Guidelines for the Lesser Florican Recovery Programme

Ministry of Environment and Forests, Government of India

Introduction

Identification of the Species for Initiating Action

Lesser Florican (*Sypheotides indica*) is smallest member of the bustard family (Otididae). It is one of the four threatened bustard species of India. Though Lesser Florican has been given the highest degree of protection under Schedule-I of the Wildlife (Protection) Act of India, 1972, its numbers has gone down drastically necessitating its declaration as an 'ENDANGERED' species in IUCN Red List 2011. It is also included as a priority species for recovery in the Integrated Development of Wildlife Habitats (Centrally Sponsored Scheme) by the Ministry of Environment and Forest, Government of India (2009).

Looking at its declining numbers and disappearing grassland habitats, the Ministry of Environment and Forests have identified the Lesser Florican for taking initiatives and has prepared guidelines for the recovery of this species. Therefore, these guidelines were developed after detailed consultative meetings with the state forest departments, experts from Wildlife Institute of India (WII), Bombay Natural History Society (BNHS), WWF-India and field scientists.

Section-I

Taxonomy

The systematic classification is as follows:

Kingdom: Animalia
Phylum: Chordata
Class: Aves
Order: Gruiformes
Family: Otididae
Genus: *Sypheotides*
Species: *indica*

Synonyms: Following synonyms of the species are found in published literature: *Eupodotis indica* Sibley and Monroe (1990, 1993), *Sypheotides indica* Collar and Andrew (1988), *Sypheotides indica* Collar *et al*. (1994), *Sypheotides indica* BirdLife International (2000), *Sypheotides indica* BirdLife International (2004).

Local Names: It is known with different local names in different parts of India. It is called Khar Mor (Gujarat); Tilor (Saurashtra and Kutch); Leekh, Khar Teetar (Bhil); Bhatt Kukra or Bhatt Titar (western Madhya Pradesh), Khar Mur (= grass peacock), Chhota Charat or Charaz, Barsati or Kala Charaz or Tugdar or Trina Mayur (Hindi); Chini Mor (Belgaum); Kannoul (Kannada); Niala Nimli (Telugu); Warragu Kozhi (Tamil); Chatta Kozhi (Malayalam) and Tan

Mor (Marathi). In parts of eastern Rajasthan it is also called 'Florikin'. The Pardhi or Wagri tribe in Maharashtra and Gujarat has two different names for the male and female; the male is called the "Khalchida" and the female is known as "Bhandewadi" (Kasambe, 2007).

Characteristic Features

The size of the bird is like a domestic hen, the male measuring about 46 cm; and the female slightly larger than male measuring about 51 cm. Breeding male is black-and-white coloured with a tuft of narrow spatulate-ended up-curved black peculiar plumes projecting behind the head, three on either side. Non-breeding male is similar to female, but with much white colour on wing. Colour of bare body parts is pale yellow or brownish fawn colour. The colour of upper mandible in the bill is horny brown, whereas lower one is yellowish flesh coloured. Legs and feet are fleshy or dusky yellow and look like old discoloured ivory.

The colour of the female is sandy buff, mottled and with blackish arrowhead marks on back. Two parallel blackish stripes down center of throat and fore-neck are also present. Forehead and crown is black in colour with a pale median stripe or 'centre parting'. Head plumes are absent in female. The chick (in down) is of uniform dirty pale yellow colour, with some black stripes on the wing, back and sides and about the ears; with an unclosed 'V' on the crown of the head.

According to BirdLife species factsheet it is 46-51 cm. Small, slender bustard with longish bill and legs. Male has spatulate-tipped head plumes, black head, neck and underparts. It has white collar across upper mantle and white wing-coverts. Female and immature are sandy or cinnamon-buff. Similar spp. Bengal Florican *Houbaropsis bengalensis* is larger and shorter-necked, with no head plumes and no white collar. Voice is frog-like croaks during display and short whistle when flushed. Found in grasslands in July-September when displaying males are conspicuous.

Distribution: Past and Present

The Lesser Florican is endemic to the Indian sub-continent. It is resident in nature; irregular local migrant, and also nomadic in the rainy season (SW monsoon). It was once widespread and common,. It was once abundant in *terai* region of Nepal but now is seen in the area quite rarely. It has also been sighted in Pakistan and is a vagrant in Bangladesh.

According to Jerdon (1864) the Lesser Florican is found throughout India from "near the foot of the Himalayas to the Southern most districts" but Hume and Marshall (1878) opined that this gives a somewhat erroneous idea of is distribution which is not nearly so wide as this seem to imply, because the birds are confined to the plains and open country and are not found in the hills or thick forests. Baker (1921) collected all the records available in his time and found that the florican is widely scattered in the country in all the suitable grasslands. Ali and Ripley (1969) have summarised its distribution as resident, irregular local migrant, and also nomadic in the rainy season.

Though straggler were seen as far east as Dinajpore (Hume and Marshall, 1978) and as far south as Kerala (Ferguson, 1904) the real of the Lesser Florican is in the grasslands of the Gujarat, eastern Rajasthan, western Madhya Pradesh and the Deccan. The birds are chiefly seen in these areas during the monsoon when they arrive for breeding. After breeding, most of the

birds from Gujarat, Rajasthan, and Madhya Pradesh move to peninsular India (Dharmakumarsinhji, 1950). However, migration has not been studied in detail (Ali and Ripley, 1969).

The main breeding areas were apparently in the districts of Nasik, Ahmednagar and Sholapur of Maharashtra, eastern Haryana and the Kathiawar Peninsula (south-central and south Gujarat) (Goriup and Karpowicz, 1985), but are now in southern Rajasthan, southern and eastern Gujarat, and western Madhya Pradesh (Sankaran 1991, 1994). In recent years, the Lesser Florican has become very rare (Goriup and Karpowicz, 1981) so sight records have also become uncommon.

It has also been sighted in Pakistan and is a vagrant in Bangladesh.

Present distribution:
Currently Lesser Florican breeding is restricted to Gujarat, Rajasthan, Maharashtra and western Madhya Pradesh.

In August 2010, Bhardwaj *et al*. (2011) conducted surveys in the north-western India (Gujarat, Madhya Pradesh and Rajasthan) in almost all the areas as surveyed by Sankaran (2000). Of the 169 potential grasslands available for Lesser Floricans in the north-western India, 91 grasslands were surveyed, which include grassland surveyed during 1999. Of the surveyed grasslands, Lesser Florican was found in 24 grasslands as against 37 grasslands in 1999. A total of 84 Lesser Floricans (83 males and 1 female) was sighted in three, which is 65% less than the sightings reported by in 1999 by Sankaran (2000) in all the grassland surveyed (Bhardwaj *et al.* 2011).

Maharashtra: A Lesser Florican was reported in Yavatmal district, Vidarbha region in Maharashtra1982. It was sighted in 2010 in Akola district again (Kasambe and Gahale, 2010). There are at least 20-25 Lesser Floricans in Washim Districts and joining in Maharashtra (Koustubh Pandhripande pers. com). There are records of the species from Nashik (Raha & Prakash 2001 and in Kolhapur district (pers. com. Sajnay Karkare).

Madhya Pradesh: Its known distribution in Madhya Pradesh is restricted to Dhar and Jhabua Forest Divisions of Indore Forest Circle as well as Ratlam and Neemuch districts of Ujjain Forest Circle. Recently, one female was sighted in Kuno Wildlife Sanctuary in Sheopur in August 2011 (Bhardwaj, *et al.* 2011). Madhya Pradesh has two exclusive Lesser Florican sanctuaries: Sailana Wildlife Sanctuary in Ratlam district and Sardarpur Wildlife Sanctuary in Dhar district.

