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Impact of Human Imposed Pressure on Pheasants of Western Himalayas, Pakistan: Implication for Monitoring and Conservation

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Simple Summary: The Himalayan pheasants have many cultural, economic, and environmental values. Still, unfortunately, the species is under anthropogenic pressure and biological hazards, leading to a rapid decline in its population. The current study aims to identify the human pressures imposed by major infrastructure development projects, illegal hunting, deforestation, pollution, non-timber forest collections, and other natural activities that severely damage the pheasant habitat and population in the study area. Higher altitude valleys with less disturbed habitats have significantly higher encounter rates and densities than those at lower altitudes and higher human pressure. This research suggests that conservation biologists and the wildlife department of Khyber Pakhtunkhwa should formulate approaches for effective conservation and better habitat management. It may include public awareness regarding pheasant's beneficial aspects, pre-implementations of the wildlife management plan for a major infrastructure development project, and strict rules and policies around deforestation and habitat degradation. The study also recommends that the habitat of the pheasants, specifically the threatened area of Western Tragopan, be considered a legally reserved area of conservation to improve its conservation status.

Abstract: Pheasants play a distinctive and significant role in high altitudinal ecosystems. These are good indicators of environmental changes, and their presence determines the health and balance of the bio-network. Recent human pressure continues to degrade their populations, and some pheasant species are already extinct. Therefore, the current study focuses on pheasant abundance and emerging conservation issues. The pheasant population was assessed using "Call count methods" and analyzed by DISTANCE software. The results revealed that the valleys where human interference is minimum had significantly higher encounter rates and densities of pheasants. At the same time, the pheasant population was severely affected, whether found at lower or higher altitudes, showing seasonal migration toward human settlements. The habitat suitability modeling was performed using the MaxEnt model and showed that human activities overlap with the suitable natural habitats of pheasants. The threats were identified using a systematic questionnaire survey from the nearest villages of the potential habitat, and particular attention was paid to valleys where human pressures were found to be high. Major infrastructure development projects, illegal hunting, and deforestation

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were identified as the major threats to the pheasant population. The study concluded that proper conservation measures are required to protect pheasants in their potential habitats.

Keywords: pheasant; conservation; population assessment; Himalayas; Hindukush

1. Introduction

The pheasants in the Himalayans are regarded as distinctive because of their charismatic features and the significant, balanced role they play in high altitudinal ecosystems [1–5]. They are good indicators of the environment, and their presence in a specific environment can determine the health and balance of the bio-network [2]. According to IUCN/SSC/Pheasant Specialist report, twenty-nine (57%) of these species were threatened [6]. The population is declining due to illegal hunting and other anthropogenic activities, such as habitat degradation, overexploitation, extensive grazing, and deforestation [7]. These birds are primarily ground-dwellers, with low flights, highly visible plumage, and prominent size, which make them easy targets for hunters and predators [8]. These pheasant species are present in diverse climates and ecosystems: agricultural fields, tropical rain forests, tropical dry deciduous forests, montane tropical forests, temperate coniferous forests, subalpine scrub, and alpine meadows [9,10]

The pheasants are elusive and prefer wild environments. Human activities, even in mountainous regions, continuously degrade the environment, reducing pheasant populations to the point where many are already extinct [11]. Migration from high to low altitudes during winters for physiological requirements exposes them to human pressure and intra-specific competition [12]. Human activities, overhunting, habitat destruction, and low breeding success contribute to declining populations [13–15]. Low breeding is also affected by the loss of the male population, which is hunted for its brightly colored feathers, which have a high ornamental value [14,16]. Conservation efforts can pose a risk of disease to humans due to zoonoses. Moreover, pathogen transfer within species and a breakout of zoonoses have led to the spread of diseases across the pheasant population [17,18]. Exploration of pathogen types and risk factors is needed in this situation to overcome outbreaks, and the adoption of proper protective techniques should be considered during conservation.

The forest is directly related to the distribution and abundance of species and plays an important role in the conservation of all birds, not just pheasants [6]. The increase in urbanization and deforestation adversely affects the natural habitat, and a proper management plan is needed to overcome habitat loss, including the control of deforestation as well as the conservation and efficient use of natural resources [19,20]. The availability of information on abundance patterns is essential to measure conservation status, as well as the range of conservation [20,21]. Several surveys have been conducted in Pakistan, but these are in specific areas and are time limited, presenting certain scientific gaps that need to be investigated. There is limited literature on the subfamily Phasianinae in Pakistan, which emphasizes the importance of the current study [22–24].

The present study focused on pheasant species viz: Western Tragopan (*Tragopan melanocephalus*), Himalayan Monal (*Lophophorus impejanus*), Koklass (*Pucrasia macrolopha*), and additionally collected data on the Himalayan snowcock (*Tetraogallus himalayensis*) because of reduced human interference in the habitat of these pheasant species due to higher altitudes. These species inhabit the same macro-habitat, mostly coexisting in the same vegetation type, but their microhabitat and altitudinal ranges differ. Their presence has mostly been reported in the northwest part of the western and eastern Himalayas and in the lesser Himalayas and their foothills [25,26]. Western Tragopan normally inhabits mixed coniferous forest canopied beneath dense herbs and shrubs, ranging from 1350 m to 2800 m above sea level (asl) in winter and 2400 m to 3600 m asl in summer [27,28]. This species is the rarest among the pheasants and categories under Vulnerable Status (VU) [25,29].

The Himalayan Monal range spread from Himalayan to Pakistan, India to Bhutan, and Assam [30,31]. It inhabits the upper temperate forests of conifers and broad-leaved plants with densely vegetated slopes at altitudes ranging from 2400 m to 4500 m asl [32–34]. Koklass is confined to tree lines and does not extend its range above the tree line [35,36]. Koklass can reveal its presence by loud chorus calls during its breeding season and in autumn [37,38]. Himalayan snowcocks are found frequently in Central and South Asia (alpine pastures and steep ridges) above the tree line and near the snowline [39]. In summer, this species is found between 4000–5000 m asl in the Himalayas; even in the winter, these species survive in very harsh climatic conditions, found to 2400 m asl heights [40]. IUCN provides these three pheasant species statuses as Least Concerned (LC) [25,26,34,41,42]. The current study intensively focused on the distribution, population estimation, habitat modeling, and emerging novel threats to the pheasant species of the unexplored Hindukush–Himalayan range of Pakistan. In addition, we derived recommendations for a proper conservation and management plan.

2. Materials and Methods

2.1. Study Area

The current study was performed in Pakistan's Himalayas and Hindukush ranges, specifically in Indus Kohistan (Figure 1). The Himalayan part of Pakistan comprises Chitral and Gilgit Baltistan; most of its northern peaks remain ice-capped, and the ranges of Kohistan are mostly sloping mountains and forest-covered valleys. Forests are present at specific elevations ranging from 3000 to 4000 m asl, and the land of grasses and dwarf shrubs is altered by human modification and overgrazing [43–47]. Indus Kohistan has three districts in the north of the Khyber Pakhtunkhwa province, with an area of 7656.91 sq. km.

