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## Forward

Greater efforts have been made to enhance all-round development of the University of Yangon since the Democratic Government took office in April, 2011. Priority was given to the renovation of buildings and hostels in the university campus to improve the image of the university. For the purpose of building the capacity of the faculty, scholars from abroad were invited to provide short-term or long-term training courses and to hold workshops and international conferences. For training purposes, scholars from University of Yangon were also sent abroad. In addition, University of Yangon has been promoting collaboration with international institutions. So it has also signed MoUs with them. On 13 June, 2013, Asia Research Center - Yangon University (ARC-YU) was able to sign the MoU with Korean Foundation for Advanced Studies (KFAS) for the second time. Researchers from various disciplines in Yangon University are carrying out quality research with the assistance of KFAS.

This journal accommodates 18 research papers resulted from the outstanding research projects in Science, Environmental Science and Life Science conducted by the academic departments of Yangon University. I would like to express my appreciation and congratulations on the concerted effort of the researchers who have made a great deal of excellence contributions to this issue.

Having the opportunity to conduct research and to publish the research findings in the journal of Asia Research Center, Yangon University, members of ARC, Korean Universities and Yangon University can not only share the research findings among themselves, but also more research projects<sup>8</sup> are created and thus more opportunities are offered for learning. I would, therefore, like to express my thanks to president Park In-Kook of KFAS for making the publication of the ARC-YU Journal a success.

Professor Dr Tin Tun  
Rector, Yangon University  
Chairman of Board of Trustees  
Asia Research Centre, Yangon University  
2013 December

# Occurrence and Distribution of Canid Community in Ayeyawady Region

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## Abstract

The present paper was intended to highlight the distribution of canids in the delta area for the conservation in their natural habitat. The study was carried out at 10 townships of Ayeyawady region from June 2011-June 2013. The objectives were to conduct a systematic census of wild dog in the study area; to determine the distribution and abundance. According to the data obtained, two canid species as dhole so-called Asiatic wild dog/ Indian wild dog *Cuon alpinus* and Golden Jackel *Canis aureus* were recorded. In which dhole was only recorded in north of Thabaung township whereas golden jackel somewhat common in the study sites. However, there was relatively high variation of abundance in the study area. The highest numbers in the southern part of delta areas at a variety of habitats ranging from shrub lands, marshlands, wet forests to human settlements and intensively cultivated areas. Nevertheless, their population becomes more and more reduced in the recent years as the scattered and isolated populations probably owing to loss of their habitats. Threats to wild canids and implementation of conservation were discussed.

Key words: Canids, Occurrence, Distribution, Abundance, Habitat utilization

## 1. Introduction

### 1.1 Justification for wild canid study

Myanmar is among the most biologically diverse countries in mainland Southeast Asia. In contrast to its neighbours, large areas (about 30%) of Myanmar are still forested, providing a unique opportunity to conserve biodiversity within protected areas (Rao *et al.*, 2005). Nevertheless, many natural habitats are rapidly becoming isolated primarily because of growing of urbanization lead to be growing human population and, expansion of agriculture land and increasing infrastructure of motor roads. Such of human activities are causing major impacts on natural.

The Canidae are the biological family of carnivorous and omnivorous mammals that includes domestic dogs, wolves, foxes, jackals, coyotes, and many other lesser known extant and extinct dog-like mammals. In world, a total of 34 species belong to this family. Unfortunately some canid species are declining globally under the pressure of habitat degradation and fragmentation, disease and persecution. Other has managed to survive and even thrive in human-dominated landscapes. Their habitat used overlap with people results in competition for resources, which is at the heart of the conflict between many wild canids and man (Sillero-Zubiri and Switzer, 2004).

In Myanmar, currently three species of canids were recognized viz. gray wolf *Canis lupus*, in northern Myanmar, golden Jackel *Canis aureus* in a deciduous forest from central basin of Myanmar and southern part of Myanmar-Taninthayi Region and dhole *Cuon alpinus* in a deep forest through the country (Parr and Tin Than, undated, Rabinowitz and Saw Htun Khaing, 1998).

Among them, the golden jackal is mammal fairly common throughout its range. Due to its tolerance for dry habitats and its omnivorous diet, it can live in a wide variety of habitats (Nadeem *et al.*, 2012). Rabinowitz and Saw Htun Khaing (1998) reported that the status, distribution and requirements of environments of dhole (*Cuon alpinus*) so-called called the

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San San Hmwe, Department of Zoology, University of Yangon

Asiatic wild dog, Indian wild dog, red dog and other canids in Myanmar are still needed confirmed and protect.

Steward (1993) addressed that good populations of wild dog in Myanmar held parks such as Maymyo and Shwe-U-Daung in forested widespread areas up to the late 1960. But actually status of dhole in there is not known and current knowledge of distribution, population size in Myanmar was incomplete yet. Due to the absence of information concerning the occurrence of species, distribution, home range and feeding habits and breeding behaviors in the wild. Therefore, it is difficult to provide the conservation status of that canid species.