Gujarat: It is found in districts of Dahod, Bhavnagar, Amreli, Surendra Nagar and Kutch districts (Bhardwaj, *et al.* 2011).

Rajasthan: It is found in districts of Ajmer, Bhilwada, Tonk, Pali and Pratapgarh districts (Bhardwaj, *et al*. 2011).

Andhra Pradesh: It is found in Rollapadu Wildlife Sanctuary (Kurnool district), and in Banganpalli.

Habitat Status

The Lesser Florican occurs in dry grasslands with scattered bushes, scrub and to a lesser extent in tall crops of millet and cotton. Sufficient grass cover is particularly important during the breeding season. Large trees with big canopy are not desirable in the florican habitat.

The Lesser Florican forage, shelter, display and breed in plain and undulating grasslands. . It does not inhabit hills, wetlands, marshy lands, dense forests, extreme deserts and barren lands. It is particularly a bird of grasslands and open fields, preferring drier ungrazed plains with grass 0.5–1 m tall. Magrath *et al* (1985) report that it generally avoids areas covered with tall grass or dense forests, and occupies grasslands with a shrub density of fewer than 50 per hectare (mostly *Acacia*, *Butea*, *Ziyphus* and *Calotropis*). Magrath et al. (1985) and Sankaran (1997c) observed that high grass productivity, an indicator of low grazing pressure, is a good predictor of its presence. The grasslands in north-west India preferred by Lesser Florican are dominated by *Sehima nervosum* and *Chrysopogon fulvus* varieties of grasses.

The species is reported (Sankaran and Rahmani, 1986) to often confine itself to small patches of grasslands called "beed", "bheed" or "vidi" and grassy bunds within such areas. The grasslands frequented by the species have been found to range from 2 ha to 3,000 ha in size but the species can breed even in small grass patches isolated in cultivation. According to Sankaran (2000) the majority of Lesser Florican is thought to breed in these production grasslands. Birds roost in an open space, a little way from bushes (Sankaran and Rahmani, 1986). These grasslands are left ungrazed through the monsoon so that grass grows for fodder to be harvested following the rains (around October), after which time they are virtually devoid of cover until the next monsoon and thus seasonally abandoned by Lesser Floricans. The Lesser Floricans are regularly found in agricultural fields where crops of millet, cotton and some cereals are cultivated. Their presence has also been marked in grassland habitats within forest plantations.

Sankaran (1997c) reported that in areas where grasslands are grazed, or croplands are irrigated during drought, the species tends to be found more frequently in cropland. He also observed that in years of good rainfall when grasslands are covered with tall grass, individuals shift to shorter vegetation, such as soyabean fields. When not breeding, the species sometimes uses lightly wooded country, grazed lands and scrubland dominated by *Zizyphus*.

Behavioural Aspects

The behavioural aspects of Lesser Florican can be described under subheads dealing with general habits, food, voice and calls, breeding behaviour and migration.

General Habits

The Lesser Florican is not gregarious. It is supposed to be much less shy and wild than other bustards or Bengal Florican *Houbaropsis bengalensis*. It is reported to keep in widely spaced solos. Sometimes 4-8 birds may occur in restricted vicinity. It feeds out in fairly open short grassland or burnt patches in the early morning and evening retiring into thicker cover as the day advances. The sexes are also reported to keep more or less segregated, males and females usually to different patches. It conceals in grass by lying low and flushes only when within a few meters. The birds fly a considerable distance when flushed, running immediately upon alighting. Sometimes flies long distances at grass-top height when flushed and runs on speedily upon alighting so that the bird has moved a long way off by the time the observer reaches the

spot. Under normal circumstances, it relies for safety chiefly on lying low and running through grass cover.

Flight of Lesser Florican is like other bustards, by rhythmic strokes of the broad wings, neck outstretched and legs and feet tucked under body – not trailing behind as in a stock or a crane. Its wing-beats have been described as more rapid than other bustards. The floricans fly individually, not in flocks. The arrival of birds at the onset of the breeding season coincides with the timing and intensity of the South-West monsoon. It generally begins from the end of May to August depending upon the actual period of monsoon. After the breeding season the birds have been reportedly returning in the south-easterly direction about October/November each year. The male birds leave the area before the females.

Food

Initially thought to have a diet composed "almost exclusively of grasshoppers" (Sykes 1832), the Lesser Floricans are actually omnivorous. The diet comprises a diverse mix of many types of invertebrates including locusts, other insects like flying ants, hairy caterpillars, worms, centipedes, small lizards and frogs. Seeds herbs, berries and plant shoots are also eaten. It feeds on all kinds of insects, including grasshoppers and beetles. Blister beetles (Family-Cantharidae), leaf beetles (Family-Chrysomelidae), borer beetles (Family- Buprestidae), dung beetles and scavenger beetles (Family-Scarabidae) find a special mention as florican diet in Dr. Salim Ali's literature. Captured insects are secured on ground and on grasses by jabbing at them with pointed bill like Cattle Egret *Bubulcus ibis*, or leaping up in the air to snap at such as a flying grasshopper.

Birds typically walk 5–10 m before pausing and scanning the grass for prey and checking for danger; then they either dash at or snap up a prey item or creep-stalk it in the manner of an egret (Ali et al. 1986). The area covered may be considerable; in the pre-breeding period. Birds will pause to take swarming black ants as they emerge.

It also focuses on caterpillar outbreaks on *Butea* bushes, leaping to snatch insects off leaves just out of standing reach (Ali *et al*. 1986). Sankaran (1991) reported that abundance of Orthopteran insects is a crucial factor in relation to food supply for females and young, which peaks with grass seeding at the end of September, which would coincide with a period of high consumption by females with growing broods.

Lesser Floricans are also reported to eat vegetable matter including shoots of crops, grass and herbs, seeds, drupes and berries. Like other bustards, Lesser Floricans also lead nomadic lives outside the breeding season, determined by the availability of food. Availability of enough insect population apart from the suitable climatic condition, is supposed to play a significant role in rearing of chicks after hatching of eggs.

Floricans generally feed during the early mornings and evenings. However when the birds have newly immigrated, at which time, they are in lean condition, they feed throughout the day. During the breeding season a male may be seen feeding and displaying alternatively. Normally, during breeding season when a male bird is feeding he stops calling for a while; and he usually keeps to his own territory while feeding.

During the monsoons females feed anywhere and are often seen close to marshes and swamps where they come to feed regularly. While feeding the birds often raise their heads above the

grass cover to have a look round and then resume feeding. For feeding purposes they seem to prefer shorter grasses or low crops.

Voice and Calls

A characteristic harsh frog-like croak is emitted by male during his jumping display; sometimes from the ground. Also 'a short whistle-like call is made when frightened' (Dharmakumarsinhji, 1950). A low chuckle is constantly uttered while feeding. The female also makes a similar but distinctive and shriller croaking call. Female makes another whistling call, 'Peeoo', apparently meant to attract attention of the male. Female also makes a clucking call or quirk which she emits when put off her nest which can be heard at times when she is flying.

Breeding Behaviour

The important studies on breeding behaviour of Lesser Florican are by Sankaran and Rahmani (1986), Sankaran (1991, 1997c). The species operates a lekking mating system in which no pair-bond is formed (Magrath et al. 1985, Sankaran 1994a). Males establish territories measuring 1–2 ha in size, clumped together in an exploded lek, with an inter-territorial distance of 200–500 m (Sankaran 1994a, 1995b); they display from a particular spot within the territory (Sankaran and Rahmani 1986). On average 4.7 territories were found in an area of about 1 km^2 (Sankaran 1994a). As females nest outside male territories, large areas were necessary to accommodate all the nesting females.

