wildlife deaths (average of 4.0 per month) during the lockdown. In contrast, Makalu Barun National Park (MBNP) had two, and RNP had five incidents of wildlife death during pre-lockdown but no death record during the lockdown period (Table 2).

Table 2. Death records of wildlife in different Protected Areas during pre-lockdown and lockdown period in Nepal

S.N.	Location	Pre-lockdown (Mean per month, n = 8)	Lockdown (Mean per month, n = 4)	p-value
1	Chitwan NP	3.25	1.75	0.29
2	Bardiya NP	7.37	17.25	**0.079**
3	Parsa NP	1.5	1	0.65
4	Lamtang NP	2.25	3	0.70
5	Sukhlaphanta NP	5.37	1.5	0.18
6	Shivapuri Nagarjun NP	0.25	1.5	0.16
7	Banke NP	2.875	8	**0.030**
8	Khaptad NP	0.125	0.25	0.623
9	Api Nampa CA	0.25	1	0.348
10	Krishnasar CA	0625	1	0.721
11	Kanchanjunga CA	0.25	0.25	1
12	Sagarmatha NP	0	4	-
13	Makalu Barun NP	0.25	0	-
14	Rara NP	0.65	0	

Biodiversity conservationists and nature lovers were in shocked by the news of killing six musk deer in SNP on April 26, 2020, on the 32nd day of the lockdown (Photo 1). The root cause of this incident may be that the Covid-19 lockdown forced people to confine themselves in their homes to shake off the epidemics of COVID-19 including National park officers and forest guards. Unfortunately, during these days when people were inside their homes following lockdown, security personnel were in the urban area focused on implementation and security in lockdown. Only a limited number of security personnels (army and police) were deployed, in urban areas for security reasons and to regulate the effectiveness of lockdown. Pokheral (2020) emphasized that local people who may be reluctant to kill wildlife for religious reasons, may become involved with poaching if their source of income dries up, such as happened because of the COVID-19 lockdown. Lack of effective mobilization of an intelligence network may also have allowed more wildlife poaching in and around the protected area as they were also affected by the lockdown. This situation created space to intensify the poaching and illegal activities inside the forest and protected area (RSS, 2020; Saeed, Sinha, Joshi, & Shishir, 2020).

A similar situation may have applied in other PAs. In PNP during lockdown, there was a deadly crossfire between the army and poachers in which one of the poachers was killed. In

146 BNP, poachers killed an elephant, and on 27 March 2020, the crossfire between poachers and
147 the Nepal Army in BNP, led to the death of a poacher and also injured an army staff. These
148 incidents suggest that park management and security personnel faced a huge pressure on
149 biodiversity and wildlife conservation both inside and outside the protected area during the
150 lockdown.

152 **Photo 1.** Poaching of musk deer (killed in snare) in Sagarmatha NP during Covid-19
153 lockdown (Photo credit: *Dawa Nuru Sherpa*)

154 **Forest e-related crime arrest cases**

155 Forest-related crime means illegal trespass inside the protected area, and illegally logging,
156 collecting herbs, sources of food and other non-timber forest product (NTFP) from PAs In
157 the fiscal year 2019/2020, twelve protected areas did not have any recorded reports of crime
158 related to forests and related arrests against it. Among the remaining eight PAs, CNP had a
159 significant increase in forest-related crime ($p = > 0.05$). 26.5 cases on an average per month
160 on average in pre-lockdown in CNP jumped to 182.25 cases per month during lockdown
161 period. Similarly, incidents increased by 568% in SNNP ($p = 0.029$, Table 3).

162 **Table 3:** Forest-related crime in different Protected Areas during normal and lockdown
163 period in Nepal

S.N.	Location	Pre-lockdown (Mean per month, n = 8)	Lockdown (Mean per month, n = 4)	p-value
1	Chitwan NP	26.50	182.25	0.0205
2	Bardia NP	7.5	3.67	0.7283
3	Parsa NP	4.12	0.33	0.3259
4	Makalu Barun NP	3.25	1.67	0.6118
5	Shey-Phoksundo NP	1.6	6.5	0.1159
6	Sagarmatha NP	1.375	0.5	0.6713
7	Shivapuri Nagarjun NP	29.375	166.75	0.02912
8	Banke NP	2.375	3.5	0.5377

164

165 In a virtual conversation with the Assistant Warden of CNP Mr. Rishi Ranabhat, he reported
166 that the park faced extreme pressure of illegal activities during the first month of lockdown.
167 The wild animals were freely roaming inside the park, presumably because the decrease in
168 human activities was allowing animals free movement. According to him; the patrolling team
169 of the park had observed 32 rhinos while traveling17 kilometers from Sauraha to Kasara and
170 the park staff counted 600 spotted deer at Bhimlephant. Forty-two blue bulls were spotted at
171 one spot of grassland. Mr. Ranabhat reported, however, that the record of illegal cases in
172 CNP filed in the first month of the lockdown was higher than the total of the previous eleven
173 months. A total of 483 cases of illegal acts were filed between April 2019 and March 2020
174 whereas 514 cases were filed within the first month of the lockdown period.