## 1.2 General description of Ayeyarwady Region

The present work was designed to study the occurrence and distribution of wild canids in southern part of Myanmar, Ayeyawady Delta Region. It is bounded on the north by the Bago Region, on the east by the Bago Region and Yangon Region, on the south by the Andaman Sea (Katpale pinle) and on the west by the Rakhine State and the Bay of Bengal. Astronomically, it lies between 15° 45' N and 18°30' N latitudes, and 94°15' E and 96°15'E longitudes. It has an area of 13567 square miles (35140 sq km), embracing 26 townships and 2129 village tracts. Regarding to the physical background of region is the southermost part of the Central Basin of Myanmar, which has been built up by the Ayeyarwady and its numerous distributaries. In the west is backed up by the Rakhine Yomas and the entire region is almost level. The topography become lower towards the south, and are only about 500 feet high in Pathein, although they are more than 3000 feet near Hinthada.

The climate is a tropical monsoon type with 26.16 °C in average annual temperature and 100 inches annual rainfall in the south and west. The rainy season (monsoon season) typically lasts from May through October, the cool season from November through January and dry season from February through April. Floods usually subside towards the end of August or early September. The forests in the upland and hilly sections of west Pathein and Hinthada have been put under reserve due to their importance as protective cover for watershed areas.

The main objectives of present work were

- to investigate the wild canids distribution in the different study sites
- to confirm the presence of jackel in Ayeyarwady delta region
- to identify environmental factors associated with their distribution
- to identify key management considerations

## 2. Materials and Methods

### 2.1 Study area and study sites

The present study was conducted at ten townships in three districts of Ayeyawady Region such as Pyapon District (Dedaye township, Kyaiklat township, Pyapon township, Bogalay township) , Myaungmya District (Myaungmya township, Labutta township, and Ngapudaw township) and Pathein District (Pathein township and Thapaung township) (Figure 1 and Figure 2).

The study period was lasted from June, 2011 to January 2013.

### 2.2 Survey methods

Survey Methods: such as questionnaires, interviews, personal communications with local peoples and hunters/ catchers regarding the presence or absence of canids in the study area. In which, the semi-structured interviews were carried out in different villages in and

around the selected study sites. All interviews were conducted as a guided discussion using a written set of questions for reference.

Also the methods of direct sighting or confirmation of sign based on sightings in the field work confirmed evidence of jackal presence and from various reliable sources in the study area. There have been used to determine the presence and distribution of a species including documentation of tracks, scats, scratches, burrows or dens.

For estimating animal abundance, the indirect methods were used such as “Den and burrow survey”, “Scat deposition transects”, “Scent and Track counts” and “Vocalization survey” and direct method camera trap followed by Gese (2004).

The data analysis was shown as percentage for each study areas.