The vertical jumping habit of the male birds is the most characteristic feature of the Lesser Florican. Its seasonal arrival is noticed by jumps made by male birds. The male stands at a selected place, looks round and jumps to a height of 1.5 to 2 meters. A male florican may jump up to 600 times in a day. This jump is used to set up a territory for the breeding season. The jumping is a warning to other males to stay away and also information to females about its location. While jumping, it also makes a frog-like croaking call which can be heard from as far as 300 to 400 meters.

Besides, a few records of Lesser Floricans dispersing to south-east India, its behaviour and movements during the non-breeding season are poorly understood. It has been reported to wander erratically eastward through terai of Uttar Pradesh and Nepal, Bihar, Orissa and West Bengal. Its occurrence is rare in the coastal strip between the Western Ghats and the Arabian Sea. The majority of breeding floricans in Saurashtra and Kutch have been reported as immigrants from peninsular India by Dharmakumarsinhji (1950) on the basis of his observational data. He noted that Lesser Floricans arrive on the south-east coast of Saurashtra from the direction of Gujarat and Bombay across the Gulf of Cambay.

Breeding Season

Breeding season coincides with the onset of South-Western monsoon. As soon as sufficient grass cover becomes available in otherwise dry areas, the Floricans start arriving in their breeding grounds. They disperse to breed over vast tracts of country in years of good rainfall. The onset of the summer monsoon, which occurs from July to September, is the time when male Lesser Floricans establish territories and compete to dazzle and charm potential mates with their aerial displays and fine plumage.

Territory Establishment

Males moult out of their female-like non-breeding plumage and acquire the breeding plumage in the course of June and July (Sankaran and Rahmani 1986). They display from the onset of the monsoon rains, usually in July, till the end of September, often selecting an elevated patch of ground or small ridge for their performances (Sankaran 1991, 1993, 1994a). However, the height of grass appears to dictate the timing of territorial establishment.

Display

The males leap up to two meters into the air in an energetic flurry of wing beats, and then, with wings tucked in, fall swiftly back to the ground. During courtship they repeat this aerial display as many as 500-600 times a day, all the while emitting a frog-like croak.

The attraction or advertisement display serves to repel rivals from a territory and attract eligible hens. It is given from a bare spot, usually some little eminence in grassland or standing crops. The 'arena' is regularly resorted to by the male Florican and by his constant jumping, the grass is trampled and the ground is stamped bare. Such bare 'launching pads' are often indicated by the excreta of the bird. The cock flexes his legs and springs perpendicularly in the air to a height of two or three meters depending on the height of the surrounding grass. At the onset the neck is arched backwards till almost resting on the back and he utters a guttural frog-like croak. The wings are partially open, level with the body and fluttering rapidly, the legs pulled in as in the sitting position. The bird then floats or parachutes down vertically to the starting point, tail spread, legs gradually lowered for landing and often kicked forward and back as if running on air, to steady itself. A spring is completed in 4 to 5 seconds and is soon repeated. Activity is most intense in the early mornings and late afternoons, but continues more or less throughout the day if cloudy and drizzly.

The whole display comprises three phases, the first upward leap with a spring like action, second the attainment of maximum height with fluttering of wings (usually nine times in one jump) with neck arched backwards, simultaneously producing the croaking call and third parachute like smooth descent to the original spot.

Breeding

Male attracts females by his springing display, mates with the hen for a short while, taking no further interest in raising the family. Except when a female wishes to mate with a male, the sexes rarely come together (Dharmkumarsinhji, 1950). It will not be out of place to quote Stuart Baker who wrote, "... it is indiscriminate in its love affairs. Males are certainly not polygamous. Nevertheless, a male may mate with one or more females during the season. Likewise a female may be mated to one or more males until fertilized."

Breeding in cultivation is not frequent, but does occur, having usually been recorded in soyabean *Glycine max* and groundnut, and less frequently in cotton, sorghum *Sorghum vulgare*, maize *Zea mays*, sugarcane *Saccharum*, rice *Oryza sativa*, mustard *Brassica campestris*, lentils and wheat *Triticum vulgare* (Sankaran, 2000). The grasslands in southern India are therefore apparently used when unfavourable conditions affect the usual breeding range (Sankaran and Manakadan, 1990).

Egg Laying

Following successful courtship, the female finds a scrape in the ground to locate a simple nest, which is not more than a bare patch of ground, often even without any depression, amidst grass thickets or in crops. Female lays four to five eggs which are quite distinctive in appearance with a shade of olive-brown, mottled, streaked and blotched with brown. According to Gadhvi (2003) the average clutch size is 4 to 5 eggs. Average size of 57 eggs was 49.1 x 41.3 mm. (Baker). Eggs are incubated by hen alone. During the 21 day incubation period, in which the male plays no role, the female sits cautiously still on the nest to avoid detection. Females' habit of not moving away from the eggs during the process of incubation increases their vulnerability to predators and poachers. The relatively mobile, newly hatched chicks stay with their mother roughly for over 15 to 30 days.

Nest-site

The females invariably nest in long grass outside the male's territory (Sankaran, 1994), although one nest was reported inside a male territory (Ali *et. al.*, 1986). The nest site may be in part determined by the cover afforded to the female, not only for the nest to escape detection but also for her to avoid further harassment by displaying males (Sankaran and Rahmani, 1986).

Clutch size and incubation period

Clutches consist of 3–4 eggs (Ali et al., 1986, Sankaran and Rahmani 1986). Incubation period is 21 days.

Care of young

The female alone leads the chicks; limited observations by Sankaran and Rahmani (1986) suggest that family parties may remain on the breeding grounds for at least a month longer than males.

Other data

Little data on life span of Lesser Florican is available to claim authentically the longevity of birds. Life-span is uncertain; one ringing recovery involved an adult re-trapped after four years (Dharmakumarsinhji 1950).

Migration

The Lesser Florican is a local migrant in India. It undertakes movements which appear to be governed largely by rainfall, but which remain poorly understood. The sexes are cryptically coloured during the non-breeding season (Sankaran 1993), and this has always made a good understanding of the species' movements and spatial requirements very difficult to follow. It breeds chiefly in the north-western sector of its range (Gujarat, western Madhya Pradesh, north-western Maharashtra and south-eastern Rajasthan), moving there at the start of the monsoon period (June–July) and subsequently (October–November) appearing to disperse south and east into the breadth of the Indian subcontinent, where there is little clear evidence of its precise status, distribution or habitat requirements (Sankaran and Rahmani 1986, Sankaran 1990, 1993, 1997d, Sankaran *et al.* 1992).

Movements over different regions are predicted to be partial and opportunistic, with the species tending to concentrate in those regions where rainfall has been good, and with sporadic occurrences outside this range in both breeding and non-breeding seasons. Tribal communities in Andhra Pradesh and Karnataka reported that the species could be seen year-round in appropriate areas in these states but was most often seen in winter, from November and December (Sankaran *et al*. 1990). Ringing recoveries involving 18 of 489 birds suggested that birds were moderately site-faithful, with 10 being in the same area as ringed and the remainder mostly well within a 50 km radius of their ringing site (Dharmakumarsinhji 1950); this however would be expected in years when rainfall was consistent.

