Report of the Task Force on

Grasslands and Deserts

Government of India
Planning Commission

New Delhi

Report of the Task Force on

Grasslands and Deserts

Government of India
Planning Commission

New Delhi

Executive Summary

Grasslands and deserts are the most neglected ecosystems by the Ministry of Environment and Forests which looks after biodiversity conservation in India. Protection, development and sustainable use of grasslands are very important for the rural economy and livestock. India has more than 500 million livestock, more than 50 percent of the fodder for this livestock comes from grasslands. Many natural grasslands (e.g. wet grasslands of *terai*, *shola* grasslands of the Western Ghats, dry grasslands of Deccan) have been converted to plantations, sometimes even in Protected Areas. Some of the most threatened species of wildlife are found in the grasslands and deserts (e.g. Great Indian Bustard, Lesser Florican, Indian Rhinoceros, Snow Leopard, Nilgiri Tahr, Wild Buffalo etc). Despite the importance of grasslands and deserts for biodiversity conservation, livestock dependency and for poverty alleviation, we still do not have Grassland Development and Grazing Policy in place.

The major recommendations of the Task Force for Desert and Grasslands are follows:

1. *There is an urgent need for a **National Grazing Policy** to ensure the sustainable use of grasslands and biodiversity conservation. For implementation of the various recommendations of the National Grazing Policy and R&D, we need funds to the tune of Rs 100 crore.*
2. *Necessary modification would be required in the new **EIA guidelines** by including ecologically fragile and environmentally sensitive areas where prior EIAs will have to be made mandatory. Also, presence of representatives from identified institutions and experts should be made mandatory during public hearing whenever an EIA is done in the grassland and desert ecosystems so as to review the identified impacts, prediction and mitigation.*
3. *Considering a wide range of activities and programmes under each Ministry and R & D Institutions, it would be extremely important to identify some of the cross cutting themes and launching the **Integrated Research and Development Programmes** in the grasslands and deserts. (Rs 50 crore)*
4. *It is recommended that a network of grassland ecologists be established and a country wide **Long Term Ecological Research** (LTER) needs to be initiated in representative biogeographic zones. These LTER sites could then serve as*

ecological benchmarks for future training, teaching as well as monitoring sites. Simultaneously the nodal agencies need to take up the new dimensions of grassland ecology including impact of climate change and land use practices within and around grassland and desert ecosystems. (Rs. 50 crore)

5. *Considering bustard species, and Snow Leopard as flagship species of grasslands (hot and cold deserts), there is an urgent need to start multiple-state and multiple-departments, centrally-sponsored* ***Project Bustard*** *and* ***Project Snow Leopard****, on the same pattern of Project Tiger and Project Elephant. (Rs 15 crore each project).*

6. *There is an urgent need to increase grasslands and desert ecosystems in Protected Area system, especially in the Thar Desert and the cold desert of Ladakh and Sikkim which are grossly under-represented. The Desert National Park located in Jaisalmer and Barmer should be declared as a* ***Biosphere Reserve****. (Rs 30 crore).*

7. *The Ministry of Environment and Forests (MoEF), Government of India should start a division or section to look after the grasslands issues, on the pattern of Wetland Division to be headed by a Joint Secretary.*

   Species to benefit through better protection of grasslands and deserts, ecosystems and habitats to benefit from protection of Grasslands and deserts, protected areas to benefit from protection of grasslands and deserts are at Appendices – I, II and III respectively.