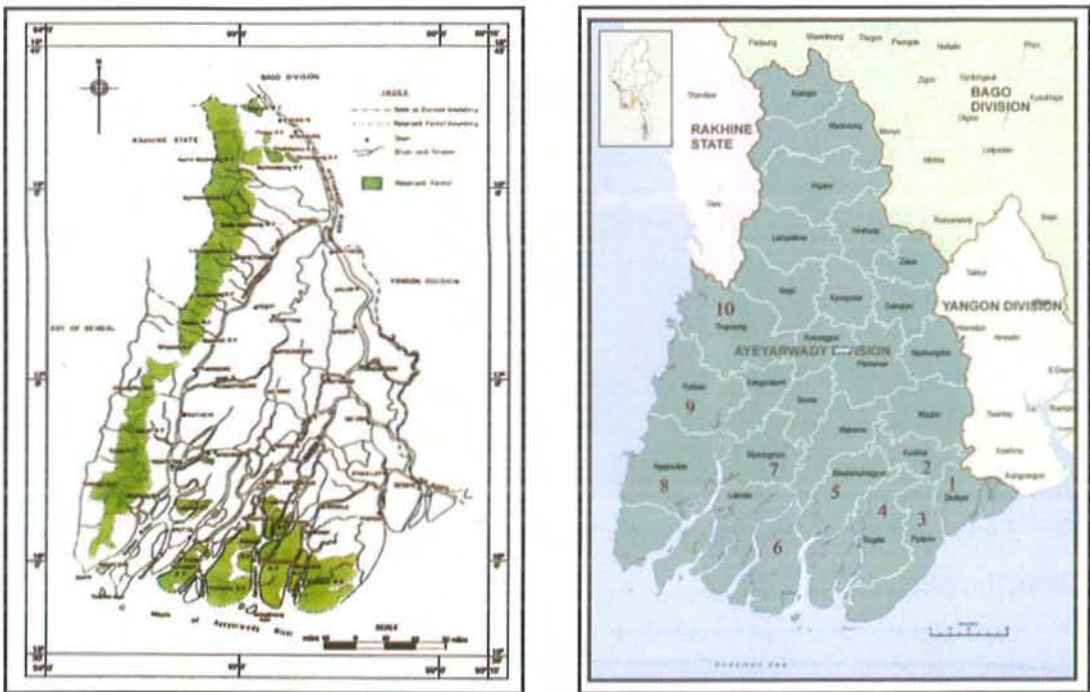


Figure 1. Map of showing Ayeyarwady Region and selected studied area

### 3. Results

#### 3.1 Occurrence of canid species in the study area

Two species of canid were documented in the study area such as Dhole so called the Asiatic wild dog/ Indian wild dog *Cuon alpinus* (Pallas 1811) and Golden jackel *Canis aureus* Linnaeus, 1758.

Among them, dhole was not common throughout the study sites. The pictures of dhole were obtained by camera traps at northern part of Thabaung township area whereas Golden jackel was fairly common throughout the range as the isolated and mostly fragmented population clusters in a few locations in the study areas.

#### 3.2 Conservation status

According to the conservation status referenced by the IUCN Red List Data (2012), the golden jackel was listed as Local concern (LC) whereas dhole was classified under as ‘Endangered’ in the wild (EN). It was also protected in Appendix-II (2003) of CITES (Fig. 3).





Figure 2. Map of showing study sites for data collection (Source: Google earth)

### 3.3 Distribution

Their distribution was divided in two sub-regions: southern and northern delta areas. Based on the predominant habitat types, the jackal presence areas was at wetlands, mainly in southern delta area (Figure 4).

The result observed dhole distribution in Northwestern Thabaung was at above 35 m as well as southern coastal wetland jackel populations were observed in areas at less than 10 m altitude. Their population was less abundant where seasonal flooding occurred in rice agro-ecosystem.



Figure 3. Picture of Dhole so-called Asiatic wild dog, *Cuon alpinus*

The jackal population has also declined during the last a couple of years, and the species has become rare in parts of Ayeyarwady delta area. The present study confirms that no jackal groups existed most of the area of northernmost areas. There was unconfirmed to presence of jackal group in central province of the Ayeyawady region. During the survey 215 possible areas of presence were visited and a positive jackal response was recorded in 85 (39.53%). The survey villages and confirm records was shown in Table 1 and Figure 4.

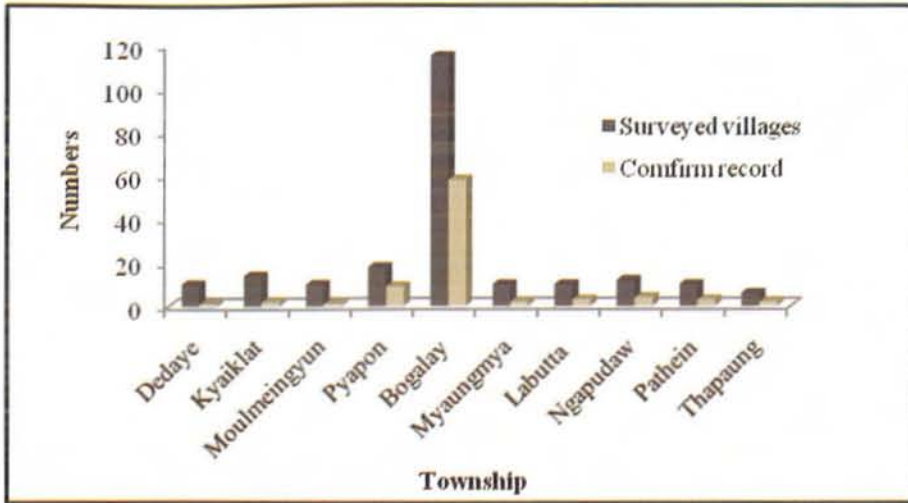


Figure 4. Surveyed villages and confirm record in different townships

The occurrence of jackels at Kyaiklat Township (16° 26'N, 95°23'E) such as Tar-pyat in north and Hpaung-yoe-chaung in west; at Maulmeingyun township- Kyun deik and Sisali Htone in North; Pyapon township, around Pyindaye reserved forest area, Myogon (15° 56'N, 95°35'E ), Daw Nyein (15° 54'N, 95°36'E) and Kalahteik (15° 56'N, 95°39'E); at Bogalay township, in Ka-don-ka-nNi Reserved Forest (15° 48'N, 95°10'E) and Mein-ma-hla-kyun (15° 51'N, 95°14'E - 16° 04'N, 95°13'E); at Myaungmya township around Pyinywa (16° 29'N, 94°50'E); at Labutta twonship, Pyin Kha Yaing (15° 58'N, 94°23'E), Chaunggua (16° 00'N, 94°24'E), Thetkehaung (15° 59'N, 94°31'E), around Heinggyi Kyun (15° 59'N, 94°16'E) in south-west and Polaung (15° 51'N, 95°02'E) in south-east, Daniseik (15° 57'N, 95°00'E), Bogon (15° 55'N, 94°55'E) Kyauktazi (15° 50'N, 94°53'E) in east were recorded.