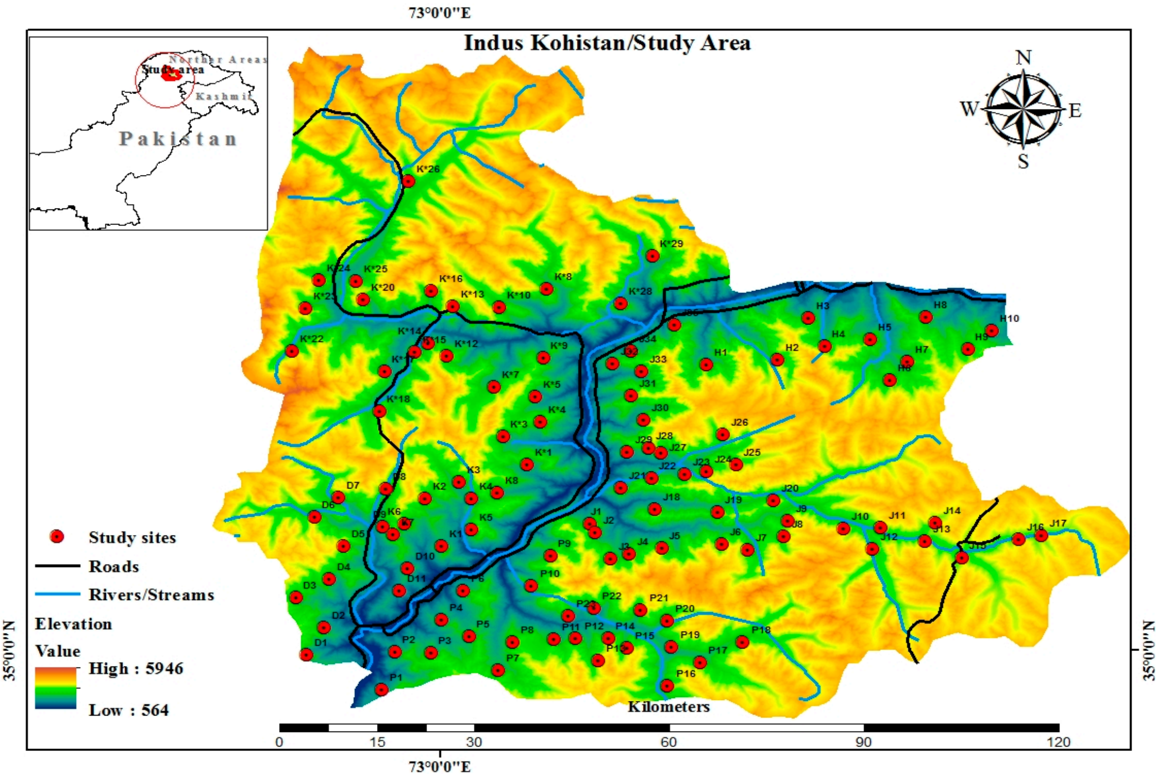


Figure 1. Digital elevation model (DEM) of the study area showing the study sites (vantage points), roads, rivers, and altitudinal variation of the study area.

The people of the region experience seasonal migration (summer and winter) with their livestock [48]. Adjoins Azad Kashmir from the east, district Swat in the west, Diamer (Gilgit Baltistan) in the north, and neighbor from the south with Battagram and Shangla [27].

The main major infrastructure development projects in the study area include the Diamer Bhasha and Dassu dams, and the Kayal and Dubair Khur hydropower projects, all of which severely damaged the habitat of the concerned pheasant species. Six valleys were selected: Palas, Jalkot, and Harban from the Himalayas, and Dubair, Kayal, and Palas valleys from the Hindukush range.

2.2. Study Design and Methods

This study was conducted from 2019 to 2021 during the breeding seasons (March–June). The valleys and study points were selected based on previous literature, potential habitats, human pressure, and information provided by residents and hunters. Consideration was taken that the population should not be mixed within the survey plots. The pheasant population assessment was performed using the vantage point count method. This method of surveying is more appropriate and widely used for assessing pheasant populations characterized by loud calling behaviors in mountainous regions [6,29,48]. After arriving at the vantage point, call counts started just before dawn, and dusk with counting efforts lasting 60 min in each survey. We selected a 300 m imaginary circle around each vantage point, where all calls were easily recorded and detected. At each count station, two observers simultaneously and independently conducted call counts by focusing on the circular plot, the direction, the distance of the call, and the mode of detection (i.e., call record, visual detection, or combination). The observers discussed and recorded the results detected by both observers, combining the number of counts on final data sheets, and averaging the counts of both observers for final analysis [49–52]. One hundred and ten vantage-point surveys were conducted to assess the population from different valleys of the whole study area. Samples of shed feathers were also collected from the field identified in the ecology lab. This confirmed the occurrence and was estimated as one count. We used these feathers for the molecular study of the concerned pheasant species.

The visual assessment and questionnaire surveys on conservation issues were conducted in villages nearest to the potential habitat (study plots). Assessment looked at the effect of dams and mini power generator installations on pheasant populations and their natural habitats. Three different types of questionnaires were filled out to evaluate conservation issues for the pheasant. For threat analysis, a separate sheet was used to investigate the different types of threats to pheasants and their habitats in the study area [6]. Furthermore, the questionnaire survey also focused on different aspects directly or indirectly involved in the degradation and decline of the pheasant population and their habitats, respondents' perceptions of the hunters, their level of education, and their profession. The questionnaire survey also focused on information regarding the pheasant's population status in the area, easily huntable species, intensively hunted species (more willingly hunted by the people), the purpose of hunting, and their economic values. A total of 284 questionnaires were filled out by respondents of different education, ages, and professions, with a special focus on the communities that were affected by dams.

2.3. Data Analysis and Mapping

Distance sampling of the point transect data was used using the DISTANCE 7.4 software package [50] to analyze the density and encounter rate of the pheasant population [51]. MaxEnt (3.4.2) was used to predict the suitable habitat of the pheasant, and ArcGIS (10.5) was used to plot the MaxEnt result and construct the study area map. ArcGIS (10.5) was also used to plot the habitat overlapping map. QGIS (2.18.10) was used for layer downloading and arrangements, Excel (2016) was used for abundance and table arrangements, and Origin (2021) was used for graphical representations.

3. Results

3.1. Abundance

The abundance calculation of pheasants in the region has been investigated for the last three years: 2019, 2020 and 2021. Average counts and encounter rates were analyzed for all selected species of pheasants. The study showed that Palas valley, Jalkot valley, and Kandia valley's pheasant populations were more stable than the other three valleys. The results from encounter rates indicate that Kayal valley and Harban have a moderate number of species compared to Palas, Jalkot, and Kandia valley. Dubair valley had a minor encounter rate from all other valleys (Table 1).

Table 1. An abundance of pheasants includes valley-wise abundance and their encounter rate.

Valley Name	Average Counts	Encounter Rate
Palas Valley	75.7	4.5
Jalkot Valley	87.3	4.2
Harban Valley	15.7	2.6
Dubair Valley	11	1.7
Kayal Valley	15.3	3.2
Kandia Valley	57.3	4.2

Average counts: average of both Dawn and Dusk counts from each vantage point by two independent observers, **Encounter rate:** Number of birds recorded from a single vantage point in one-hour sample period.

3.2. Abundance Models

For further clarification, we analyzed different density models: uniform cosine, half normal cosine, uniform cosine, hazard rate Hermite polynomial, and uniform-simple polynomial. Models were selected to have a minimum Akaike Information Criterion (AIC) value and a small variance. Model selection for all three avian species having values of the percentage of coefficient of variance (CV) and density (D) involved some uncertainty because there was no higher difference in AIC values among the models.

The Western Tragopan density estimate was 2.6/km^2, ranging from D LCL 2.1 to D UCL 3.3. The %CV value was 0.1 (Table 2).

Table 2. Model selection based on estimates of AIC and density (D) for the habitat of Western Tragopan in the study area.

Model Number	Model	AIC	Parameters	ESW/ EDR*	D	D LCL	D UCL	%CV
M01	CDS Half normal-cosine	4550.9	5	11.8	10.6	9.1	12.2	0.07
M02	CDS Uniform-simple Polynomial	3908.6	4	23	2.6	2.1	3.3	0.1
M 03	CDS Uniform-cosine	4058.2	5	15.3	6.3	4.0	7.9	0.1
M04	CDS Half normal-simple polynomial	4503.7	3	15.4	6.2	5.5	7.0	0.06
M05	MCDS Half normal-cosine	4620.8	1	24.9	2.4	2.1	2.7	0.05
M06	MCDS Half normal simple polynomial	4503.7	3	15.4	6.2	5.5	7.0	0.06

ESW/EDR* = Effective Strip Width and Effective Detection Radius.

The best-suited model for all three species (Western Tragopan, Himalayan Monal, and Koklass pheasant) was a CDS uniform simple polynomial with the lowest AIC values.