175 CNP also had a record of poachers killing an elephant and three critically endangered
176 gharials within the first 10 days of the lockdown.

177 Mr. Ranabhat emphasized that "*The trespass increased by three times from pre-lockdown in*
178 *CNP. Illegal entry into the National park increased after strict lockdown when local people*
179 *returned from the urban areas to villages. They were active, especially in illegal fishing. The*
180 *people caught in illegal fishing were caught at 4 times higher than normal rates. Generally,*
181 *CNP arrests 10-15 fisherman with gill nets per month but during the lockdown, more than*
182 *150 fishermen with gill nets were arrested and cases filed* (Photo 2). *Gill nets can capture*
183 *more than 200kg of fish in one setting and it may also capture crocodilians especially the*
184 *critically endangered Gharial. So, a collaboration with Nepal Army and local buffer zone*
185 *users group was increased, and the patrolling rates were increased to three times more than*
186 *pre-lockdown to control the situation*"

187

Photo 2: A group of people arrested by the patrolling team in CNP with gill net and large fish (Photo credit: National News Agency, *Nepal)*

Mr. Keshav Dodhari, an officer of SNNP had experienced similar incidents at Shivapuri Nagarjun NP. According to Mr. Dodhari, 50-60 people were arrested daily at SNNP in the initial days of the lockdown. Most people entered the park illegally to collect fuelwood and mushrooms. Collecting wild mushrooms near Tokha, Sundarijal, and Budhanilkantha area is famous and also was practiced before the declaration of the protected area. Logging cases were also increased in SNNP by four times more than pre-lockdown. Some groups of people were also arrested while setting nets and snares. SNNP also increased patrolling 2-3 times to control the illegal activities inside the park after these arrests.

Logging and reports of illegal smuggling of the logs during the lockdown were reported from outside the protected area too. The Nepalese Army captured the smuggling of timbers and illegal logging from Siraha, Kapilbastu, Rupandehi, Palpa, Kanchanpr, Kailali, Bara, Morang, Arghakhanchi, and Ilam Districts. Mr. Dakshya Kumar Basnet, District Superintendent of Police (DSP) of Nepal Armed Police Force (APF) of Kailali district informed that the incidents of tree logging and timber smuggling were greatly increased in

Kalali District during the lockdown. Officers of Division Forest Office Kalali also confirmed that they had arrested 10 different teams of smugglers from Bhajani, Godawari, Bardagoriya, Lamki, and Ghodaghodi area during the first month of the lockdown (Aryal, 2020; Ghimire, 2020; Himalayan News Service, 2020b; RSS, 2020). The spokesperson of the Dhading District Police Office, Mr. Rupak Khadka, and Assistant DFO Mr. Loknath Lamsal provided the information that the DFO Dhading arrested culprits smuggling more than 73 cubic feet of Sal (*Shorea robusta*) timber during the initial days of lockdown. Similarly, AFO and an inspector from the District Armed Police Force (APF) office Sunsari Mr. Krishana Dhakal jointly arrested two teams of smugglers with more than120 cubic feet of Sal timber in a truck and tractor that was leaving Sunsari District. The chairperson of Jana Jagriti community forest, Kanchapur District reported that they arrested two teams of smugglers who were cutting logs from their community forest. Smugglers had cut five trees and hidden six logs. Such incidents in Kanchanpur were increased in the initial two months of the lockdown.