Percent of occurrence of jackel in the different study sites, the highest percentage of confirmation was recorded in southernmost village of Pyapon (46.93%) and Bogalay townships (53.42%). Similar distribution of jackels with the ranged 30-33% recorded in Labutta, Ngapudaw, Pathein Thapaung townships. In Myaungmya township (20%), in Kyeiklat township (14.28%), in Dedaye and Maulmeingyun townships (10%) were recorded (Figure 5).

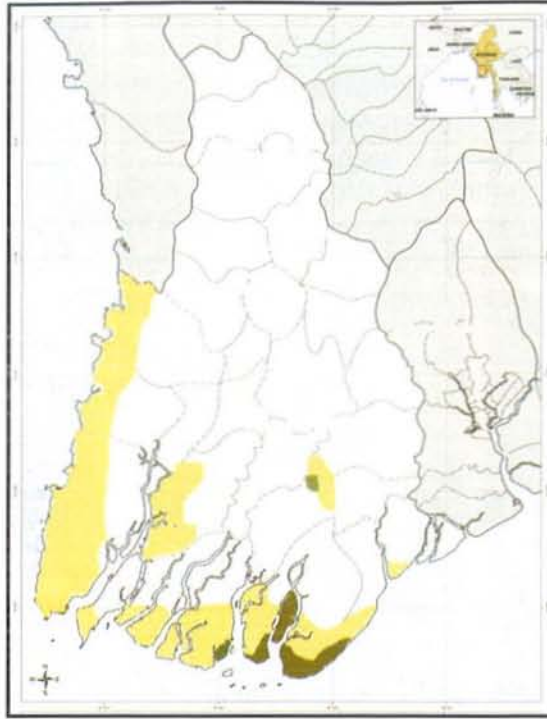


Figure. 5 Maps summarizing the current jackel distribution within delta area, Ayeyarwady region. Potential areas are shown in yellow shading, with the dark green color indicating higher probabilities of occurrence

### 3.4 Ecology and habitat use

The vegetation pattern within the study area was a complex mosaic of evergreen forest, deciduous forest, dry mixed deciduous forest, moist mixed deciduous forest, mangrove agriculture and scrubland. Especially agro-ecosystem of southernmost of survey areas was flooded from July through September.

The preferences of habitats of golden jackel were similarities in the different study sites. Especially they used lowland riverine forest, adjacent open forest and plains in the outskirts of small villages at a variety of habitats ranging from shrub lands, marshlands, wet forests to human settlements and intensively cultivated areas. The jackel used the habitat in the shrubs and at the edge of forest cover.

Nevertheless, the habitat condition of the most of study areas were degraded and fragmented due to cultivation and urbanization. Such of habitat may not support the population of jackel densities in some survey area. Especially their habitats were diminished resulting after from the nargis cyclone in 2008.

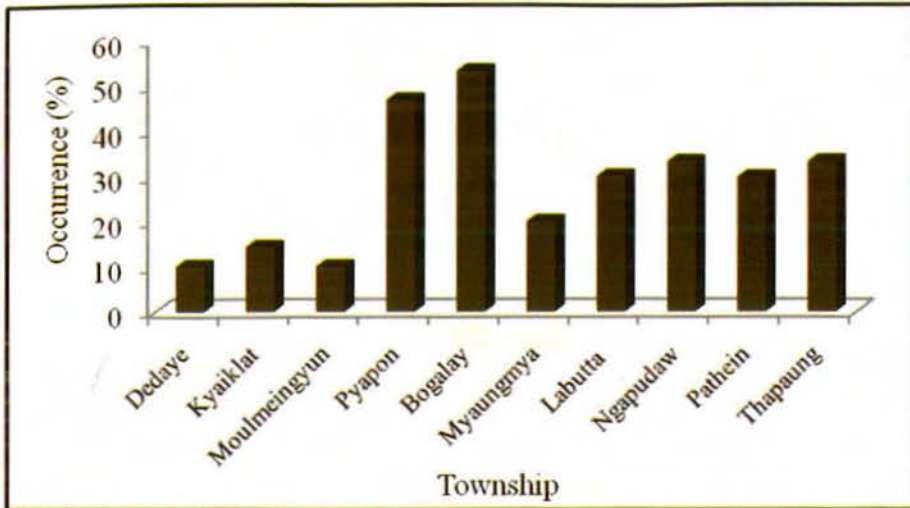


Figure 6. Percent confirmation of jackel occurrence in different study sites

### 3.5 Habit

They are nocturnal and lives solitary and in groups of two and four individuals. The largest group observed consisted of five individuals, but such a number was observed only three times during the survey (Figure 6).