The density of individuals in the study zone was assessed using the following equation.

$$D = n \times f(0)\ 2\ L$$

where:

D = density per km^2

n = Number of detected objects.
f (0) = probability of density.

UCL 2.7. The %CV value was 0.1. These results revealed uncertainty for occurrence in all sites of the study area because AIC values do not deviate much from one another.

The results showed that the density estimate for the Himalayan Monal was 2.2/km^2. Its density ranges from D LCL 1.8 to D UCL 2.8. The %CV value was 0.1 (Table 3).

Table 3. Model selection based on estimates of AIC and density (D) for the habitat of the Himalayan Monal in the study area.

Model Number	Model	AIC	Parameters	ESW/ EDR*	D	D LCL	D UCL	%CV
M01	CDS Half Normal Cosine	3799.8	5	13.3	8.1	6.4	10.2	0.1
M02	CDS Uniform-simple polynomial	3286.3	4	25.5	2.2	1.8	2.8	0.1
M 03	CDS Uniform-cosine	3396.9	5	16.1	5.5	4.6	6.6	0.09
M04	CDS Half Normal simple polynomial	3756.9	4	16.6	5.2	4.1	6.6	0.1
M05	MCDS Half Normal-cosine	3831.4	1	25.4	2.2	2.0	2.5	0.06
M06	MCDS Half Normal simple polynomial	3758.9	3	16.77	5.1	4.4	5.8	0.07

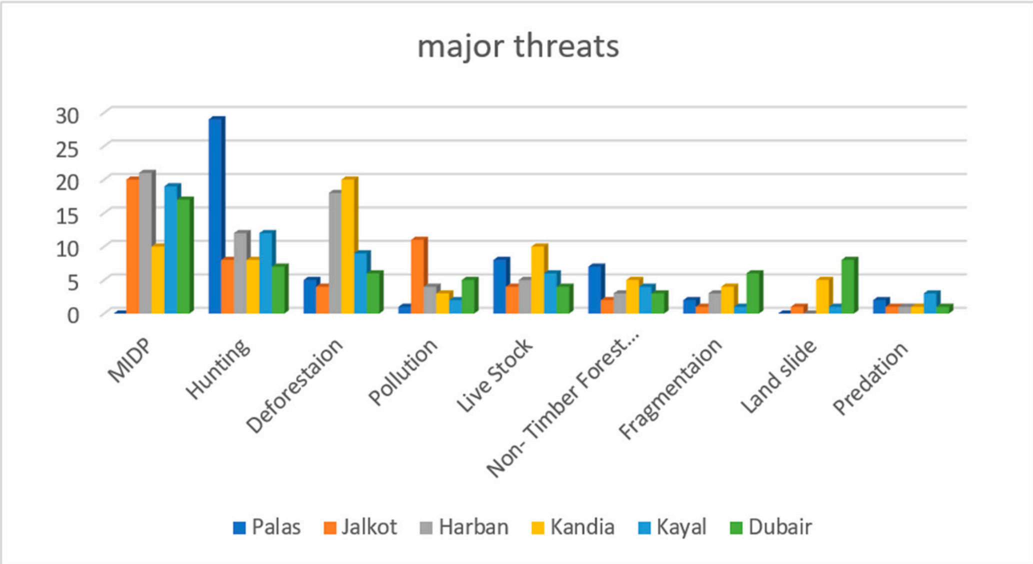
The density estimate for Koklass pheasant was 2.1/km2 with a range from D LCL 1.7 to D UCL 2.7. The %CV value was 0.1 (Table 4). These results revealed uncertainty for occurrence in all sites of the study area because AIC values do not deviate much from one another.

Table 4. Model selection based on estimates of AIC and density for the habitat of Koklas pheasant in the study area.

Model Number	Model	AIC	Parameters	ESW/ EDR*	D	D LCL	D UCL	%CV
M01	CDS Half Normal-Cosine	3893.8	5	15.1	6.2	2.6	15.4	0.5
M02	CDS Uniform-simple polynomial	3409.4	4	25.9	2.1	1.7	2.654	0.1
M 03	CDS Uniform-cosine	3511.2	5	16.1	6.2	5.2	7.548	0.09
M04	CDS Half Normal-simple polynomial	3855.7	3	14.8	6.5	5.6	7.484	0.07
M05	MCDS Half Normal-cosine	3697.6	5	6.9	27.7	21.9	35.146	0.1
M06	MCDS Half Normal-simple polynomial	4151.3	3	30.2	1.7	1.6	1.918	0.05

3.3. Major Threats

The pheasants faced human pressures and natural hazards throughout their natural habitats. The threats to the pheasants imposed by human activities included illegal hunting, major infrastructure development projects, deforestation, non-timber forest collection, fragmentation, excessive/immoderate life stocks, and pollution. Natural threats, such as landslides, diseases, and natural predations, ineffectually affect the populations of the pheasants and their habitats in all the valleys of the study area. The major threats that severely damage the populations and habitats of the concerned species include major infrastructure development projects, illegal hunting, and deforestation (Figure 2).



MIDP; major infrastructure development projects

Figure 2. Major threats and their impacts on the pheasant population and their habitats.

3.4. *Major Infrastructure Development Projects Overlapped on Pheasant Predicted Suitable habitat*

The current study quantified the pheasant distribution's suitable habitat and core zones. Geographical distribution of pheasants predicted by the MaxEnt model occupying the ranges from the lower regions of a sub-tropical thick forest of oaks (altitudes > 1800 m), tropical conifer forest including deodar, fir, spruce, and pine forest to the pastures (altitudes < 4000 m). The categorization of the total study area (7656.91 sq. km) is based on three potential thresholds: the highly suitable habitat is 844.4 sq. km, the moderately suitable habitat is 2819.42 sq. km, and the remaining habitat is the not-suitable (poor) habitat predicted by the model. We also used the Cringing model to predict the hot spots, which revealed that the Bar Palas region of Koli Palas district and Jalkot, Kandia valley of district upper Kohistan, are predicted as core zones or hot spots for the Himalayan Monal (Figure 3).

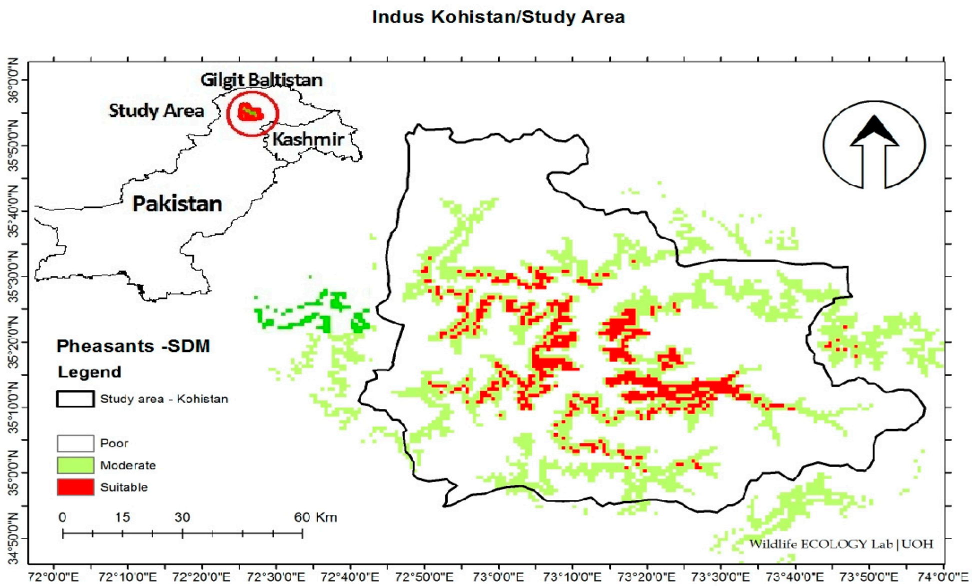


Figure 3. Species distribution modeling (MaxEnt) predicted suitable habitats for the pheasant species in the study area.