Wildlife crime-related arrests

Only six protected areas arrested people involved in wildlife crime in the fiscal year 2019/2020. During lockdown, records of wildlife crime was significantly increased in CNP ($P < 0.5$). The record was very high in SNNP too during lockdown but there was no record of any such cases pre-lockdown. Wildlife-related crime rates were higher in BNP and SNP, too but these increases were not statistically significant, while wildlife-related crime rates were lower in BaNP (Table 2). Wildlife crimes were also reported from outside protected areas during the lockdown. Divisional Forest Officer of Bajura, Mr. Bhim Prasad Kandel reported that illegal activities inside the community and national forests were greatly increased in the district during the lockdown. DSP Bajura, Mr. Tanka Prasad Acharya added that many local poachers entered the forests to capture and kill Daphe pheasant (*Lophophorus impejanus*), Northern red barking deer (*Muntiacus vaginalis*), and other wildlife. The bushmeat was used for personal use and also sold in the market. Similar reports were received from Morang, Sunsari, Mahotari, Bardiya, and Surkhet Districts. Mr. Surendra Subba, Chair Person of Arjundhara Community Forest Jhapa reported that a group of professional poachers and smugglers were active during lockdown for logging and poaching. Mr. Khem Sitaula, Chair Person of Jamunakhai Community Forest in Jhapa added that they had not succeeded to

234 control smuggling and poaching effectively in the lockdown period, even though they
235 increased the frequency of patrolling. Jhapa district suffered from cross border effects in
236 poaching and illegal activities during lockdown.

237 **Table 4.** Wildlife crime in different Protected Areas during normal and lockdown period in
238 Nepal

S.N.	Location	Pre-lockdown (Mean per month, n = 8)	Lockdown (Mean per month, n = 4)	p-value
1	Chitwan NP (CNP)	14.75	90.50	**0.022**
2	Bardia NP (BNP)	1.875	5.5	0.23
3	Parsa NP (PNP)	1.25	0.33	0.54
4	Banke NP (BaNP)	2.125	1.333	0.48
5	Sagarmatha NP (SNP)	0.375	2.333	0.20
6	Shivapuri Nagarjun NP (SNNP)	0	7	-

239

240 Discussion

241 Overall, it appears that all forests and community forests were under pressure from poaching
242 and smuggling of wildlife and timber, and the pressure increased during the lockdown
243 (Himalayan News Service, 2020a; Sharma, 2020). In our data on wildlife crime and forest-
244 related crime, two PAs: CNP and SNNP had large increases in incidents. We do not believe
245 that these increases were caused by increased intensity of patrolling, because patrolling were
246 increased after the number of crimes and arrests were increased in respective PAs. Both PAs
247 are located very close to heavily populated cities and there is human habitation inside the
248 PAs, which might have led to more illegal activities in these PAs during the lockdown phase.

249 At the same time, the lockdown and the nexus of negative news of CoViD-19 news media
250 simultaneously left positive impacts of the Great Pause of outdoor movement of people,
251 which helped to reduce air and sound pollution. Social media around the world abounded
252 with posts sharing on the surprising wildlife encounters during the lockdown, especially in
253 urban environments (Szozda & Shutterstock, 2020). People from different corners of the
254 world have reported sightings of rare animals as pumas in downtown Santiago, Chile,
255 dolphins in untypically calm waters in the harbor of Trieste, Italy. Jackals were seen in broad
256 daylight in urban parks in Tel Aviv, Israel, herds of Mountain goats in North Wales and

257 Turkey. Spotted deer were seen in Colombo city (BBC, 2020a; Rutz et al., 2020), lions in
258 Africa were noticed occupying highways, barking deer were seen on highways of Japan,
259 deer, and civets in the urban area of Europe and India (Krishnankutty, 2020). In Nepal, there
260 were not only more animals observed than usual in Kathamandu valley, but there were also
261 some unexpected visitors - White Egyptian vulture was observed for the first time in 20 years
262 in Kathmandu during lockdown (BBC, 2020b), and there was a report of leopard seen in
263 Kritipur near Tribhuvan University premises (Kirtionline, 2020).

264 At present, it is too early to conclude that the observations of wild animals seen in cities of
265 Europe, Asia and Kathmandu was affected or catalyzed by lockdown and reduced movement
266 of human, as has been hyped by social media. But the clear hypothesis is that humans and
267 wildlife have become more interdependent than ever before, and it will be important to study
268 this complex relationship of the impact of human activities on wildlife behavior and
269 movement. A quantitative scientific investigation with a continuous study is urgently needed.
270

271 **Conclusion:**

272 Protected areas near human settlements have experienced a negative impact of lockdown
273 since forest and wildlife-related crimes were significantly increased. Death of wildlife inside
274 PAs was significantly increased in BNP and BaNP, but the injury records of wildlife did not
275 change between pre-lockdown and lockdown periods inside the PAs. During a strict
276 lockdown, wildlife was sighted more frequently and they were found freely moving.
277 However, the diversion of security personnel allowed increased access by poachers and
278 timber thieves, many or some of whom may have been urbanites laid off from their jobs. All
279 of this led to increased illegal activities. A special arrangement of surveillance involving
280 local communities could help mitigate such illegal activities during any future lockdowns.

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295 .

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