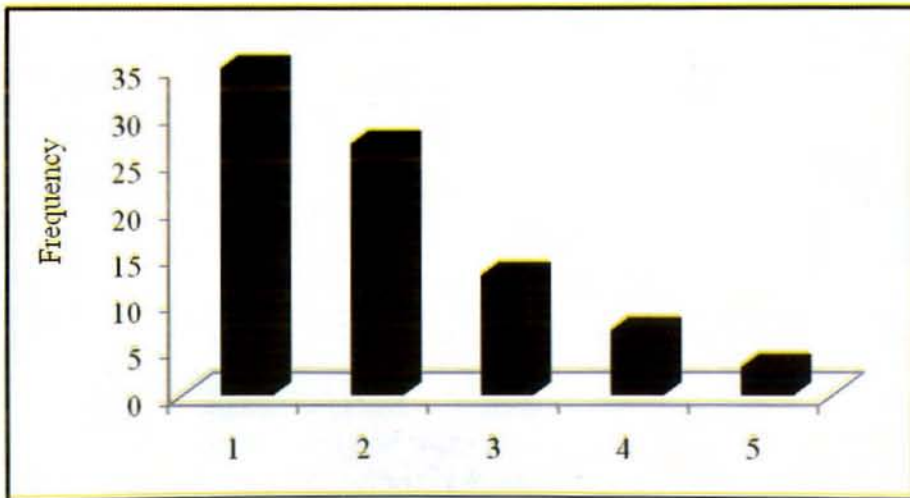


Figure 7. Frequency and number of approaching jackel individuals

They have extended its distribution range in the study area and have found suitable habitats for their survival. The mean distance of their habitat was within the range 0.1-3.5 km from the human settlement. They make a peculiar hawling during the in the evenings. Their calling rate fluctuates seasonally, with more calls being produced during in the dry season and fewer calls being producing during the wet season. They come close to settlements and even go in there searching for food at night and frequent attacking on poultry and lambs in the villages. They eat carcasses and crabs at marshland.



Figure8. Evidence of scats and carcasses collected during the survey

#### 4. Discussion

The present research gave the information of distribution, status, relative abundance and population trends of wild canids in Ayeyarwady delta. Furthermore, the possible existence of remnant population of jackels and dholes in the study area environs in order to facilitate comparison of results with those of the future surveys in other region of Myanmar. The study was conducted by interviewing and documentation by “Questionarie survey” to local peoples and hunters; by direct sighting in the field. However, the line transects were not carried out for detecting of direct surveys due to the few number of population. In the present work, a total of ten townships were surveyed to know the occurrence of wild canids distribution which assessed on the basis of local information and/or few records direct sighting.

In the present survey two species such as dhole *Cuon alpinus* and golden jackel *Canis aureus* were found of in the survey area. Dhole is was only recorded in northwest of Thabaung township. No visual or auditory evidence of other wild canids in the study areas. Dhole is one of the endangered canid species and not find any visual or auditory evidence of living at the southern part of delta area. Therefore the little information was known about current dhole population sizes and distribution across its current geographic range whereas the golden jackel was considered to be moderately common as far as the southern villages of study area. Villagers interviewed indicated that the jackel and dhole were locally hunted for its meat.

According to the historical distribution of dhole, is a medium-sized social canid that once occurred over a wide geographic range, most of South, East, and South-east Asia. Extending from the Tian-Shan and Altai mountains and the Maritime Province of the former USSR southwards through Mongolia, Korea, China, Tibet, Nepal, India, and South-eastwards into Myanmar and Indochina, Thailand, the Malaysian peninsula, and the Indonesian islands of Sumatra and Java (Durbin *et al.*, In Myanmar, dholes were recorded by camera trapping at 11 of 15 survey areas scattered across the country, only four of which were protected. Dholes and/or leopards have apparently replaced tigers as the top predator in these areas (Myanmar Forest Department 2003).

Moreover, Iyengar *et al.* (2005) stated that the Asiatic wild dog or dhole was once very widely distributed across Asia but now has a very fragmented range. Two major phylogeographical groupings were found across the mainland, one extending from South, Central, and North India (south of the Ganges) into Myanmar. They are widely distributed through the forests in Myanmar. They are probably the most significant large predators in the Sino-Himalayan region of Myanmar (Lekagul and McNeely, 1988; Rabinowitz and Saw Htun Khaing, 1998). They are adapted to life in very different environments ranging from mountainous alpine regions in Russia to open steppes in Tibet to scrubland and dense forests in South Asia (Iyengar *et al.*, 2005).