The novel issues for pheasant conservation in the study area were identified as major infrastructure development projects for electricity generation in the region, as these constructions overlapped with the pheasant's natural habitat in the study area. The ongoing and completed projects, including the Diamer Bhasha Dam, Dassu Dam, Dubair Khur hydropower project, and Kayal hydropower project, overlapped 336.21 sq. km (39.82%) of the suitable predicted habitat and 1336.21 sq. km (48.35%) of the moderately suitable habitat. The natural habitats of the pheasants in the four valleys were severely affected and altered, mainly by the resettlement and relocation of roads. The Jalkot Valley habitat is mostly affected by the construction of the Dassu dam (4320 MW Electricity generation). Harban Valley pheasant populations and habitats are affected by the Diamer Bhasha Dam (4500 MW Electricity generation). Dubair Valley pheasants and their habitats were affected by the Dubair Khur hydropower project, which is deep in the valley. The Kayal Valley habitat is also disturbed by the construction of the Kayal hydropower project, ultimately leading to a decline in pheasants from the specific area (Figure 4). The rest of the upcoming projects that have recently started are the Leo Dam, Shaha hydropower project, Karang hydropower generation, and Bar Palas hydropower project, which will directly or indirectly affect the vulnerable remaining suitable habitats of the pheasants.

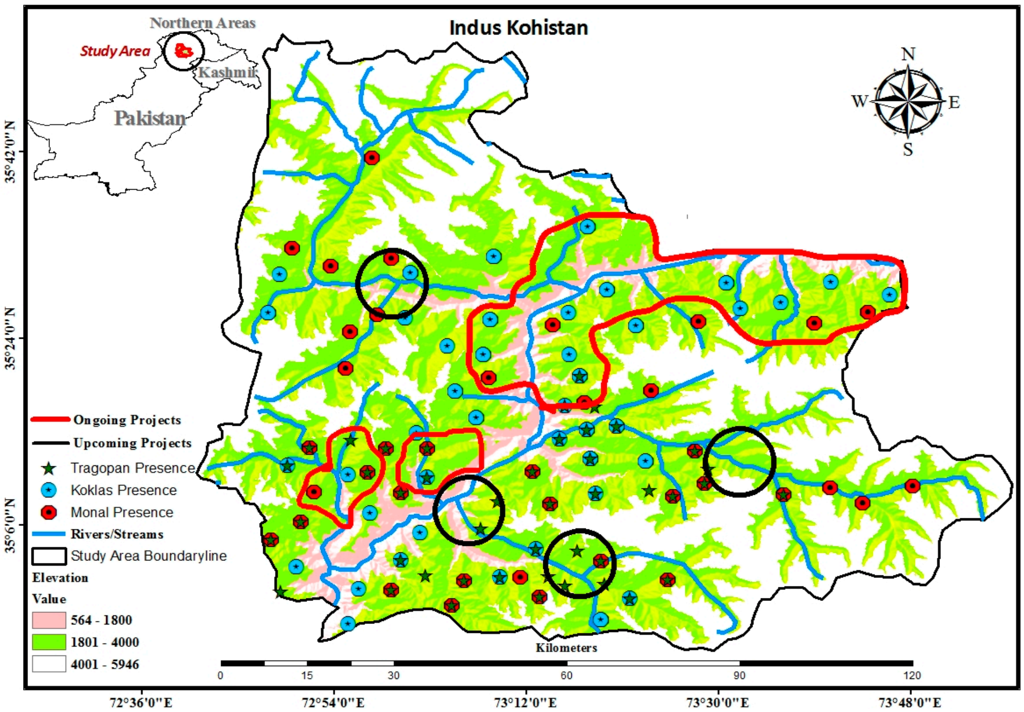


Figure 4. Major infrastructure development projects/Dams and electric power generation projects in the study area show the occurrence points and overlapping of suitable predicted habitats of the pheasant species.

During major infrastructure development projects, different activities, such as installation and relocation of the Karakorum highway from riverbeds to higher altitudes, resettlement of affected local communities from reservoir areas of dams to the upper natural habitat of the pheasants, and heavy machinery operations were the major threats to habitat and the primary cause of the declining population of pheasants in the region. Furthermore, sound pollution from heavy blasting and construction machinery also affected the dynamics of the pheasant. Resettlement constructions, dust, and relocation of roads dramatically affect the natural habitat shrinkage of pheasants. Another major threat is in-flight collisions with the transmission lines within the potential area. These construction activities directly affect the population of the concerned pheasant, especially the study area's lower-ranging altitudinal species (Figure 5).

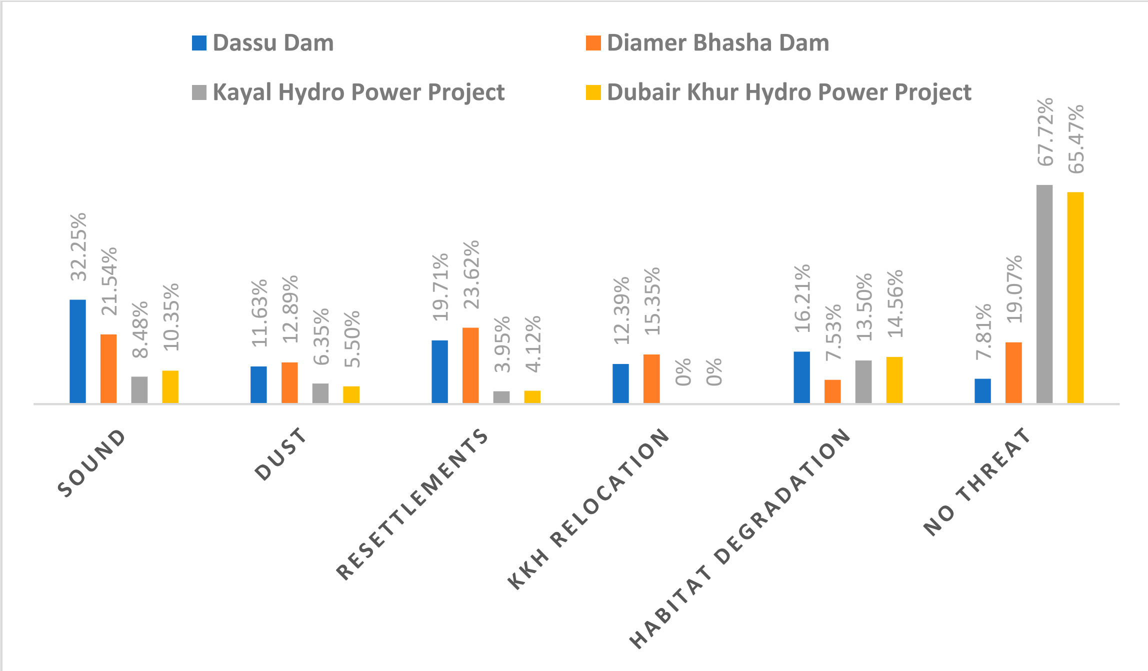


Figure 5. Different newly emerging threats imposed by major infrastructure development projects in the study area.

3.5. Hunting and Deforestation

The results revealed that in areas where law enforcement agencies and departmental wildlife access are limited, people excessively hunt the pheasant species for economic and amusement purposes and increase deforestation to overcome their economic shortage (Figure 2). The current survey results indicated that mostly illiterate farmers and non-specialists were passionate about hunting. Among the literate, the people working as lower-class government workers or having village jobs (from where they can easily access the habitat of the pheasant for hunting) and undergraduates were mostly involved in hunting, poaching, and snaring (Table 5).

Table 5. Information regarding hunters, their level of education, and profession was collected from the surveys.