Report of the Task Force on Grasslands and Deserts

The Planning Commission (Environment and Forests Division), vide letter number M-13033/1/2006-E&F, dated 21 August, 2006 constituted a Task Force on Grasslands and Deserts for the Environment and Forests Sector for the Eleventh Five-Year Plan (2007-2012). The composition of the Task Force was as follows:

Dr. Panjab Singh, Chairman

Dr. Asad R. Rahmani, Bombay Natural History Society, Mumbai

Mr. Sonam Wangchuk, SECMOL, Ladakh

Dr. Charudatta Mishra, Nature Conservation Foundation, Mysore

Dr. K. D. Singh, International Forestry Expert, Ex-FAO, New Delhi

Dr. Pratap Narain, Director, CAZRI, Jodhpur

Dr. K. A. Singh, Director, IGFRI, Jhansi

Mr. Sanjay Kumar, DIGF, MoEF

Mr. Sonam Wangchuk and Dr. Charudatta Mishra regretted their inability to participate in this Task Force due to their other commitments . In order to have representative from high altitude grasslands and cold desert, the Chairman co-opted the following two experts:

Dr. G. S. Rawat, Wildlife Institute of India, Dehradun

Dr. Raghunandan Singh Chundawat, International Snow Leopard Project

The Terms of References of the Task Force were as follows:

1. *Review the current laws, policies, procedures and practices related to conservation and sustainable use of grasslands and desert ecosystems and recommend correctives.*
2. *Similarly review the institutional and individual capacities available to address issues related to conservation and sustainable use of grassland and desert ecosystems and recommend how they may be adequately strengthened.*

3. *Assess the current issues and systems of integrating concerns relating to fragile grassland and desert ecosystems into other sectors (ministries, departments) and to recommend required new or remedial measures.*
4. *Review the current EIA laws, policies, procedures and practices as being applied in the grasslands and desert ecosystem context and recommend corrective measure to address significant issues that specifically arise in the context of these fragile ecosystems.*

The Task Force held three meetings in Delhi on 13 October, 1 November, and 20 November 2006. In addition to these meetings, informal email or telephone discussions were held by members and draft notes were exchanged.

Introduction

Grasses and their values have been recognized since time immemorial as the present day cereal crops are the cultivated varieties of their wild ancestors. Use of grasses, as food resources or as fodder has led to extensive breeding programs and improvement in pasture land. In India concept of scientific pasture management has not been properly planned, despite the fact that India has one of the largest livestock populations in the world, with an estimated 520 million heads. Efforts in India for pasture management have been confined either to improvement of existing grasslands or introduction of suitable exotics. There is no sound management plan for the development of pasture land and protection of existing patches of grassland, some of which are unique and harbour rich fauna. We have not even fully documented the value of these grasslands in terms of their biological diversity.

Grasslands evolved under a system of grazing, drought and periodic fire and almost all the existing grasslands are maintained by either of these or a combination of all these factors. Tropical grasslands, which are in the mid successional stage, are largely maintained by annual or biannual burning in most of the protected areas (sanctuaries and national parks). Whereas in unprotected areas they are maintained by livestock grazing and other biotic factors. As a seral community, the development of sere is often checked by environmental conditions and is retained as a subclimax rather than climax as in semi-arid and arid areas. In areas of high rainfall, forest is the climax vegetation and wherever grasslands exist, they are due to clear felling of forests or due to edaphic and fluvial factors (e.g. *terai* grasslands of northern India). Maintenance of these mid successional grasslands, especially as a wildlife habitat to protect some of the key grassland species thus depends upon careful planning and management of these grasslands.

Whyte (1957) has classified Indian grasslands into eight types but Champion & Seth (1968) recognized only three broad categories. Between 1954 and 1962, the Indian Council of Agricultural Research conducted grassland surveys and classified the grass cover of India into five major types (Dibadghao & Shankarnarayan 1973):