Records of it occurring all year round in several areas in the past presumably indicate that sufficiently large areas of habitat then permitted at least some birds to remain in several parts of India, and suggest that with the loss of its grassland habitat its movements to western India may have become more pronounced over the last century. Nevertheless, A. O. Hume indicated that the species spent the “rainy season” in Gujarat and other parts of western India, but passed the “cold and dry seasons” in the “central tablelands of the peninsula”. Anderson (1883) recorded its absence during “hot weather” from Bangalore when it was common in north Shimoga district nearly 270 km north-west.

As soon as the heavy rains break in south and central India, the birds tend to migrate northwards and westwards respectively. Birds maybe seen arriving in heavy rainfall and they tend to follow the course of main current. If there is insufficient rainfall in one area, the birds migrate to adjacent areas where the rainfall is better (Dharmakumarsinhji 1950).

Floricans are known to return to particular grasslands in successive years and at several sites birds have occurred every year for at least 20–30 years, suggesting that there may be a strong site-fidelity among males (Magrath et al. 1985). However, Dharmakumarsinhji (1955) made somewhat different observations and suggested that the same individuals do not necessarily visit the same grassland or locality every year.

Status of Species and Trend Analysis

Status of Lesser Florican

Lesser Florican breeds in India in Gujarat, south-east Rajasthan, north-west Maharashtra and western Madhya Pradesh, with some dispersal to south-east India in the non-breeding season. It is a rare summer visitor to the terai of Nepal. Formerly widespread and common, it has been declining since at least the 1870s. From 1982-1989, its population declined by nearly 60% (4,374-1,672 birds). However, by 1994, it had increased by 32% to 2,206 birds. These population fluctuations are directly correlated with breeding season rainfall patterns. They indicate that it is susceptible to extinction in the event of severe, prolonged drought (BirdLife, 2010).

Lesser Floricans, endemic to Indian subcontinent, belong to order Gruiformes of Class Aves. Gruiform means "crane-like." which has little resemblance with the form of this bird. Earlier abundant and common ‘game’ bird of grasslands in Gujarat, Rajasthan, Madhya Pradesh, Maharashtra and Karnataka, now its’ occurrence is restricted to few pockets in Western and South-central India. Shrinking habitat and changing climate is posing unprecedented threats to the existence of this magnificent bird.

Lesser Floricans qualify as 'ENDANGERED' species because of a very small, declining population. The decline in Lesser Florican population is primarily due to rapid shrinkage and degradation of its dry grassland habitat. The rate of decline of this bird is predicted to increase further in near future as pressure on the remaining grasslands intensifies.

A steady decline in population of the Lesser Florican is reported to have begun around the 1870s as fallout of massive hunting for sport followed by habitat loss due to changing land use pattern and invasion of non-native plant species. The estimated global population of Lesser Florican was 4374 in 1982 which declined by 60 percent to about 1672 birds in 1989. However, a survey in 1994 showed a population of 2206, an increase of 32% on the 1989 figures attributed to fairly good rainfall in Western India during the period. The population was estimated to have reached 3530 birds in 1999. Now perhaps less than 2500 Lesser Floricans survive in the whole world making it one of the 50 most endangered birds globally. The climate change due to global warming is likely to affect this monsoon breeder most adversely due to high degree of dependence on rainfall pattern for breeding season.

India has two exclusive Lesser Florican sanctuaries, both in Madhya Pradesh – Sailana Wildlife Sanctuary in Ratlam district and Sardarpur Wildlife Sanctuary in Dhar district (For details, see Annex-3). Sailana Wildlife Sanctuary was established after a visit of the renowned Ornithologist Dr. Salim Ali to this region in 1983.

In the 1980s and early 1990s, extensive surveys were conducted by the BNHS and later by SACON (Sankaran 1991, 1994, 1996b, 2000, Sankaran *et al*. 1992). From 1982-1989, its population declined by nearly 60% (4,374-1,672 birds). However, by 1994, it had increased by 32% to 2,206 birds. In 1999, Sankaran (2000) estimated a population 3,530 birds. These population fluctuations are directly correlated with breeding season rainfall patterns. They indicate that it is susceptible to extinction in the event of severe, prolonged drought (Birdlife International 2001).

Trend Analysis

The overall trend of Lesser Florican population is towards decline in all parts of the country. However, the overdependence of the species on monsoon and temperature makes it difficult to claim conclusively about its population trend. Recent survey carried out in 2010 by Wildlife Institute of India estimated a population decline of 65% of Lesser Florican population in north-west India (Bhardwaj *et al.* 2011) when compared to 1999 survey (Sankaran, 2000).

International and National Obligations:

Lesser Florican is protected in India by its inclusion under Schedule 1 of the Indian Wildlife (Protection) Act 1972. As it is listed in Schedule-1 on the Indian Wildlife Protection Act, it has got highest level of protection in India. It is included in IUCN Red Data list under the 'Endangered' category.

It is listed in Appendix II of the Convention on International Trade in Endangered Species (CITES) and under the CMS Convention. India is a signatory to both CITES and CMS Convention.

Lesser Florican has been identified as one of the species for Recovery Programme under the Integrated Development of Wildlife Habitats (Centrally Sponsored Scheme) of the Ministry of Environment and Forests, Government of India, 2009.

Biotic Pressure and Socio-Economic Profile

Grasslands are under severe pressure from unregulated grazing, people, exotic species encroachments apart from diversion of such lands for various other purposes having adverse impact on habitat.

The primary occupation of the local people in and around the Lesser Florican habitats is cultivation and animal husbandry. The potential habitats are under severe threat because of unregulated grazing, change in land-use pattern, land conversion from grassland to cultivation.

Very little information is available about the socio-economic profile of the communities which are associated with the habitats of Lesser Florican.

THREATS

Poaching and Trapping

Poaching and trapping of the Lesser Florican are still being done by some of the traditional hunting groups, for example *Phasepardis/* called *Wagris* in Gujarat), in Maharashtra are reported to be the biggest threat to this species (Kasambe and Gahale 2010). This is done mainly as part of sustenance of their livelihood, while in other parts of its distribution range it is still being hunted for food. Further, in many of the other areas within its distribution, as they nest in the agricultural lands (Sankaran *et al*. 1992) also, the locals remove the eggs whenever they find them for eating. All these are still prevailing mainly due to non-stringent and the little protection given to the breeding areas, though protection is at place in some of the areas. In many other areas, systematic awareness of the significance of this species among the local communities living within and around the breeding areas, better alternative and sustainable livelihood option for the traditional hunting communities, absence of a formal institution, which could facilitate all these, including networking of various stakeholders, motivating locals in reporting and reducing the illegal activities and in strict enforcement of legislation, is totally lacking.

While serving to safeguard his territory and attract hens, the display jumps unfortunately exposes the males and renders them particularly vulnerable to enemies. Easy detection of bird's presence by unique jumping behaviour is responsible for much of the decimation of the species by poachers and vandalistic 'sportsmen'.

Pesticides

Floricans are known to live in the habitats that are a matrix of grasslands and agricultural lands with crops like cotton, millet, sorghum, maize, soyabean, sugarcane, mustard, rice, groundnut, lentils and wheat. These crop-based habitats are not only used for breeding and escape cover but also for feeding and source of food are bound to get affected with application of pesticides.

This may lead to the death of adult birds feeding on the pesticide infected insects and grains. It may also affect hatching success adversely as a result of bio-magnification.

B. Habitat Loss & Alteration

A. Direct Threats

Habitat loss by rapid reduction in the area of grasslands owing to conversion to agriculture and overgrazing appears to have contributed to decline of florican populations most adversely. The spread of the invasive species like *Prosopis juliflora* and *Lantana camara* alters the habitat characteristics. Growth of big trees in the florican habitat has an adverse impact as it obscures visibility as well as provides the perching facility to falcons and other predator birds which relish preying upon vulnerable juveniles of the Lesser Florican.