Whilst golden jackal (*Canis aureus* L.) is the most widely distributed jackal species. They can live under a wide variety of natural conditions and this ecological plasticity allows it to settle large geographic range (Markov, 2012). Their range is extensive and includes contiguous areas of Africa, Asia, and Europe (Macdonald and Sillero-Zubiri 2004). The most northern distribution is placed far to the south of Northern Myanmar (Lekagul and McNeely, 1988; Corbet and Hill, 1992). While Rabinowitz and Saw Tun Khaing (1998) reported that this species appears to be present but not common in North Myanmar, its status and distribution remain uncertain.

Based on record of distribution from local villagers and hunters, dholes were in the northwest of deltaic areas due to the suitable ecological conditions for dholes in those areas while jackal was expansion throughout the delta area. Nevertheless they have a fragmented distribution associated with coastal wetlands. According to the previous literatures indicated that the jackals are the most widely distributed jackal species. The species can live under a wide variety of natural conditions and this ecological plasticity allows it to settle large geographic range, covering the territories of East Africa, Southeastern Europe and South Asia to Burma. In Europe, the species distribution is patchy and it is resident in the Balkans. Several factors may influence patterns of distribution, including vegetation and landscape structure, food availability, competition with other carnivores, and human population levels (Morris 1925, Prater 1965, Barnett *et al.* 1980, Johnsingh 1983). The local populations are disappearing coincident with the destruction of the remaining patches of this habitat (Giannatos *et al.* 2005; Jhala and Moehlman, 2004, 2008).

The population was expansion throughout the delta area in decades. But the population was decreased steadily year by year. After Nagis, its number rapidly decreased in the delta area. Some parts of area disappeared golden jackals and their population was shrinking due to anthropogenic causes as the expansion of agricultural activities into marginal areas affected on the geographical range of canids distribution. Nevertheless the high numbers of jackal in southern parts of delta areas probably could represent one of the factors limiting the food availability such as crabs, fishes and domestic animals. The range of predicted jackal habitat does not expand into the north.

In the present work no recent attempt has been made to estimate dhole population status and we did not sight a single jackel, although other evidence were recorded during this survey. Based on the numbers of questionnaire surveys, a decline of the golden jackal population in most of the delta area since last four years. In the present survey recorded few pack of individuals (3 to < 5 indi.) in some villages of the delta area. The population has become rare in parts of the delta area and now survive in small, scattered populations. Therefore, the detailed information on population size of this species for overall delta area was not available.

It might be due to the original populations were much fragmented into many smaller areas by the large-scale destruction of natural habitats. Besides it associated with the anthropogenic impacts that lead to undergone a fundamental changes of their habitats such as agricultural fields, urbanization in wildlife habitats and construction of roads. Therefore, no potential jackels habitat was spotted in most of the study environs. Jackels are traditionally hunted for the purpose of selling for food in the study area. As a result loss of population and become low densities which were the seemingly isolated packets in the former habitats.

And also it seems reasonable that extensive flooding adversely affects the abundance of jackals by excluding them from areas with deep water. The relative abundance with the seasonal flooding was importance fact in the study area. It is unknown whether some jackals remain on small patches of high ground throughout the floods or whether they tend to migrate back and forth into these areas with the rising and receding flood waters. According to the recent contemporary data, none of the local people has heard jackel in some areas for several years seem to support our conclusion that jackel do not occur at the former places anymore. It is of course possible that few individuals of still occur in an area or it remained undetected population which causes to extremely low chance for encounter/sighting.

Regarding to their habitat used, Prater (1971) stated that the jackel's habitats are a wide variety of natural and agricultural habitats from sea level to a least 4000m altitude. Moreover, Poche' *et al.* (1987) stated that golden jackals occur in intensively cultivated areas of Bangladesh. They are well adapted to dry open countries and are present in plains and deserts throughout Pakistan (Roberts, 1997). In the present result found that a variety of habitats ranging from shrublands, marshlands, wet forests to in eco-fringe of human settlements and intensively cultivated areas. Mostly they occupied at clearing areas near to villages mainly in dense parts of small in size forest habitats – young coniferous plants. The conflict problems with man were noted in most of the study villages as a result the reduction of population in the study area. Thus avoiding human's disturbance during the daytime, they flee from the area to explore newer areas for their habitation.

Especially habitat fragmentation reduces the population and disturbance to carry out their day-to-day activities. Because dense vegetation usually associated with wetlands may provide cover for avoiding humans during the daytime and be an important limiting factor for the existence of golden jackals in close proximity to humans (Jaeger *et al.*, 2007). In human-dominated landscapes, jackal numbers are strongly dependent on both food availability and day-time resting areas (Yom-Tov *et al.* 1995, Giannatos *et al.* 2005, Jaeger *et al.* 2007, Bino 2008). In addition Kait and Sahi (2012) stated that habitat fragmentation and urbanization are most affected for the carnivore mammals. Especially, the endangered canid in the wild is under threat from the depletion of prey base, habitat loss and fragmentation, human persecution, disease and pathogens (Davidar, 1975). The present result noted that jackel have larger home ranges, they require larger areas for their activities. Especially, the daytime cover an important determinant of the distribution and local abundance of jackals. The major impacts were the

increase of human population and urbanization in wildlife habitats which have been destroyed in the most of areas.