1. ***Sehima-Dichanthium* Type**: These are spread over the Central Indian plateau, Choto-Nagpur plateau and Aravalli ranges, covering an area of about 17,40,000 km². This region has an elevation between 300 and 1200 m. There are 24 species of perennial grasses, 89 species of annual grasses and 129 species of dicots, including 56 legumes. This is also a rich wildlife area, with a large number of protected areas, especially forest protected areas (sanctuaries and national parks).
2. ***Dichanthium-Cenchrus-Lasiurus* type**: These are spread over an area of about 436,000 km², including northern parts of Delhi, Aravalli ranges, parts of Punjab, almost whole Rajasthan, and Gujarat, and southern Uttar Pradesh. The elevation of this region is not high, between 150 to 300 m. There are 11 perennial grass species, 43 annual grass species, and 45 dicots including 19 legumes. This area has many protected areas, mainly in the hilly regions, but the *Lasiurus sindicus* dry grassland of the Thar desert is under-represented in the PA system. These grasslands are extremely important for the survival of certain bird species.
3. ***Phragmites-Saccharum-Imperata* type**: These types of grasslands cover about 2,800,000 km² in the Gangetic Plains, the Brahmaputra Valley and the plains of Punjab and Haryana. The elevation of this region between 300 to 500 m. There are 10 perennial grasses, 26 annual grasses, and 56 herbaceous species, including 16 legumes. The Gangetic Plain is one of the most thickly populated regions in the world so original grassland type is almost gone. Some wet grasslands survive in protected areas of the *terai* region and the Brahmaputra floodplains. These wet grasslands harbour many globally threatened wildlife species.
4. ***Themeda-Arundinella* type**: These grasslands cover about 230,000 km² and include the states of Assam, Himachal Pradesh, Jammu and Kashmir, Manipur, Uttar Pradesh and West Bengal. The elevations ranges between 350 and 1200 m. There are 37 major perennial grass species, 32 annual grass species, and 34 dicots including 9 legumes.
5. **Temperate and alpine cover**: These are spread across altitudes higher than 2100 m and include the temperate and cold desert areas of Himachal Pradesh, Jammu and Kashmir, Uttar Pradesh, West Bengal and the north-eastern states. There are

47 perennial grasses, 5 annual grasses and 68 dicots, including 6 legumes. These high altitude grasslands harbour wildlife not generally found in other parts of the country. This area is also under-represented in the PA system.

Depending upon the biotic influences and local variations in topography and soil structures, these five broad categories can still be subdivided into several grass associations.

Another unique type of grassland type is the **Shola grassland** of the Western Ghats. This type is generally over looked or clumped with other grassland type. However, Shola grasslands are unique as they are confined to the high altitude (>1700 m) in the Western Ghats and interspersed with tropical forests (generally found in the mountain folds and valleys). Shola grasslands are maintained by fire and frost and appear to be climax vegetation as an ancient and geographic relict species of ungulate (Niligir Tahr) is found in the shola grasslands and no where else in the world.

The grasses are considered to be the most evolved species of plants. They are remarkable as they have short life cycle yet a long life i.e. take a short time from germination to reach maturity. Unlike trees, when cut, they sprout back almost instantaneously. They are capable of supporting or converting into incredibly huge amounts of biomass. They also support a rich and diverse variety of fauna. They are efficient in absorbing rain water and play vital role in water retention and hydrology of an area.

Grassland Protection

Grasslands are not managed by the Forest Department whose interest lies mainly in trees, not by the agriculture department who are interested in agriculture crops, nor the veterinary department who are concerned with livestock, but not the grass on which the livestock is dependent. The grasslands are the ‘common’ lands of the community and are the responsibility of none. They are the most productive ecosystems in the subcontinent, but they belong to all, are controlled by none, and they have no godfathers.

All types of grassland ecosystems are under tremendous grazing pressures. For example, in the semi-arid grasslands, the carrying capacity is 1 Adult Cattle Unit (ACU) per ha (Shankar and Gupta 1992), but the stocking rates are as high as 51 ACU per ha, while in

the arid areas, the carrying capacity is 0.2-05 ACU per ha but the stocking rates are 1 to 4 ACU per ha (Raheja 1966).

Fodder production

Punjab and Haryana have large areas under intensive fodder production where 1 ha of fodder cropped area supports 11-12 ACU (Singh and Misri 1993). This proves that livestock production is more efficient from cultivated fodder than from the degraded grazing lands.