Widespread destruction and conversion of grasslands due to large scale changes in land-use pattern over the decades have resulted in a drastic decline in florican habitat almost everywhere. Diversion, fragmentation, encroachment and shrinking of the vast expanses of grasslands in north-western India due to various socio-economic reasons have further complicated the issue of grassland protection. In many areas as much as 40–70% of grasslands have been reported to be lost to agriculture, leased to graziers or ploughed up, a situation that was particularly alarming in privately owned grasslands (Sankaran, 1995c).

Encroachment of some good grasslands in certain parts of Gujarat resulted in permanent loss of some of the most important breeding areas where the floricans were displaying, causing a huge loss of habitat for both bustards and local herdsmen (Sankaran, 2000) depending on pastoral lifestyle. Magrath *et al*. (1985) found around the 1980s that the rapid spread of exotic *Prosopis juliflora* posed a serious threat to florican habitat. This problem reportedly continues, rendering grasslands poor for both birds and fodder production (Sankaran 2000). Certain studies on grasslands in western India have indicated that rainfall is crucial to breeding success: in good monsoon years grass re-grows strongly after grazing, but in drought years it does not, resulting in habitat unsuitable for Lesser Floricans to breed (Sankaran, 1990, 1991).

Habitat loss and alteration in the form of land use change, overgrazing, change in cropping pattern, encroachment of grasslands, mining, power projects, afforestation, inappropriate grassland management and climate change, is one of the main cause of extinction of main species and also the prime cause for the decrease and local disappearance of Lesser Florican.

Landuse changes

Lesser Florican which is dependent on prime grasslands as their habitat have got adapted to use grassland- agriculture mixed habitats, mainly due to grasslands being converted to the later. Presently, due to increase in human population and their needs, in many parts of the distribution range of this species, the grasslands, which constitutes the grazing or wastelands of the villages, are being converted into agriculture lands after encroaching, taken over for improving tree cover through afforestation schemes, developing wind driven power projects, mining, and other infrastructure development including house construction. This land use change has led to local disappearance and decline in numbers of this species in many parts of its distribution range. However, it is important to stop all these land use conversion at least in the existing and the potential breeding areas, there is no specific land use policy with regard to the grasslands and the village revenue wastelands that are covered with grass but at different levels of degradation, which also harbors this threatened species. Also, non-availability of data or research on the types of land use changes that are detrimental to the habitat and species is also a reason for not being able to properly address this issue.

Overgrazing

Overgrazing by nomadic cattle and sheep is a major factor in eliminating suitable grasslands from much of the historical range of the species. The practice of burning of old standing grass whether by accident, vandalism or as a management tool has also been found detrimental to Lesser Florican populations (Manakadan and Rahmani 1999). While state-owned grasslands survive relatively intact, privately owned grasslands may have declined in extent by around 50% (Magrath *et al*. 1985).

Lesser Florican, indicator of the health of grassland, is primarily dependent on undisturbed grasslands, especially for breeding. Presently, the grasslands except for the ones that are protected, rest of the areas that are unprotected, are under different levels of degradation mainly due to overgrazing. Sankaran *et al.* (1992) opined that with extensive and intensive land use changes, particularly overgrazing of its grassland habitat, the lesser florican appears to be seriously threatened with extinction. The free-roaming animals have access to every possible habitat and it is estimated that almost half of 329 million ha land mass of India is degraded (Rahmani 2006). As the livelihoods of the local communities in the arid and semi arid regions, where the grasslands are predominant and the bustards are surviving, are mainly dependent on livestock based income, and in most cases are open grazed without any rotational system. Due to this the grasslands have lost its potential to support proper growth of grass; disappearance of native species that were suitable for the livestock as well as the Lesser Florican in addition to being highly degraded without any cover and encroachment of shrubs and trees and other exotics. All these are the result of overgrazing and lack of knowledge on the significance of the grazing systems, lack of proper grazing policy, increasing or improving the grass resource and benefit sharing.

Changes in crop pattern

Lesser Florican, which prefers matrix of grassland and agriculture lands, is increasingly facing problems mainly due to change in crop pattern. These species are found to use the crop fields of cotton, millet, sorghum, maize, Soyabean, sugarcane, mustard, rice, groundnut, lentils and wheat, which can be considered as pseudo-grasslands (Sankaran *et al*. 1992, Rahmani 2006). Now these crops are being replaced by hybrid verities and other high yielding crops that are not suitable as habitat components for Lesser Florican, resulting in avoidance of or disappearance from some parts of its distribution range.

Encroachment of Grasslands

Since the rainfall in most parts of the country is decreasing and agriculture production has decreased in the arid and semi arid regions, the farmers are resorting to high yield verities and use of pesticides. The farmers have started encroaching the grazing on grasslands and the revenue wastelands in order to increase the yield or meet out their needs. Joshua *et al.* (2011) reported 50 –80 % of the grasslands, mainly grazing and revenue wastelands being encroached by the locals in the Sonkhaliya Closed Area where both Lesser Florican and Great Indian Bustard still survives. Also, the grasslands are being encroached by shrubs and trees and by the exotic species like *Prosopis juliflora*. This has led to loss of habitat for both the bustards.

Inappropriate grassland management

Overgrazing, encroachment, afforestation, leasing out grasslands and revenue wastelands, the habitats of Lesser Florican for mining and other infrastructure management and land use change, is a result of inappropriate management of these grasslands. An example of this is the natural grasslands of Naliya in Abdasa taluka of Kachchh in Gujarat, where the grasslands

has been put into many development and land use changes such as afforestation by forest department, compensatory afforestation, erection of wind mills for power generation, encroachments for agriculture, construction of earthen bunds in the name of soil and water conservation in addition to over grazing. All these are clearly due to inappropriate grassland management, thus resulting in habitat loss for the species. Presently there are no norms and policy that governs all these.

Mining

Mining, especially the open caste mines are one of the main causes for loss of habitat for this species. Since mining is a source of high economy, the areas with minerals are being leased out for mining, which has led to loss of the grasslands and in some areas like Sonkhaliya, where ore is extracted, even agriculture lands are being taken over for mining (Joshua *et al.* 2011). Even though the mines are small (less than 0.5 ha), being open caste mines the grassland area is lost in addition to the dugout waste being a visual intrusion to the birds, as males display to attract females, a main part of its breeding. This has led to increase in the vehicle and human movement in the area, which also disturbs and affects the species.

Power projects

In order to use the wind power to generate electricity through erection of Wind Mills, open areas like coastal areas and the adjoining grasslands, natural grasslands and the revenue wastelands and at places even some of the agricultural lands are being taken over. This development has taken over some of its prime habitats like the Wind Mills erected in the grasslands of Kachchh. Further, the heavy electric lines connected with tall towers as part of power transmission has also taken over some parts of the grasslands. Both these have resulted in loss of habitat as well as death of the birds that get electrocuted due to getting hit during flight.

Afforestation

The grasslands which does not have any status like forests and usually considered as wasteland, is targeted for all sorts of development including all types of afforestation, like compensation plantations for some area being lost or submerged under certain development projects, improvement of forest cover and development of fuel wood or medicinal plant plots. This not only occupies the space in the grasslands, but also fragments the grassland landscape and also forms as a visual intrusion for the bustards, in addition to loss of prime habitats, which is very crucial for breeding.