### 5. Conclusion and Recommendation

The concluded findings of the study are as follows:

- (1) This project has documented the occurrence and distribution of wild canids in the delta areas.
- (2) Two species of wild canids i.e Golden jackel *Canis aureus* and Dhole so called Asiatic wild dog/ Indian wild dog *Cuon alpinus* were recorded in the present survey areas.
- (3) Among them dhole was only recorded in northern part of Thabaung Township, but unconfirmed the presence of that species group in southern province.
- (4) The jackel occurs sparsely in most areas of its range of distribution in fringe of forest ecosystem and agro-ecosystems of the study area including southern parts of localities at 10 m elevations.
- (5) Nevertheless, flooding was extensive in the deepwater rice agro-ecosystem. the distribution of wild canid changes their habitat/ area. A food and shelter are likely to increase opportunities to establish territories.
- (6) Nowadays they had been suffered a rapid decline in its distribution and population numbers. Also the extensive flooding adversely affects the abundance of jackals abundance.
- (7) The wild canid species may be under considerable pressure by the anthropogenic impacts. As a result the numbers of wild canids in delta areas was trend to decrease.
- (8) The biggest threats to across their range are considered to be from habitat loss and direct human exploitation by hunting for food
- (9) The destruction of the coastal marshes has been suggested as the cause for the population density of wild canid community over most of their range.
- (10) Being the conservation status for wild canids is very poor in Myanmar, the present result was meant to assist conservation decision makers for prioritizing geographic areas for future wild canid survey research, management, and conservation.
- (11) It is recommended that the conservation management programme should be considered to allow populations to recover in the area.
- (12) The adequate measures for its regulation are needed in regions and detailed studies are also required.
- (13) Moreover research on information of other wild canid distribution and the molecular genetics study and adequate measures on ecological requirements also are needed in all Myanmar.
- (14) Indeed the present results will bring first detailed information about canid distribution and habitat association, applicable for local landscape planning and for its conservation management.



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### References

- Barnett**, B.D., Cohen, J.A., Johnsingh, A.J.T., and Fox, M.W, 1980. Food habits of the Indian wild dog (*Cuon alpinus*): a preliminary analysis. *J. Bombay Nat. Hist. Soc.* 77: 314 – 316.
- Bino**, G, 2008. Spatial and numerical responses of golden jackals (*Canis aureus*) and red foxes (*Vulpes vulpes*) to resource manipulation. MSc thesis, The Hebrew University of Jerusalem, Jerusalem: 1–85.
- Gese**, E.M, 2004. "Survey and Census Techniques for Canids", *USDA National Wildlife Research Center - Staff Publications*. Paper 337.
- Giannatos**, G., Marinos, Y., Maragou, P., and Catsadorakis, G, 2005. The status of the golden jackal (*Canis aureus* L.) in Greece. *Belgian Journal of Zoology*, 135: 145–149.
- Iyengar** , A., Babu, V. N., Venkataraman, A. B., Maclean, N. and Morin, P. A, 2005. Phylogeography, genetic structure, and diversity in the dhole (*Cuon alpinus*), *Molecular Ecology* , 14: 2281–2297.
- Jaeger**, M. M., Haque, E., Sultana, P., and Bruggers, R. L, 2007. Daytime cover, diet and space-use of golden jackals (*Canis aureus*) in agro-ecosystems of Bangladesh, *Mammalia*, 1-10.
- Jhala**, Y.V. and Moehlman, P.D, 2004. Golden jackal (*Canus aureus*). In: (C. Sillero-Zubiri, M. Hoffmann and D.W. Macdonald eds.) *Canids: foxes, wolves, jackals and dogs. Status survey and conservation action plan*. IUCN/SSC Canid Specialist Group, Gland, Switzerland, and Cambridge, UK. pp. 156–161.
- Jhala** Y. V., Moehlman, P. D, 2008. *Canis aureus*. – In: IUCN 2011. IUCN Red List of Threatened Species. Version 2011.2. [www.iucnredlist.org](http://www.iucnredlist.org)
- Johnsingh**, A. J.T, 1983. Large mammalian prey-predators in Bandipur. *J. Bombay Nat. Hist. Soc.* 80: 1 – 57.
- Kait**, R. and Sahi, D. N, 2012. Determination of the local, national/global status and effect of urbanization on Carnivora mammals in Jammu District and Trikuta Hills of JandK, India, *International Journal of Biodiversity and Conservation* Vol. 4(14): 530-534.
- Lekagul**, B. and McNeely, J, 1988. *Mammals of Thailand* 2nd edition Saha Karn Bhaet Co., Bangkok.