Wildlife of the Indian grasslands

Some of the rarest species of wildlife are found in the grasslands, many of them totally dependent on them. The Bengal Florican, One-horned Rhinoceros, Pygmy Hog, Hispid Hare, Wild Buffalo, Hog Deer, Swamp Deer in *terai* grassland, the Great Indian Bustard in dry, short grasslands, the Lesser Florican in moonsonal grasslands of western India, and the Nilgiri Tahr in the *shola* grasslands of the Western Ghats are some examples. According to reports of the Wildlife Institute of India (WII), less than 1% of the grasslands come under the Protected Area Network. With a livestock population of more than 500 million and growing, the grasslands are under tremendous biotic pressure, mainly grazing and conversion to other uses. Presence of such a huge livestock population and dependence of the rural population on it, proves that protection, restoration and sustainable use of grasslands are important policy and ecological imperatives. Besides, providing habitat, shelter, and food, both to livestock and wildlife, the grasslands also serve important catchment for rivers, streams, reservoirs, dams, check-dams and village ponds. In short, grasslands with forest and other natural vegetative cover greatly help in the water regime and hydrological cycle. Therefore, it is imperative to recognize the ecological, hydrological, economic and sociological role of grasslands as a source of survival for millions of livestock and rural people, as protector of soil and water, of rare wildlife species and biodiversity conservation in general.

Grasslands and deserts are the only breeding grounds of a number of avian species, whose nesting time is the monsoon. Due to the presence of crops in the fields, the monsoon is the period most affected by the free-ranging livestock, who have nowhere else to go. This is the time when the grass grows. If grass is over-grazed at this time, it not only prevents fodder production and seed formation, but also nests of ground-living birds are trampled. No grasslands, however resilient, can bear the overuse and abuse that they are subjected to.

Arid and Semi-arid grasslands

The dry desert occupies nearly 10% of India's geographical area, mainly in Rajasthan and Gujarat. One of the smallest deserts in the world, the Indian Thar desert has a high avian diversity, from its location on the cross-roads of the Palaearctic and Oriental biogeogrphic regions. As the Thar desert is not isolated, avian endemicity is very low. Although no detailed work on the avifauna of the Indian Thar has been done, nearly 300 species of birds have been recorded. Important desert species are the Great Indian Bustard *Ardeotis nigriceps*, Houbara Bustard *Chlamydotis undulata*, Cream-coloured Courser *Cursorius cursor*, Hoopoe Lark *Alaemon alaudipes*, various species of sandgrouse, raptors, wheatears, larks, pipits and munias. In the Rann of Kutch of Gujarat, both Greater *Phoenicopterus roseus* and Lesser *Phoeniconaias minor* flamingoes breed when conditions are suitable. These nesting colonies come under increasing pressure due to tourist disturbance and a large number of nests have been reported to be destroyed. As the site of nesting colonies shift, depending upon inundation, it is difficult to protect them.

In the Thar desert, there is one national park named the Desert National Park (3,162 sq km). Technically, it is a wildlife sanctuary. There are five more wildlife sanctuaries of 12,914 sq km in this zone. On paper, 7.45% of the desert is under the PA network. However, the ground situation is very different. There are 44 villages inside the Desert NP, and more than half of the Little Rann Wildlife Sanctuary (4,953 sq km) is under human occupation. Similarly, the Kutch Desert Sanctuary (7,506 sq km) is under military occupation, being located in the border area. Besides over-grazing, expansion of agriculture, salinization due to wrong irrigation practices, the desert ecosystem is also being altered due to invasive species such as *Prosopis chilensis.*