C. Paucity of ecological information

Ecological information on Lesser Florican that is highly critical for the better management of its habitat and conservation of this species is available for only very few sites, while there is no such information for other areas.

Data deficiency on biology of the species

Though there have been studies on the biology of the species it was restricted to certain area and sites (Sankaran and Rahmani 1986, Sankaran 1990, Sankaran 1997, Dutta *et al.* 2010), while such information is not available on this species for other parts of the species distribution range as Lesser Florican habitat requirements during breeding and non breeding season varies and as they are more dependent on matrix of grassland and agriculture which depends on rainfall of the area. The species however follows a basic biological life pattern the change in local environment and habitat conditions in different parts of the distribution range

makes the bird to adjust/adapt locally. These biological adaptations are very crucial for framing proper conservation action. Presently, the biological information in general and other local adaptation made by the species is lacking.

Inadequate knowledge of current distribution, population status, demography, movement-dispersal and habitat use

The distribution of Lesser Florican varies from year to year as it depends on the rainfall pattern and is urgently needed for conserving this species from becoming locally extinct in parts of its range. In addition the population status along with various aspects of demography for areas within the distribution range is not available except for some sites. The information on movement of the adult and sub-adult birds between breeding and non breeding sites, and the dispersal pattern according to the rainfall pattern and different habitat use and availability of habitat in different parts of its distribution range are very important for drawing population, habitat and areas specific conservation plan, which is also lacking. Knowledge on all these aspects is very crucial for the long-term survival of this species.

Inadequate research on association of Lesser Florican with other grassland species/vegetation

The association of Lesser Florican with its habitat would be evident and clear only if the vegetation and grassland species that forms the main component of the habitat is known. Presently information on the vegetation type and structure, grass species preferred for nesting, hiding, feeding is not available and even if available it is not sufficient to draw proper relationship, in addition to the information not available for all parts of its distribution range.

In many places the locals have a better knowledge on the presence of the species in their area along with insights on its biology also, as in the case of the *Phasepardhis* in Maharashtra, which would be of immense use for the conservation of the species, which is also not documented systematically.

Further, knowledge on all the above three would be needed to identify potential future sites and loss of existing sites for Lesser Florican through predictive models, but this is not available now.

Lack of technical & popular literature

All information available through research that is very important for proper management and conservation of the Lesser Florican has not reached the local stakeholder, the communities and the managers, who are directly related and involved in its conservation. However, most of this information is available to science; it is available in the form of technical manuals for the managers and NGOs working in the area and popular articles more importantly in a simple and all local languages used in the distribution range of the species for better understanding of the local communities. Further, systematic awareness creation among local and training the managers and NGOs using the scientific information to blend their various activities with the betterment of the species and its habitat, which is also not done in a serious and systematic manner. These are one among the main reasons for the existing precarious status of the Lesser Florican and its habitat.

D. Policy Issues & Governance

Lack of coordination between states

However, all states that harbour Lesser Florican have their own means and strategies to protect and conserve the species and its habitat, there is presently lack of coordination among the states as each state is taking its own course of action in not only managing the habitat and

species but also on basic necessity of monitoring the population or its distribution, without knowing what the other states are doing. There is no cooperation among the states even though the florican may be moving from one state to another and in some case officials of one state do not even know that the same bustard species is found in other states (Rahmani 2006). So it is very important to initiate a national conservation effort something in the lines of Project Tiger or Project Elephant that is presently absent.

Fewer studies on grassland ecosystems

Presently according to Wildlife Institute of India, less than 1% of the grasslands come under Protected Area Network, and is predominantly located in Trans-Himalayan and Himalayan regions (Rahmani, 2006). Further with a livestock population of more than 540 million and growing, the grasslands are under tremendous biotic pressures, mainly grazing and conversion to other uses. Since 'grasslands' are considered as wastelands and does not have a separate conservation status like 'forests,' it is being targeted for all sorts of development including infrastructure, compensatory afforestation and others. This is mainly due to lack of appreciation or awareness of the ecological and economic importance of the grassland ecosystem.

Lack of proper grazing & land-use policy

Grasslands are not managed as an ecosystem in their own right by the Forest Department whose interest lies mainly in trees, or by the Agriculture Department who are interested in agriculture crops, nor the Animal Husbandry Department who are concerned with livestock but not grass on which the livestock depends (Rahmani 2006). Further, the community grazing lands, which were earlier protected or managed through robust traditional institutions ensuring their sustainability, has broken down mainly due to take-over by government and disintegration of the institutions managed by the community. Presently, there is no such grazing policy, which considers all the management and benefit sharing aspects, no significant importance is given to grasslands in the land-use policy and finally no existence of a community based holistic seasonal grazing policy such as protecting grass from grazing so as to get maximum biomass or fodder, in the process the protection helps in conserving the Lesser Florican.

No conservation prioritization

It is always difficult to protect all the areas with the species of concern and especially grasslands, the most sorted ecosystem by the local communities. This being the scenario it is very crucial to identify the areas of conservation significance, such as the breeding sites of the Lesser Florican, large contiguous grass landscape, where more birds visit including the non breeding season habitats. Presently there is no effort made by the government to identify such areas of conservation prioritization.

Lack of participatory conservation-approach

It is evident that most of the habitats, the grasslands, of the Lesser Florican, except for 1% grasslands that is under protected area network, are open access areas due to which it is highly degraded. Interestingly, protection of fodder producing natural grasslands helps immensely in protecting the threatened birds like Lesser Florican as this species breeds during the monsoon when such grasslands would be protected to allow the grass to grow (Rahmani 2006). These grasslands should also be kept out from encroachment by exotics and weeds, trees and shrubs. As the local communities and their livelihood is closely nit with these grasslands, as it provides fodder, they must be involved when strategies are framed for the conservation of this species, which is lacking now and usually the locals are not given

importance. Basically there is a lack of participatory conservation approach that is very crucial for the conservation of LF and its habitat.

Inadequate inter-departmental coordination for conservation
The species and habitat would be conserved in a proper manner only if all the stakeholders are involved in carrying out various improvements and developments including protection and planning. The lack of clear tenure to local communities, confused land records between the revenue and forest departments, and other such issues of land rights and responsibilities also aggravate the problem (Rahmani 2006). This is mainly due to inadequate inter-departmental coordination for conservation, which in turn is due to lack or non existence of advisory cum coordination community at the district level that can take up joint management initiative.

Negligence of traditional knowledge
As mentioned earlier in our country, only livestock is considered as wealth, not the grasslands on which this livestock does not depend nor the traditional knowledge that helps maintain this livestock. All these, especially the traditional knowledge had aided in conservation and management of all the grasslands in earlier days, and certain systems were followed that has almost disappeared due to human population pressure and wrong land use policies of the government (Rahmani 2006). It is very important to recognize, promote and use this traditional knowledge while linking livelihoods with conservation, which is presently totally neglected.

Section-II

Prescription for Recovery of Species

Part-I: Species Level Recovery Action

The objective of this Species Recovery Plan is to restore the florican habitat and save endangered Lesser Florican population from extinction. Another objective is to increase understanding about the behaviour and habits of floricans to facilitate formulation of suitable policies and adoption of best available management options.

Study of Population Ecology
Study of population Ecology of Lesser Florican is very significant due to its extreme dependence on rainy season and conditions of grasslands where it arrives for breeding. Continuous degradation of known habitats frequented by Lesser Florican leads to local migration of birds to adjoining areas.
Increasing percentage of birds in private holdings outside the sanctuary area, also indicate that species is encountering relatively unfavorable conditions for population dynamics in designated sanctuaries. Search for alternative breeding grounds with more conducive situations and adequate management interventions at species level will be possible only after proper study of population ecology in local and eco-regional context.