S.#	Valley	Are People Interested in Hunting?		Educated/Illiterate		Level of Education		Profession			
		Yes	No	Educated	Illiterate	Prim	Grad	Farmer	Student	Laymen	Servant
1	Palas	82%	18%	14%	86%	88%	12%	52%	10%	30%	8%
2	Jalkot	72%	28%	16%	88%	78%	22%	50%	8%	32%	10%
3	Harban	56%	44%	20%	80%	72%	28%	48%	6%	44%	2%
4	Dubai	54%	46%	44%	56%	88%	12%	44%	4%	44%	8%
5	Kayal	34%	66%	52%	48%	90%	10%	36%	2%	42%	20%
6	Kandia	56%	44%	12%	88%	92%	8%	38%	6%	40%	16%

The questionnaire survey results revealed that the Koklass pheasant was the easiest species to hunt followed by Himalayan Monal. The survey also revealed that people preferentially hunted Himalayan Monal and Western Tragopan due to their bright plumage and economic value, and that sport and food were the two primary reasons for hunting (Table 6).

Table 6. Illegal hunting of Himalayan pheasants, hunting preference, and purpose of hunting in the study area.

S.#	Valley	Increasing/ Decreasing		Easily Hunting Species				Intensively Hunting Species				Purpose of Hunting			Economic Value
		Inc	Dec	WT	HM	KK	SC	WT	MN	KK	SC	Food	Sport	Info	
1	Palas	72%	28%	10%	24%	56%	10%	24%	58%	14%	4%	40%	46%	14%	WT
2	Jalkot	40%	60%	6%	42%	48%	4%	22%	56%	18%	4%	34%	20%	46%	MN
3	Harban	24%	76%	0%	30%	58%	12%	0%	70%	24%	6%	42%	12%	46%	MN
4	Dubair	38%	62%	4%	28%	66%	8%	16%	62%	20%	2%	38%	26%	16%	MN
5	Kayal	22%	78%	12%	40%	46%	2%	10%	66%	18%	4%	46%	12%	42%	MN
6	Kandia	44%	56%	0%	34%	42%	24%	0%	72%	16%	12%	28%	24%	48%	MN

WT; Western Tragopan, HM; Himalayan Monal, KK; Koklass, SC; Snowcock.

4. Discussion

The primary focus of this study was to determine the effects of human pressure directly or indirectly on the pheasant species of the Hindukush–Himalayan region, with special reference to Indus Kohistan, Pakistan. The Himalayan pheasant species has been mostly reported in the northwest part of the western, eastern, and lesser Himalayas and their foothills [26]. Distribution of all species, Western Tragopan, Himalayan Monal, Koklass, and Himalayan Snowcock, were found in Palas valley of district Koli Palas Kohistan and Jalkot Valley of district upper Kohistan. In the same context, the Kayal Valley of district lower Kohistan has an average number of all four pheasant species. In the Harban and Kandia Valley of the upper Kohistan district, the rare Western Tragopan was absent during the study. Dubair Valley of the district lower Kohistan had three species of pheasant: Western Tragopan, Koklass, and Himalayan Snowcock. The Western Tragopan normally inhabits mixed coniferous forest canopied beneath dense herbs and shrubs ranging from 1350 m to 2800 m asl in winter and 2400 m to 3600 m asl in summer [27,28].

The results revealed that the abundance of Western Tragopan in Palas, Kayal Valley, and Dubair Valley is mostly reported up to 3650 m asl in summer and flashback in winter up to 1800 m asl. In the Jalkot Valley, the pheasant populations exhibit a small degree of altitudinal migration and shift to occupy a slightly higher altitudinal range during the summer. Himalayan Monal inhabits the upper temperate forests of conifers and broad-leaved plants with densely vegetated slopes at altitudes ranging from 2400 m asl in winter to 4500 m asl in summer [32,33]. The current study also revealed that the Himalayan Monal shows a greater range of seasonal migration, reaching up to 4000 m asl in summer and a flashback to their winter habitat of 2000 m asl in all the valleys of the study area. In hot summers, the bird's range reaches up to alpine pastures. Koklass is confined to tree lines and does not extend its range above the tree line [35,36]. This pheasant also shows a seasonal migration up to 3500 m asl in summer and back to their winter habitat of 1600 m asl in Palas, Kandia, and Kayal valleys, but in Jalkot, Harban, and Dubair valleys, the range is much higher in winter as well as in summer season. The Himalayan Snowcock, during the summers, is mostly reported between 4000–5000 m asl in the Himalayas; even in the winter, these species survive in very harsh climatic conditions and can be found up to 2400 m asl [40]. The altitudinal range of these species is mostly reported from 3600 m to 5300 m asl in the summer and winter, migrating toward lower altitudes of 3000 m asl. The results of the data analysis through Distance 7.4 revealed different values of AIC, density (D), and percent CV for all three species, which in turn depended on the topography of the macrohabitat in the study area.

The abundance calculation of the pheasants in the region has been under investigation for the last three years, and the average counts and encounter rates were analyzed for all pheasant species. Human activities, even in montane regions, have affected the population of these species, causing ongoing population declines and, in many cases, localized extinction [11]. It has been reported that heavy dam construction and urbanization directly or indirectly affect biodiversity [53]. The habitat suitability modeling showed that the Himalayan Monal and Himalayan Snowcock populations are satisfactory in all valleys, either affected by dams or not, due to the higher altitudinal behavior. Still, winter migration to lower altitudes may increase the threats caused by urbanization and major infrastructure development projects. Jalkot, Kayal, Harban, and Dubair valley's lower altitudinal pheasant species, especially the Western Tragopan and Koklass pheasant populations, are severely affected by major infrastructure development projects, deforestation, and illegal hunting activities. The major infrastructure development projects include the Diamer Bhasha Dam, Dassu Dam, Dubair Khur Powerhouse, Kayal hydropower project, and many small hydropower generator installations. These constructions contaminate the terrestrial, atmospheric, and riverine ecosystems, and produce noise pollution during blasting and heavy machinery operations, further affecting their population dynamics. The dam and hydropower project constructions have a huge impact on the shrinkage of the natural habitat by resettling the affected local community from lower to higher altitudes and relocating roads from riverbeds to upper altitudinal ranges. Huge transmission lines in the area also pose a threat to pheasants due to mid-air collisions. Dam construction, particularly multiple dam cascades, leads to habitat fragmentation [54]. The study also found that areas with less human interference have higher encounter rates than disturbed habitats. Due to major infrastructure development projects and urbanization, the population of these pheasants has been fragmented in different zones, such as the population of Western Tragopan, mostly found in Palas and Jalkot valleys, and a very small population found in Dubair and Kayal valleys. These valleys are disjointed by major infrastructure development projects and natural barriers, such as huge mountain systems and the Indus River.

The survey questionnaire focused on information regarding pheasant population status in the area, easily huntable species, intensively hunted species, the purpose of the hunting, and their economic values. The local communities of Kandia (46% households) and Harban valley (32% households) of the upper Kohistan district depend on timber and fuel woods for their basic livelihood and economic purposes. The Koklass pheasant was easy to hunt because it preferred to live in low elevations and engage in loud-calling behaviors. Its population has decreased in the Palas, Jalkot, and Kandia valleys, where illegal activities are common. Himalayan Monal was intensively hunted due to its bright plumage, which was used as headgear for traditional caps and economic benefits. The threatened Western Tragopan population was endemic to Palas, Jalkot, Dubair, and Kayal valleys in remote areas with less altered habitats. Still, in winter, this pheasant is also facing illegal hunting activities. Himalayan Snowcock preferred higher altitudinal areas compared to the other three pheasant species. The species is under less human pressure because of its high altitudinal occurrence, but unfortunately, in winter, its migratory behavior brings it to lower altitudes, where it also faces illegal activities. The population of the pheasant species is declining due to illegal hunting and other anthropogenic activities, such as habitat degradation, exhaustion, extensive grazing, and deforestation [7]. This study further revealed that illegal hunting devastated the population of these rare pheasants. According to the interviewers, the pheasants were extensively hunted in the winter due to their migration from higher to lower altitudes and easy access. The hunting protocol, species, and timing also differ among the hunters of different valleys; in the Jalkot and Harban valleys, hunting takes place mostly after dusk and before dawn, when pheasants exhibit roosting behavior. The species most extensively hunted in these two valleys is the Himalayan Monal. Hunting mostly occurs at daylight in the Palas, Dubair, Kayal, and Kandia valleys. In Palas Valley, the most extensively hunted species is the threatened Western Tragopan because of its large population in the valley. Exhibiting features such as ground-dwelling habits, low flights with large body sizes, and highly visible plumage, these pheasants were the easiest to hunt [8,23]. All pheasants studied had ground-dwelling, low-flight, and loud-calling behaviors. It was noted that the seasonal and daily movements of the pheasants were mostly vertical by ground, and very rarely did they fly or move horizontally.