Semi-arid is a region with a rainfall varying from 400 to 1000 mm and it is dominated by grass and shrub species. The semi-arid region shows high avian numbers, especially gramivorous species such as finches, munias, larks, doves and pigeons. It has dry deciduous forest, but extensive tracts of grasslands are seen in the Deccan plateau in central India, the Malwa plateau in western India, and in the Saurashtra region and Kutch in Gujarat. The semi-arid region merges with the arid on the western side and with the Gangetic plains in the north. More than 100 bird species use the semi-arid grasslands for foraging and/or nesting. A majority of species (83%) are present in other grassland types or even small grassland patches within forests, but 17 species are exclusively present in this zone. Only four species are found in the Semi-arid and Deccan regions and nowhere

else. They are the Malabar Crested Lark *Galerida malabarica*, Syke's Crested lark *Galerida deva*, Green Munia *Lonchura formosa* and the Rock Bush Quail *Perdicula argoondah*. Brown Rock Chat *Cercomela fusca* is another endemic bird found in Arid, Semi-arid and the Gangetic plains. Perhaps the most endangered species of the semi-arid grasslands is the Lesser Florican *Sypheotides indica*. Its main breeding areas used to be the grasslands of the Malwa plateau, Kutch and Suarashtra, but due to destruction of grasslands, this bird has disappeared from most of its range.

The Semi-arid grasslands occurring in eastern Rajasthan, Gujarat, western Madhya Pradesh, and parts of Uttar Pradesh, Haryana, Punjab and southern parts of Jammu & Kashmir, constitutes about 5,48,850 sq km or 16.60% of India's geographical area. In the semi-arid zone, there are 8 national parks, totaling 1,319 sq km or 0.24%, and 83 wildlife sanctuaries, covering nearly 14,000 sq km or 2.56% of surface. Some sanctuaries are on paper only, with no effective control and management.

Some of the Protected Areas of arid and semi-arid grasslands have an important genetic resource in the form of grass and shrub species, which are important for ecological and food security of the country. Therefore, these PAs and other types of protected areas should not be considered as important only for wildlife conservation but should be considered as gene banks. For example, most of our cereals have originated from wild grasses. Arid and semi-arid areas also have important breeds of livestock that also need protection. Therefore, protection and enhancement of PAs in arid and semi-arid regions and also protection of wildlife outside PA system should be given high priorty and should be integrated in the over-all land-use policy of the country.

Thar Desert

The Thar Desert is one of the smallest deserts in the world, but it exhibits a wide variety of habitats and biodiversity. It is the most thickly populated deserts in the world with an average density of 83 persons per sq. km, whereas, in other deserts, the average is only seven persons per sq. km (Baqri and Kankane 2001). It is considered an important desert in terms of its location where Palaearctic, Oriental and Saharan elements of biodiversity are found.

Despite its comparatively small area, the Thar Desert has a high avian diversity, from its location on the crossroads of the Palaearctic and Oriental biogeographic regions. As the Thar desert is not isolated, avian endemicity is very low. To the west, it is connected through the Sind plains with the Persian and then the Arabian deserts, to the northeast

with the Gangetic plains, and to the east, it joins the Semi-Arid biogeographic zone. In the south, it merges with the Rann of Kutch. Therefore most species of birds of the Thar are widely distributed.

Between 250 to 300 species have been reported from the Thar desert. This variation is mainly due to the fact that some authors include Kutch, parts of Saurashtra and the western side of the Aravalli mountains in the Thar desert while others have more a restrictive definition of the desert that includes only nine districts of western Rajasthan and Kutch in Gujarat. In the Rajasthan part of the Thar, nearly 250 species have been reported (Rahmani, 1997a, 1997b). Tremendous changes in the avifaunal structure of the Thar desert are taking place due to the Indira Gandhi Nahar Project (IGNP) and species never seen earlier are now regularly found near the canal (Rahmani 1997a, 1997b; Rahmani and Soni 1997). However, this project is playing havoc with the desert ecosystem by changing the crop pattern, traditional grazing regime and because of colonization by new people who do not have the same conservation value system which the desert people had. Due to easy availability of water everywhere, unsustainable livestock grazing is taking place and the famous Sewan grasslands which have survived for hundreds of years with low grazing pressure now under tremendous pressure. These grasslands are the major habitat of the highly endangered Great Indian Bustard *Ardeotis nigriceps*, and the winter migrant Houbara or the Macqueen's Bustard *Chlamydotis macqueeni*.