Management Interventions

The major management intervention should be protection of natural grasslands and improvement of degraded grasslands. At this stage *ex-situ* conservation is not recommended.

Part-II Habitat Level Recovery

Habitat level recovery action would involve habitat protection from fire and grazing, removal of invasive species and improvement in food and water supply conditions by voluntary reduction in use of fertilizers and pesticides by farmers.

Habitat Management

Maintenance of ecosystem integrity of florican habitat is of paramount significance for conservation of birds during breeding season. Proper management of grasslands is necessary for maintenance of ecosystem integrity of florican habitat. The major problem in conservation of Lesser Florican is its seasonal use of grasslands as breeding grounds. It is a bird of open grasslands and it does not prefer habitat with tree cover. Excessive tree growth in grasslands may force the birds to abandon the breeding grounds and look for alternate grasslands. Attempts therefore, should be, to avoid habitat manipulation in favour of tree or shrub growth.

The Lesser Florican is a monsoon breeder and with the commencement of rains, it is seen in the protected fodder producing grasslands known as beed, vidi, rakhal or jod of Gujarat, eastern Rajasthan, western Madhya Pradesh, northern Maharashtra and parts of Andhra Pradesh. Sometimes it is seen in crop fields of millet, sorghum, maize, etc, which can be considered as pseudo-grasslands. Being a monsoon breeder, it changes its breeding grounds depending upon the monsoon conditions. It is believed that movement of floricans is influenced more by the monsoons than anything else. It is therefore not easy to protect the Lesser Florican in a few sanctuaries as it may not visit these sanctuaries at all or visit in small numbers if the rainfall is not favourable. A network of fodder producing grasslands is recommended throughout its breeding range to ensure fodder security to rural communities as well as providing favourable habitats during the monsoons for the Lesser Florican.

It is also likely to simultaneously benefit other species inhabiting grassland ecosystem. The pure natural grasslands are declining because of increasing pressure of grazing from surrounding villages and the declining economic value of the grass produced. Grasslands also support a rich and diverse variety of fauna including the diversity of mammals, reptiles, insects, arthropods, worms, annelids and molluscs. They are capable of rapid and recurrent regeneration producing incredibly huge amounts of biomass. The efficiency of grasslands in arresting soil erosion and enhancing subsurface flow of rainwater by absorbing it in soil surface plays a vital role in water percolation, stream flow and thus the hydrology of an area. In other words, florican conservation is nothing but sustainable utilization of our grasslands, for the benefit of livestock, pastoral villagers and wildlife.

The conservation of Lesser Florican and protection of grasslands are compatible. By the time the grass is ready for harvesting, the main breeding period of the florican is over. Therefore, delaying grass harvesting by a week or so, is necessary to protect chicks of floricans as well as chicks of other grassland birds. Long-term planning and studies are needed to make precise prescription on habitat management. However, following interventions for habitat management are proposed based on earlier research and experience.

Protection of Lesser Florican Habitat

Protection of florican habitat from encroachment and degradation is necessary to maintain conditions favourable for breeding. Diversion of land for agricultural purposes or some other land-use is one of the biggest threats to its habitat; and possible measures should be adopted to avoid such diversions for other purposes. Protection of fodder producing natural grasslands also helps in the protection of many threatened bird species inhabiting grasslands.

Removal of Invasive Species and Promotion of Native Vegetation.

Uncontrolled growth of invasive species especially some shrubs like *Lantana* and trees like *Prosopis* is deteriorating the condition in florican habitat in several areas. Removal of invasive species has been recommended and adopted in certain protected areas of Maharashtra to facilitate the growth of Great Indian Bustard population. Similar activity for removal of invasive species from florican habitat in other areas may be taken up to improve the condition of habitat by promoting native vegetation and create favorable conditions for Lesser Florican.

Fire Management

Importance of fire as a management tool for grasslands is well established. Controlled burning followed by broadcasting of quality grass seeds is helpful to the health of grasslands in many ways. Similarly light harvesting of grass to reduce fire hazard is also necessary in some areas. Fire management in Lesser Florican areas will also be helpful in ensuring good fodder supply to the communities.

Grazing Regulation

The cattle population of the local villages as well as huge nomadic populations from adjoining Gujarat and Rajasthan states migrating annually through the project area leads to over-utilization of grasslands surpassing the carrying capacity. Unproductive and less productive cattle surpass the carrying capacity of the grazing grounds of villages. Open forest compartments are also not in a position to fulfill this disproportionately high demand for fodder. It often leads to conflicts with nomadic grazers and creates law and order problem locally.

Some kind of rotational or seasonal grazing, some regulation on free ranging animals, total protection of select grassland plots to serve as nucleus for seed bank, securing tenure for pastoralists (both resident and nomadic) over pastures will be encouraged in consultation with local communities. Genetic improvement of livestock using indigenous breeds (not exotic ones) and the traditional knowledge that helps maintain this livestock will also be paid attention, in awareness campaign.

Ensuring Adequate Food Supply for Lesser Floricans
In order to increase and restore the natural food (insects), it is necessary to control the use of broad spectrum pesticides in and around the Lesser Florican habitats.

Organic Farming Awareness Programme

Habitat degradation due to excessive use of chemical fertilizers and pesticides in agriculture owing to depleting soils is one of the major threats to the existence of Lesser Floricans as well as other creatures existing in the grasslands and agrarian ecosystem. It is therefore necessary to educate, encourage and support local people to shift to organic farming, or at least minimize the use of chemical insecticides in preferred breeding grounds of floricans.

Livelihoods Support

Livelihoods support to pastoral communities in adjoining village would be helpful in reducing pressure on grasslands. Support for suitable income generating activities, would be extended to the identified beneficiaries in lieu of their pro-active contribution to grassland protection in areas frequented by Lesser Florican. This will however be a supplementary activity in identified suitable areas only.

Research and Monitoring:

Research and Documentation

Regular research and documentation of ecology and behavior of Lesser Florican is necessary to formulate a sound strategy for its conservation. The changing nature of its habitat due to increasing biotic pressure is affecting the arrival pattern of floricans in the area under discussion. Identification of research priorities and commencement of basic work will be taken up to set right direction for future research work. To begin with, following activities are proposed:

Status Survey of Lesser Florican
There is also lack of uniformity in data being compiled at different places. It is therefore proposed to undertake a systematic status survey of Lesser Florican during the breeding season throughout the distribution area. Proper mapping of sighting locations and potential sites may be helpful is developing suitable alternative habitats for florican without affecting rural populations.

Lesser Florican Ecology and Behaviour Research
Most of the ecological and behavioural studies on Lesser Florican are based on observations during breeding season. Studies on food habit, habitat preference, migration pattern and other behavioural aspects during non-breeding season have hardly been studied. Absence of information on behaviour during non-breeding seasons is apparently a significant problem in the conservation of Lesser Florican. The breeding season behavioural studies are also mostly on male birds which are easily located due to their unique jumping display.

Studies on florican behaviour during non-breeding season therefore should be paid attention to compile more information for better understanding, planning and execution of field operations.

Entomological assessment of grasslands in florican habitat should also be taken up to understand food preferences of the species. Impact assessment of pesticides on the food of the Lesser Florican and other grassland species needs to be studied.

Communication, Public Awareness and Involvement of Local Communities.

No initiative of florican conservation can succeed without involving local communities and private grass beed owners. Peoples' apprehensions and misunderstandings need to be eliminated and an active participation in conserving Lesser Florican population needs to be solicited.