Furthermore, illegal hunting is found at its peak in the Palas valley of district Koli Palas Kohistan, Harban valley of district upper Kohistan, and Kayal valley of district lower Kohistan. Seasonal migration to lower altitudes for physiological requirements causes intra-specific competition, hunting, and poaching threats [12]. Similar results were found, as Koklass usually prefers lower altitudes under the greatest human pressure. The male Himalayan Monal is under the greatest threat of hunting in the region because of its bright plumage and high economic and traditional values, as revealed by several studies [16,51]. Human activities, such as overhunting and economic and cultural values, threaten these species. Low breeding success and habitat destruction contribute to declining populations [13,15,55]. Non-timber forest collections (NTFC) and excessive stocks in the potential pheasant habitat also play a part in reducing the pheasant population. Landslides and natural predation had subtle effects on the pheasant population and its habitats. In addition, it was reported that there were diseases within the pheasant populations. Pathogen transfer within species and the breakout of zoonoses have led to the spread of disease in the pheasant. The exploration of pathogen types and risk factors is needed in this situation to overcome an outbreak, and proper protective techniques should be adopted during conservation. The respiratory and intestinal microbiota has been identified in chickens and ducks, but very little has been reported in pheasant species [17]. The mortality and weakness, blindness, and neurological symptoms of partridges and green birds have been studied, and they seem to be a conservation issue in wild birds [56]. This study mostly focused on theoretical data and interview results regarding diseases. No significant answers were reported, and the population did not seem to be affected by the disease.

5. Conclusions and Recommendations

Pheasant populations and their habitats are under great pressure from human and natural hazards, causing them to decline greatly. These birds are distinctive because of their significant and balanced role in high altitudinal ecosystems. They are known to be the best indicators of the environment and to determine the health and balance of the bio-network. The current study focused on pheasant abundance and emerging conservation issues. To assess the population, the “Call count method” was used and analyzed with DISTANCE software. The valleys with higher altitudes and less disturbed habitats have significantly higher encounter rates and densities than those with lower altitudes and declining habitats.

Furthermore, threats to the pheasants were identified using a systematic survey questionnaire completed by inhabitants from the nearest villages of the studied habitat and were specially focused on the habitat where human pressures were found at their peak. Major infrastructure development projects, illegal hunting, and deforestation were major threats. The threats imposed by major infrastructure development project activities include sound and air pollution, resettlement, and relocation of roads and affected local communities from riverbeds (dam reservoirs) to the higher potential habitat of the pheasants. The pheasant’s suitable habitat is overlapped by human-built activities that ultimately shrink the habitat. This is the first study to determine the population versus conservation issues. The novelty was that the major infrastructure development projects severely damaged the pheasant population and their habitats.

This research work will assist conservation biologists and the Wildlife department of Khyber Pakhtunkhwa in formulating recuperative approaches for effective conservation and better habitat management. This will be in the form of public awareness programs, need-wise urbanization (approved town and construction planning from EPI and other wildlife protection departments before urbanization), and early implementation of wildlife management plans during major infrastructure development projects and habitat degradation. Strict rules and policies for deforestation are also needed to educate local communities about alternatives to deforestation for construction materials and fuel woods, which ultimately limit illegal activities in the study area. The study also recommends that the habitat of all the pheasants of the study area, specifically the threatened Western Tragopan habitat, be either included in a legally reserved area for conservation or categorized in a specific conservation status.

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References

1. Webb, J.; Wallwork, J.; Elgood, J. Guide to Living Birds, Macmillan International Higher Education. 2016. Available online: https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Webb%2C+J.%3B+Wallwork%2C+J.%3B+Elgood%2C+J.+Guide+to+Living+Birds.+2016&btnG= (accessed on 13 March 2022).
2. Egwumah, F.A.; Ekwugha, E.U.; Ajayi, O.E. Paramount Roles of Agroforestry Systems as Habitat for Bird Species. *Paramount Ecol. Resour.* **2022**, *9*, 1–17.
3. Sathyakumar, S.; Poudyal, K.; Bhattacharya, T.; Bashir, T. Galliformes of Khangchendzonga Biosphere Reserve, Sikkim, India. In *Biodiversity of Sikkim—Exploring and Conserving a Global Hotspot*; Information and Public Relation Department: Gangtok, India, 2010; pp. 301–315.
4. van Horik, J.O.; Langley, E.J.G.; Whiteside, M.A.; Beardsworth, C.E.; Madden, J.R. Pheasants learn five different binomial colour discriminations and retain these associations for at least 27 days. *Anim. Behav. Cogn.* **2018**, *5*, 268–278. [CrossRef]
5. Johnsgard, P. The North American Quails, Partridges, and Pheasants. 2017. Available online: https://books.google.rs/books?hl=sr&lr=&id=o6g8DwAAQBAJ&oi=fnd&pg=PA7&dq=5.%09Johnsgard,+P.+The+North+American+Quails,+Partridges,+and+Pheasants.+2017.&ots=kGFscwGOq3&sig=4o195aOimtu5b20vD0ExqsMDPZ4&redir_esc=y#v=onepage&q=5.%09Johnsgard%2C%20P.%20The%20North%20American%20Quails%2C%20Partridges%2C%20and%20Pheasants.%202017.&f=false (accessed on 13 March 2022).
6. Awan, M.N.; Saqib, Z.; Buner, F.; Lee, D.C.; Pervez, A. Using ensemble modeling to predict breeding habitat of the red-listed Western Tragopan (*Tragopan melanocephalus*) in the Western Himalayas of Pakistan. *Glob. Ecol. Conserv.* **2021**, *31*, e01864. [CrossRef]
7. Mosley, S. *The Environment in World History*; University of California Press: Oakland, CA, USA, 2010; pp. 1–125. [CrossRef]
8. Guha, R. The Unquiet Woods: Ecological Change and Peasant Resistance in the Himalaya. 2000. Available online: https://books.google.rs/books?hl=sr&lr=&id=UHfJLK6g_a8C&oi=fnd&pg=PR10&dq=Guha,+R.+The+Unquiet+Woods:+Ecological+Change+and+Peasant+Resistance+in+the+Himalaya.+2000.&ots=f1yYuPvKQP&sig=trWZ-IQMDTdNegRwullqGpmsAIc&redir_esc=y#v=onepage&q&f=false (accessed on 26 November 2020).
9. Bhattacharya, T.A.; Sathyakumar, S.; Rawat, G.S. Distribution and abundance of Galliformes in response to anthropogenic pressures in the buffer zone of Nanda Devi Biosphere Reserve. *Int. J. Gall. Conserv.* **2009**, *1*, 78–84. Available online: http://www.pheasant.org.uk (accessed on 19 November 2020).
10. Shahabuddin, S.K.; Naveed, A.; Adil, K.; Waheed, A.; Basit, A. Exploring the population status of family Phasianidae in Totalai Game Reserve, District Buner, Khyber Pukhtunkhwa, Pakistan. *Br. J. Poult. Sci.* **2016**, *5*, 13–20. [CrossRef]
11. Soh, M.C.K.; Sodhi, N.S.; Lim, S.L.H. High sensitivity of montane bird communities to habitat disturbance in Peninsular Malaysia. *Biol. Conserv.* **2006**, *129*, 149–166. [CrossRef]
12. Thomas, C.D.; Cameron, A.; Green, R.E.; Bakkenes, M.; Beaumont, L.J.; Collingham, Y.C.; Erasmus, B.F.; De Siqueira, M.F.; Grainger, A.; Hannah, L.; et al. Extinction risk from climate change. *Nature* **2004**, *427*, 145–148. Available online: www.nature.com/nature (accessed on 26 November 2020). [CrossRef]