Other important desert species are the Cream-coloured Courser *Cursorius cursor*, Greater Hoopoe-Lark *Alaemon alaudipes*, various species of sandgrouse, raptors, wheatears, larks, pipits and munias. In the Rann of Kutch of Gujarat, both Greater *Phoenicopterus roseus* and Lesser *P. minor* flamingoes breed when conditions are suitable. These nesting colonies come under increasing pressure due to tourist disturbance, and a large number of nests have been reported to be destroyed. As the sites of the nesting colonies shift, depending upon inundation, it is difficult to protect them.

In the Thar desert, Rodgers *et al*. (2000) have listed one national park of 3,162 sq. km. and five wildlife sanctuaries of 12,914 sq. km. On paper, 7.45% of the desert is under the PA network. However, the ground situation is very different. There are 44 villages in the Desert National Park, and more than half of the Little Rann Wildlife Sanctuary (4,953 sq. km) is under human occupation. Similarly, the Kutch Desert Sanctuary (7,506 sq. km) is under military occupation, being located in the border areas. There are only two PAs in the Thar desert with legally no human occupation: the seven sq. km Tal Chhaper

Blackbuck Sanctuary in Rajasthan and the two sq. km Lala Bustard Sanctuary in Gujarat, both are IBAs.

Cold Desert of the Indian Trans-Himalayas

The Indian Trans-Himalayas, also known as the Indian cold desert, support very sparse vegetation. Based on the physiognomy, three categories of natural vegetation are clearly discernible namely, Alpine Arid Scrub (AAS) or Steppe formations, Alpine Arid Pastures (AAP), and Marsh Meadows (MM). The AAS vegetation is dominated by the *Artemisia-Caragana, Hippophae- Myricaria,* and *Ephedra gerardiana* communities. The AAPs are largely dominated by graminoids while the MMs have a preponderance of sedges. The plant community structure and composition are strongly influenced by the microtopography and soil moisture. Accordingly, various habitats such as moist slopes, riverine areas, sandy plains, field borders, valley bottoms, rubble slopes, scree slopes, and marsh meadows exhibit distinct formations and communities. The characteristic species in the Trans-Himalayas are the species of *Saussurea, Potentilla, Corydalis, Astragalus* and *Oxytropis.* In general, the Indian Trans-Himalayas is poorer in floral diversity as compared to the moist alpine meadows of the Greater Himalayas. A small portion of the Indian Trans-Himalayas is represented in the Central Himalayas (Sikkim) which is relatively higher in terms of species diversity compared to the northwestern region. This region is characterized by low primary productivity, harsh climatic conditions, and specialized growth forms (Kachroo *et al*. 1977).

The Trans-Himalayas (4,500 to 6,000 m) consisting of Ladakh in Jammu and Kashmir, Lahul-Spiti in Himachal Pradesh, and a small area of Sikkim is a part of a much larger Tibetan plateau of Tibet and China, consisting of about 2.6 million sq. km. It has high mountains, deep valleys and flat, arid plains. Many major rivers, for example, the Brahmaputra, Sutlej and Indus start from this region but much of this has internal drainage system where the rivers end in vast lakes. Such lakes and marshes, mostly saline, are important as breeding grounds for birds such as the Black-necked Crane *Grus nigricollis*, Bar-headed Goose *Anser indicus*, Great Crested Grebe *Podiceps cristatus*, and others. While the flat plains provide habitat to the Tibetan Sandgrouse *Syrrhaptes tibetanus*, Horned Lark *Eremophila alpestris* and various species of wheatears *Oenanthe*. The Tibetan Snowcock *Tetraogallus tibetanus* and the Himalayan Snowcock *Tetraogallus himalayensis* can be seen on the treeless mountains, sometimes both the species occurring in the same area. There is no truly endemic or restricted-range bird species in this region. The Tibetan Eared Pheasant *Crossoptilon harmani*, often