Peoples' involvement in florican conservation requires a two-pronged strategy. Whereas, direct reward and incentives for grass beed owners and informers are needed to facilitate on-site protection; general mass awareness is equally important even for motivating the forest department authorities and policy makers through democratic institutions. The need to introduce some kind of reward for the informers has also been stressed by the local people.

There is a need to launch a publicity campaign for the foresters themselves followed by mass awareness campaign through print and electronic media.

Public Awareness and Education

Availability of suitable literature and audio-visual training material is necessary to sensitize various stakeholders for conservation of Lesser Florican. There is an urgent need to produce suitable educational material in local languages on grassland ecosystems and floricans for publicity in schools, colleges, and sanctuaries. General conservation awareness campaign for public through electronic and print media would be launched to build constituency in favour of florican conservation.

PLAN OF OPERATIONS (CONSERVATION ACTIONS):

Priorities
Top: Immediate action required (within six months).
Medium: Action within 6 months to 2 years.

States:
RJ: Rajasthan
GJ: Gujarat
MP: Madhya Pradesh
MH: Maharashtra
AP: Andhra Pradesh

Section II	Solutions	Actions	Responsible personnel/committee	RJ	GJ	MH	AP	MP	Priority	ti s a S y
Part 1 Species level recovery action **A. Study of population**	Identification of less known breeding areas & important non-breeding areas outside PAs	Systematic, centrally organized status & distribution survey has to implemented at the landscape scale at an initial stage for benchmark	WII & BNHS will develop the survey protocol and submit it to MoEF. MoEF will involve WII, BNHS, WWF &	Y	Y	Y	Y	Y	Medium	<

ecology		information	local NGOs for field implementation							
		Satellite telemetry program has to be scientifically undertaken to understand seasonal movement patterns & life-history requirements	WII & BNHS with support from MoEF & WWF	N	Y	N	N	Y	High	
B. Management intervention)										
	Awareness programs	Workshops have to be conducted and publicity manuals have to be produced for conservation-management of birds and habitats among the F.D.staff & communities	WII, BNHS & WWF with local NGOs	Y	Y	N	N	N	Medium	
	Protection to birds	Local networks (Lesser Florican monitoring cells) have to be established for regular patrolling of Lesser Florican areas and sharing related information	State Forest Department with the help from BNHS and WWF and local NGOs	Y	Y	Y	Y	Y	Medium	
		Minimize Lesser Florican - unfriendly infrastructure (electric poles) from important areas	State Government (FD, PWD and other departments)	Y	Y	Y	Y	Y	Medium	
Part 2 Habitat level recovery **A. Habitat protection & restoration)**	Seasonal protection to known core areas that are existing PAs to create sacrosanct breeding refuges that are periodically freed from all disturbances to secure nesting success	New fencing in core areas and maintaining the existing ones		Y	Y	Y	Y	Y	High	
		Appoint forest guards to exclude disturbances to breeding birds		Y	Y	N	Y	Y		

	Engaging conservation partners	Alternatively, flexible management of Lesser Florican landscapes on private public mixed ownership lands by innovative incentive (subsidy etc.) driven encouragement OR through declaration of community/conservation reserves, wherever possible & accceptable, should be done depending on sites.	State Government	Y	y	Y	y		Medium	2
	Link local livelihoods with Lesser Florican conservation in important breeding & non-breeding areas	Conduct stakeholder analysis to identify livelihood issues	WII, BNHS & WWF with local NGOs	Y	y	y	y	y	Medium	1
		Provide incentives to farmers and pastoralists in important Lesser Florican areas to continue Lesser Florican –friendly traditional practices.	MoEF and State Government	Y	y	y	y	y	Medium	1
		Restoration and maintenance of grasslands; no invasive shrub/tree plantation and removal of unwanted plants	FD	Y	Y	Y	Y	Y	High	t
B. Scientific management of bustard habitat		Developing landscape level management plan based on scientific inputs	WII, BNHS & WWF and State FD	Y	y	y	y	y	Medium	

	Policy making for grassland conservation	Implementation of 'Project Bustards'	MoEF							
Part 3 (Plan of operation)	**Committee structure**	National, State & Local committees	MoEF and State Governments	Y	Y	Y	Y	Y		
	Monitoring conservation indicators and biological indicators	Centrally standardize population & habitat monitoring protocol using modern tools		Y	Y	Y	Y	Y		1

Part-III Institutional framework:

Preparation, execution and monitoring of the implementation of the Lesser Florican Recovery Plans:

Sr. No.	Actions	MoEF	State Forest Department	NGOs/Research organizations				
				Guj	MP	Raj	MS	AP
1	Preparation of Action Plan		State Forest/Revenue / Panchayat Departments	WII, BNHS, WWF	WII, BNHS, WWF	WII, BNHS, WWF	WII, BNHS, WWF	WII, BNHS, WWF
2	Execution	MoEF	State Forest/Revenue / Panchayat Departments	WII, BNHS, WWF, KERC	WII, BNHS, WWF	WII, BNHS, WWF, TWSI	WII, BNHS, WWF	WII, BNHS, WWF

3	Monitoring & Evaluation	Monitoring Committee, MoEF	State Forest Department	KERC, WII, GEER, BNHS, WWF	WII, FES, BNHS, WWF	WII, TWSI, BNHS, WWF	BNHS, WWF, Samvedana GIB Foundation	BNHS, WWF

Site Specific Recommendations

Rajasthan

1. Sonkhaliya Landscape (Ajmer)
    - Notification of Sonkhaliya as Community Reserve
    - Eradication of *Prosopis juliflora* from the grasslands
    - Community awareness programme and Capacity building
    - Ban on mining activities
    - Check on land conversions for other purposes.
2. Shahpura area (Bhilwara)
    - Eradication of *Prosopis juliflora* from village pasture lands
    - Community awareness and capacity building
3. Pratapgarh
    - Continuous monitoring by the State Forest Department
    - Check on rapid land conversion in potential habitats
    - Community awareness programme and Capacity building

Madhaya Pradesh

1. Sailana Wildlife Sanctuary (Dist. Ratlam)
    - Checking the rapid change in land use pattern
    - Eradication of invasive species from the grasslands
    - Community awareness programme and Capacity building
2. Sardarpura WLS (Dhar)
    - Need of active protection to check uncontrolled grazing during breeding season
    - Community awareness programme and Capacity building
3. Petlabad (Jhabua)
    - Intensive protection to check uncontrolled grazing

Gujarat

1. Rampara Grassland (Dahod)
    - To be notified as Conservation Reserve
    - Community Awareness and capacity building
    - Regulated grazing and grass collection after breeding season
2. **Velavadar Landscape (Bhavnagar)**
    - Continuous monitoring of Lesser Florican, its habitat and other variables in NP
    - Eradication of *Prosopis juliflora* from the southern part of NP

- Community awareness programs.

Maharashtra

Continous monitoring of lesser Florican, its habitat and other related parameters.

Conservation through active participation of poaching community (*PhaseParadhi etc)*

Implementation of Lesser Florican friendly practices on private as well as non protected landscapes.

Regulated grazing and grass collection for the maintenance of grassland habitat.

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Appendix-II

List of the participants who attended '**Consultative workshop to Develop Guidelines for the Species Recovery Programmes for Three Resident Species of Bustard and Floricans in India**' organized by Ministry of Environment and Forests, Government of India, WWF-India and BNHS at WWF-India Auditorium, New Delhi on November 1st and 2nd 2011.

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