13. McGowan, P.J.K.; Duckworth, J.W.; Xianji, W.; Van Balen, B.; Xiaojun, Y.; Khan, K.M.; Yatim, S.H.; Thanga, L.; Setiawan, I.; Kaul, R. A review of the status of the Green Peafowl Pavo muticus and recommendations for future action. *Bird Conserv. Int.* **1998**, *8*, 331–348. Available online: https://www.cambridge.org (accessed on 13 March 2022). [CrossRef]
14. Kushwaha, S.; Kumar, A. A review on Indian peafowl (*Pavo cristatus*) Linnaeus, 1758. *J. Wildl. Res.* **2016**, *4*, 42–59.
15. Rodrigues, A.S.L.; Akcakaya, H.R.; Andelman, S.J.; Bakarr, M.I.; Boitani, L.; Brooks, T.M.; Chanson, J.S.; Fishpool, L.D.C.; Da Fonseca, G.A.B.; Gaston, K.J.; et al. Global gap analysis: Priority regions for expanding the global protected-area network. *BioScience* **2004**, *54*, 1092–1100. Available online: https://academic.oup.com/bioscience (accessed on 13 March 2022). [CrossRef]
16. Hill, G.E.; Inouye, C.Y.; Montgomerie, R. Dietary carotenoids predict plumage coloration in wild house finches. Proceedings of the Royal Society of London. Series B. *Biol. Sci.* **2002**, *269*, 1119–1124. [CrossRef] [PubMed]
17. Bukhari, S.M.; Alghamdi, H.A.; Rehman, K.U.; Andleeb, S.; Ahmad, S.; Khalid, N. Metagenomics analysis of the fecal microbiota in Ring-necked pheasants (*Phasianus colchicus*) and Green pheasants (*Phasianus versicolor*) using next generation sequencing. *Saudi J. Biol. Sci.* **2022**, *29*, 1781–1788. [CrossRef] [PubMed]
18. Del Hoyo, J.; Elliott, A.; Sargatal, J. Handbook. 1994. Available online: https://www.aviornis.nl/uploads/media/Parelhoenders_in_Handbook_of_the_Birds_of_the_World_01.pdf (accessed on 2 February 2022).
19. Woodworth, L.M.; Montgomery, M.E.; Briscoe, D.A.; Frankham, R. Rapid genetic deterioration in captive populations: Causes and conservation implications. *Conserv. Genetics* **2002**, *3*, 277–288. [CrossRef]
20. Hassan, Z.; Shabbir, R.; Ahmad, S.S.; Malik, A.H.; Aziz, N.; Butt, A.; Erum, S. Dynamics of land use and land cover change (LULCC) using geospatial techniques: A case study of Islamabad Pakistan. *SpringerPlus* **2016**, *5*, 812. Available online: https://link.springer.com (accessed on 13 March 2022). [CrossRef]
21. Lee, D.C.; Marsden, S.J. Adjusting count period strategies to improve the accuracy of forest bird abundance estimates from point transect distance sampling surveys. *Ibis* **2008**, *150*, 315–325. [CrossRef]
22. Lambert, F.R. The consequences of selective logging for Bornean lowland forest birds. *Philos. Trans. R. Soc. B Biol. Sci.* **1992**, *335*, 443–457. [CrossRef]
23. Sailo, L. Ecological Studies on Grey Peacock Pheasant *Polyplectron bicalcaratum* (Linn, 1758) in the Tropical Forest of Mizoram India. Ph.D. Thesis, Mizoram University, Aizawl, India, 2019. Available online: https://shodhganga.inflibnet.ac.in (accessed on 13 March 2022).
24. Fuller, R.A.; McGowan, P.J.; Carroll, J.P.; Dekker, R.W.; Garson, P.J. What does IUCN species action planning contribute to the conservation process? *Biol. Conserv.* **2003**, *112*, 343–349. [CrossRef]
25. Fernandes, M.; Mukesh, S.S.; Kaul, R.; Kalsi, R.S.; Sharma, D. Conservation of red junglefowl Gallus gallus in India. *Intl. J. Gall. Conserv.* **2009**, *1*, 94–101.
26. Bagaria, P.; Thapa, A.; Sharma, L.K.; Joshi, B.D.; Singh, H.; Sharma, C.M.; Sarma, J.; Thakur, M.; Chandra, K. Distribution modelling and climate change risk assessment strategy for rare Himalayan Galliformes species using archetypal data abundant cohorts for adaptation planning. *Clim. Risk Manag.* **2021**, *31*, 100264. [CrossRef]
27. Jameel, M.A.; Tabassum, S.; Mehmood, S.; Shah, T.; Khan, M.F.; Kabir, M.; Awan, M.N. Does Trophy Hunting of Kashmir Markhor Really Contributing in Its Conservation? *Int. J. Conserv. Sci.* **2019**, *10*, 525–532.
28. Jameel, M.A.; Khan, M.F.; Awan, M.N.; Nadeem, M.S.; Aslam, S.; Mehmood, S.; Mahmood, T. Population and risk assessment of sympatric pheasant species in Palas Valley, Pakistan. *Braz. J. Biol.* **2022**, *84*, e259582. [CrossRef] [PubMed]
29. Gaston, A.J.; Garson, P.J.; Hunter, M.L., Jr. The status and conservation of forest wildlife in Himachal Pradesh, Western Himalayas. *Biol. Conserv.* **1983**, *27*, 291–314. Available online: https://www.sciencedirect.com/science/article/pii/0006320783900885 (accessed on 13 March 2022). [CrossRef]
30. Ramesh, K.; Sathyakumar, S.; Rawat, G.S. Methods of capture and radio tracking of Western Tragopan Tragopan melanocephalus JE Gray 1829 in the Great Himalayan National Park, India. *J. Bombay Nat. Hist. Soc.* **2009**, *105*, 127–132.
31. Grimmett, R.; Roberts, T.; Inskipp, T.; Byers, C. Birds of Pakistan. 2008. Available online: https://books.google.rs/books?hl=sr&lr=&id=OoeL2O5Iq0YC&oi=fnd&pg=PA1&dq=31.%09Grimmett,+R.%3B+Roberts,+T.%3B+Inskipp,+T.%3B+Byers,+C.+Birds+of+Pakistan.+2008.+&ots=8Vis1FpXVt&sig=V72dpKHhGn-2IU0pHsbOpDr0EjQ&redir_esc=y#v=onepage&q&f=false (accessed on 13 March 2022).
32. Malviya, M.; Lakshminarasimha, R.; Bose, S.; Dhiman, S.; Nigam, P.; Ramesh, K. Stocking for the future: Genetic and demographic correlates of Western Tragopan Tragopan melanocephalus in captivity. *J. Bombay Nat. Hist. Soc.* **2011**, *108*, 206–212. Available online: https://www.researchgate.net/profile/Parag-Nigam/publication/233730841 (accessed on 23 February 2022).
33. Awan, M.N.; Ali, H.; Lee, D.C. An annotated checklist of birds and conservation issues in Salkhala Game Reserve, an isolated Important Bird Area in Azad Kashmir, Pakistan. *Forktail* **2012**, *28*, 38–43. Available online: https://www.researchgate.net/profile/Hassan-Ali-88/publication/234556252 (accessed on 13 March 2022).
34. Delacour, J. Pheasants of the World. 1977. Available online: https://agris.fao.org/agris-search/search.do?recordID=US201300559405 (accessed on 13 March 2022).
35. Ahmad, B.; Noor, F.; Awan, M.S.; Minhas, R.A.; Ali, U. Distribution and population status of Himalayan Monal pheasant (*Lophophorus impejanus*) in Salkhala game reserve, Neelum valley Azad Jammu and Kashmir (Pakistan). *J. Anim. Plant Sci.* **2019**, *29*, 1150–1159. Available online: https://www.researchgate.net/profile/Riaz-Aziz-Minhas/amp (accessed on 13 March 2022).
36. Gupta, G.; Dunn, J.; Sanderson, R.; Fuller, R.; McGowan, P.J. A simple method for assessing the completeness of a geographic range size estimate. *Glob. Ecol. Conserv.* **2020**, *21*, e00788. [CrossRef]