considered to be a subspecies of the White Eared Pheasant *Crossoptilon crossoptilon*, is found at the edges of mixed broadleaf-coniferous forests, rhododendron, juniper and deciduous scrubs and grasslands, between 3,000 to 5,000 m. It is listed as Near Threatened (BirdLife International 2001). It is locally common and has adapted to disturbed habitats (Ali and Ripley 1987, Grimmett *et al.* 1998). Recent surveys have indicated that its population must be greater than 10,000 individuals (McGowan and Garson 1995). Where unmolested, it becomes exceedingly tame, coming to monastries in the remoter areas to be fed by Buddhist lamas, and even eating out of their hand (Ali and Ripley 1987). In India, it is found in parts of the Lohit, Siang and Subansiri districts of Arunachal Pradesh.

Shola grasslands of the Western Ghats

The Western Ghats, a chain of ancient mountains parallel to the west coast of the Indian Peninsula occupies only *c.* 5% of India's land area (about 1,32,606 sq. km), yet it harbours nearly 27% of its total flora. The Western Ghats, with a latitudinal range of more than 10 degrees, lies more or less parallel to the west coast of India. Its forests are one of the best representatives of Non-Equatorial Tropical Forests in the world (Pascal 1982). Wet Evergreen Forests are mostly confined to the windward side of the Western Ghats where the rainfall exceeds 2,000 mm. Areas 1,800 m asl in the Western Ghats are dominated by natural grasslands and adjacent pockets of Montane Evergreen Forests frequently termed as Shola-Grassland Complex.

Terai Grasslands

About 3,54,800 sq. km in area, the Gangetic Plains are one of the most fertile areas of the world, with a nearly 3,000 year history of human occupation. It is also one of the most densely populated areas of the world. The twin combination of a long history of human occupation and dense and still growing human population has resulted in an almost complete conversion of the original vegetation into cropland and human settlements. The Gangetic Plains are drained by numerous rivers and streams, the most famous obviously is River Ganga.

There is practically no natural vegetation left in the Gangetic Plains, except in the region known as *terai*, which is sandwiched between the *bhabhar* tract of the Sub-Himalayas and the main Gangetic Plain. The tall, moist grasslands of the *terai*, interspersed with the Sal *Shorea robusta* forest contain some of the most endangered bird species of India (Rahmani 1988, Javed and Rahmani 1998) such as the Swamp Francolin, Bengal

Florican, and Finn's Weaver *Ploceus megarhynchus*. Javed and Rahmani (1998) have recorded 330 species from the Dudwa National Park which is perhaps the best *terai* forest left in north India.

New special schemes for biodiversity conservation of grasslands and deserts

Poaching of tigers and threats of de-notification of legally protected wildlife habitats have dominated the media so much recently that slow disappearance of other endangered wild animals has been overlooked. Not many people know that the Great Indian Bustard, endemic to the Indian subcontinent, is now on the brink of extinction. Not only is it locally extinct from almost 90% of its former range, it has also disappeared even from three sanctuaries made especially for its protection, 25 years ago. Earlier it was mainly poaching and habitat destruction that resulted in such a pitiable situation of this grand bird of the Indian grassy plains. Now mismanagement of the habitat, sentimental protection of certain problem animals, insecure and confusing tenurial systems, apathy and ignoring of scientific advice would exterminate this species from some of the especially notified bustard areas. Similarly, the Lesser Florican has lost most of its grassland habitat during the last 20-30 years. It now survives in scattered pockets only.

Project Tiger and Project Elephant schemes of the Government of India have shown that by identifying an indicator species and focussing attention on it and its habitat, a substantial part of our natural ecosystems which benefit an array of threatened species can be protected. Bustard species can be considered as indicators of grassland ecosystems and by conserving the bustards and their habitats, a very large number of species dependent on the healthy grasslands will also be protected. Keeping in view that these magnificent birds are now on the verge of extinction, there is an urgent need to launch Project Bustards and immediately provide all the necessary inputs at the highest level to ensure their survival. Project Bustards should be launched on the same lines as Project Tiger and Project Elephant by the Government of India to save all the four Bustard species namely, the Great Indian Bustard, the Bengal Florican, the Lesser Florican and the migratory Houbara Bustard (Macqeen's) from imminent extinction, and their habitats.