- Macdonald**, D.W. and Sillero-Zubiri, C, 2004. Dramatis personae. In: (D.W. Macdonald and C. Sillero-Zubiri eds.) *Biology and conservation of wild canids*. Oxford University Press, Oxford. pp. 3–36.
- Markov**, G, 2012. Golden Jackal (*Canis aureus* L.) in Bulgaria: What is Going on? *Acta zool. bulg.*, Suppl. 4: 67-71.
- Morris**, R.C, 1925. Wild dogs and jungle tragedies. *J. Bombay Nat. Hist. Soc.* 30: 691 – 693.
- Nadeem**, M. S., Naz, R., Shah, S. I., Beg, M. A., Kayan, A. R., Mushtaq, M., Mahmood, T, 2012. Season- and locality-related changes in the diet of Asiatic jackal (*Canis aureus*) in Potohar, Pakistan, *Turk J Zool*, 36(6): 798-805.
- Parr**, J.W.K. and Tin Than. Undated. *Large Mammals of Myanmar*. Stars Empire Printing Service, Yangon.
- Poche**, R.M., Evans, S.J., Sultana, P., Haque, M.E., Sterner, R., and Siddique, M.A, 1987. Notes on the golden jackal (*Canis aureus*) in Bangladesh. *Mammalia* 51: 259–270.
- Prater**, S.H, 1965. The book of Indian animals. Bombay Natural History Society, Madras, pp. 130 – 131.
- Rabinowitz**, A., and Saw Tun Khaing, 1998. Status of selected mammal species in North Myanmar, *Oryx* 32(3): 201-208.
- Rao**, M., Myint, T., Zaw, T., and Htun, S, 2005. Hunting patterns in tropical forests adjoining the Hkakaborazi National Park, north Myanmar. *Oryx* 39(3): 292-300.
- Sillero-Zubiri**, C., and Switzer, D., 2004. Management of canids near people. Pages 257-266. In Sillero-Zubiri, C., M. Hoffmann and D.W. Macdonald, editors. *Canids: foxes, wolves, jackals and dogs. Status survey and conservation action plan*, second edition. IUCN Canid Specialist Group, Gland, Switzerland and Cambridge, UK.
- Steward**, P, 1993. Mapping of the dhole. *Canid News*. vol.1 [Online]. <http://www.canids.org/PUBLICAT/CNDNEWS1/dhole.htm>
- Yom-Tov**, Y., Ashkenazi, S. and Viner, O, 1995. Cattle predation by the golden jackal *Canis aureus* in the Golan Heights, Israel. *Biological Conservation* 7: 19–22.

Table 1 Accounts of study on wild canid distribution in the different townships in Ayeyawady delta region

Survey sites (Township)	Location	Coordinate	Surveyed villages	Occurrence confirm	Percent (%)
<b>Dedaye</b>	Dedaye (South)	16°17' N - 95°58'E	10	1	10.00
<b>Kyaiklat</b>	Kyaiklat (South/Eest)	16°37' N - 95°28'E	14	2	14.28
<b>Moulmeingyun</b>	Mawgyun (South/West)	16°21' N - 95°11'E	10	1	10.00
<b>Pyapon</b>	Ama (Pathi chaung)	15°49' N - 95°17'E	5	2	40.00
	Daungyi Coastal area	15°48' N - 95°20'E	13	7	53.85
<b>Bogalay</b>	Ka Don Ka Ni (East)	15°49' N - 95°12'E	13	8	61.54
	Ka Don Ka Ni Reserved Forest	16°37' N - 95°10'E	41	15	36.59
	Ka Don Ka Ni (West)	15°48' N, - 95°07'E	6	3	50.00
	Shwe Pyi Aye -Satsan	16°02' N - 95°22'E	11	7	63.64
	Shwe Pyi Aye - Pho-oo-san	15°56' N - 95°21'E	25	15	60.00
	Shwe Pyi Aye (North)	15°58' N - 95°23'E	5	2	40.00
	Mein-ma-hla kyun (East)	15°58' N - 95°20'E	9	5	55.56
	Mein-ma-hla kyun (West)	15°56' N - 95°1'E	5	3	60.00
<b>Myaungmya</b>	Myaungmya (South)	16°29' N - 94°57'E	10	2	20.00
<b>Lutbutta</b>	Lubutta	16°08' N - 94°45'E	10	3	30.00
<b>Ngaputaw</b>	Ngaputaw	16°32' N - 94°41'E	12	4	33.33
<b>Pathein</b>	Pathein	16°46' N - 94°43'E	10	3	30.00
<b>Thapaung</b>	Thapaung	17°02' N - 94°48'E	6	2	33.33



Figure 9. Patches of habitat condition for jackel distribution in the study area



Figure 10. Views of flooding in the agro-ecosystem at the study area environs

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