37. Miller, J.R. Survey of Western Tragopan, Koklass Pheasant, and Himalayan Monal populations in the Great Himalayan National Park, Himachal Pradesh, India. *Indian Birds* **2010**, *6*, 60–65. Available online: http://www.indianbirds.in/pdfs/Miller_WesternTragopan&KoklassPheasant.pdf (accessed on 13 March 2022).
38. McShea, W. *Guide to the Wildlife of Southwest China*; Smithsonian Institution Scholarly Press: Washington DC, USA, 2018. Available online: https://books.google.rs/books?hl=sr&lr=&id=3R06DwAAQBAJ&oi=fnd&pg=PP9&dq=38.%09McShea,+W.+Guide+to+the+Wildlife+of+Southwest+China%3B+2018.+&ots=5nNt0U4o43&sig=S0SyPz0iDxhMLItbTOtoCKK_0Q4&redir_esc=y#v=onepage&q=38.%09McShea%2C%20W.%20Guide%20to%20the%20Wildlife%20of%20Southwest%20China%3B%202018.&f=false (accessed on 13 March 2022).
39. Grewal, B.; Bhatia, G. *A Photographic Field Guide to the Birds of India, Pakistan, Nepal, Bhutan, Sri Lanka, and Bangladesh*; Princeton University Press: Princeton, NJ, USA, 2017. Available online: https://books.google.rs/books?hl=sr&lr=&id=mzupDQAAQBAJ&oi=fnd&pg=PA4&dq=39.%09Grewal,+B.%3B+Bhatia,+G.+A+Photographic+Field+Guide+to+the+Birds+of+India,+Pakistan,+Nepal,+Bhutan,+Sri+Lanka,+and+Bangladesh.+2017.+&ots=SNcfcwHGZg&sig=Sgg_xCNAF2E-NV6qlOn8adJnaUw&redir_esc=y#v=onepage&q&f=false (accessed on 13 March 2022).
40. Devkota, B. *Prey Density and Diet Relationship of Snow Ensity and Diet Relationship of Snow Leopard (Uncia uncia)*; Tribhuvan University: Pokhara, Nepal, 2010. Available online: https://snowleopardnetwork.org/wp-content (accessed on 13 March 2022).
41. Luo, G.; Yang, C.; Zhou, H.; Seitz, M.; Wu, Y.; Ran, J. Habitat use and diel activity pattern of the Tibetan Snowcock (*Tetraogallus tibetanus*): A case study using camera traps for surveying high-elevation bird species. *Avian Res.* **2019**, *10*, 4. [CrossRef]
42. Sathyakumar, S.; Bashir, T. Wildlife of the Himalaya: Conservation issues and the way forward. In *Mountain Ecosystem and Man*; Soil Conservation Society of India: New Delhi, India, 2010; pp. 322–343.
43. Abbas, S.; Hussain, E.; Abbas, H.; Hussain, S.; Tabassum, R.; Khan, M.Z.; Nabi, M. Species diversity, feeding habits and conservation status of birds in Qurumbar National Park, Gilgit-Baltistan, Pakistan. *Intern. J. Zool. Invest.* **2019**, *5*, 108–117. [CrossRef]
44. Limbu, D.K.; Rai, B.K.; Rai, K.K. Livelihood and Carbon Management by Indigenous People in Southern Himalayas. In *Carbon Management for Promoting Local Livelihood in the Hindu Kush Himalayan (HKH) Region*; Springer: Cham, Switzerland, 2020; pp. 63–87. [CrossRef]
45. Khan, A.; Ahmed, M.; Siddiqi, M.F.; Shah, M.; Calixto, E.S.; Khan, A.; Shah, P.; Iqbal, J.; Azeem, M. Vegetation-environment relationship in conifer dominating forests of the mountainous range of Indus Kohistan in northern Pakistan. *J. Mt. Sci.* **2020**, *17*, 1989–2000. [CrossRef]
46. Khan, A.; Ahmed, M.; Siddiqui, M.F.; Iqbal, J.; Wahab, M. Phytosociological analysis of pine forest at Indus Kohistan, KPK, Pakistan. *Pak. J. Bot.* **2016**, *48*, 575–580. Available online: https://pakbs.org/pjbot/PDFs/48(2)/20.pdf (accessed on 12 March 2022).
47. Amin, A.; Nasim, W.; Mubeen, M.; Sarwar, S.; Urich, P.; Ahmad, A.; Wajid, A.; Khaliq, T.; Rasul, F.; Hammad, H.M.; et al. Regional climate assessment of precipitation and temperature in Southern Punjab (Pakistan) using SimCLIM climate model for different temporal scales. *Theor. Appl. Climatol.* **2018**, *131*, 121–131. [CrossRef]
48. Farzana, P.; Anzela, K. Migratory status of the goral, Naemorhedus goral (Hardwicke) (Artiodactyla: Bovidae) in Kohistan, Pakistan. *Int. J. Biodivers. Conserv.* **2013**, *5*, 671–677. [CrossRef]
49. Kissling, M.L.; Garton, E.O. Estimating detection probability and density from point-count surveys: A combination of distance and double-observer sampling. *Auk* **2006**, *123*, 735–752. [CrossRef]
50. Thomas, L.; Laake, J.L.; Derry, J.F.; Buckland, S.T.; Borchers, D.L.; Anderson, D.R.; Burnham, K.P.; Strindberg, S.; Hedley, S.L.; Burt, M.L.; et al. *Distance 3.5. Research Unit for Wildlife Population Assessment*; University of St Andrews: St Andrews, UK, 1998.
51. Buckland, S.T.; Anderson, D.A.; Burnhamand, K.P.; Laake, J.L. *Distance Sampling: Estimating Abundance of Biological Populations*; Chapman and Hall: London, UK, 1993.
52. Jain, D.; Rana, S. Population indices and habitat association of Indian Peafowl (*Pavo cristatus*) in Haryana using line transect and call count method. *Indian J. Anim. Res.* **2013**, *47*, 152–155. Available online: http://arccarticles.s3.amazonaws.com/webArticle/articles/B47210.pdf (accessed on 13 March 2022).
53. Wu, H.; Chen, J.; Xu, J.; Zeng, G.; Sang, L.; Liu, Q.; Yin, Z.; Dai, J.; Yin, D.; Liang, J.; et al. Effects of dam construction on biodiversity: A review. *J. Clean. Prod.* **2019**, *221*, 480–489. Available online: https://www.sciencedirect.com/science/article/pii (accessed on 13 March 2022). [CrossRef]
54. Cooper, A.R.; Infante, D.M.; Wehrly, K.E.; Wang, L.; Brenden, T.O. Identifying indicators and quantifying large-scale effects of dams on fishes. *Ecol. Indic.* **2016**, *61*, 646–657. [CrossRef]
55. Ramesh, K.; Sambandam, S.; Rawat, G.S. *Ecology and Conservation Status of the Pheasants of Great Himalayan National Park, Western Himalaya*; Wildlife Institute of India: Dehradun, India, 1999; Available online: https://pdfs.semanticscholar.org/8ebb/6e3822744d4d9b5accf953f9800959a85cbd.pdf (accessed on 19 November 2020).
56. Höfle, U.; Cabrera, T.C.; Sánchez-Cano, A.; de Mera, I.F.; Risalde, M.A.; Fernandez, A.M.; Ortiz, J.A. Bagaza Virus and Plasmodium spp. Coinfection in Red-Legged Partridges (Alectoris rufa), in Southern Spain. 2019. Available online: https://www.authorea.com/doi/full/10.22541/au.164137149.90030190 (accessed on 4 April 2022).