Taking into consideration all these factors, the Government of India should be encouraged to start `**Project Bustard**' on the lines of Project Tiger and Project Elephant, with the following objectives:

To immediately constitute a Task Force for the purpose of establishing ***Project Bustard*** *on the lines of Project Tiger and Project Elephant. Project Bustard should be financed in the 11th Five Year Plan, with the following objectives:*

1. *To conserve all the four species of bustards in India, along with the involvement of local communities living in and around the identified bustard and floricans habitats.*
2. *To strictly protect the habitat and all the four species of bustards and their associated species in India.*
3. *To establish interstate cooperation among the Range States to provide protection of the habitat and the birds.*
4. *To identify areas which could be declared as bustard sanctuaries, Conservation Reserves or Community Reserves as envisaged in the Wild Life (Protection) Act, 1972 and the declaration of Ecological Sensitive Zones under the Environment (Protection) Act, 1986.*
5. *To provide necessary financial, management and scientific inputs required to protect the habitat within and outside the protected areas and all the bustards species.*
6. *To plan and implement, with the involvement and consent of state governments and local communities, landscape level strategies for grassland management, both within and outside biodiversity/wildlife reserves;*
7. *To provide necessary financial, management and scientific inputs required to protect the habitat within and outside the protected areas and all the bustards species.*
8. *To plan and implement, with the involvement and consent of state governments and local communities, landscape level strategies for grassland management, both within and outside biodiversity/wildlife reserves.*
9. *To start a long term Conservation Breeding Programme at least for the Great Indian Bustard.*
10. *To produce educational material in local languages on grassland ecosystems and bustards for publicity in schools, colleges, and sanctuaries.*

To initiate discussions on and finalize a ***National Grazing and Grassland Policy*** *in which Bustard conservation is centrally integrated.*

Even the National Forestry Commission has recommended to start new centrally-funded schemes on the pattern of Project Tiger and Project Elephant.

Recommendations of the National Forestry Commission to start new centrally-sponsored project:

[171] Project Elephant and Project Tiger have shown that by targeting rare and flagship species, many habitats and associated species can be saved. However, there are many species/habitats that are not covered by these two Central government schemes, e.g. grasslands, wetlands, high altitude mountain, riverine and marine environment. Certain species and their habitats need urgent attention of the Ministry of Environment and Forests and state governments to formulate projects in the fashion of Project Tiger. ***The snow leopard, the great Indian bustard, the Gangetic dolphin and the dugong are prominent examples for this purpose****.*

[172] To protect the highly endangered great Indian bustard (less than 500 left in the whole world), lesser florican, Bengal florican and other grassland associated flora and fauna, ***Project Bustard*** *should be initiated. As protection of grasslands would greatly benefit livestock, the Ministry of Agriculture and Animal Husbandry should also be involved. These bustards are found in at least ten states of India and therefore, it is vital to develop a centrally coordinated and funded scheme.*

[173] The snow leopard of the Himalaya is one of the most famous flagship species of the ecosystem where it lives. This ecosystem is also very fragile and coming under increasing human impact. Most of the rivers of north India originate from snow leopard habitats, so it is in the national interest to protect and nurture such habitats. As the snow leopard is found in five states (Jammu and Kashmir, Himachal Pradesh, Uttaranchal, Sikkim and Arunachal Pradesh), it is necessary to develop a centrally funded and coordinated scheme called ***Project Snow Leopard.*** *An attempt had been made in this direction in the 1980s, but Ministry of Environment and Forests later merged the scheme with the on-going C.S.S on development of national parks.*

Protected Area (PA) network

In India, we have nearly 95 national parks and 500 wildlife sanctuaries. Most of these PAs are in the forest ecosystems. According the report of the Forestry Commission (2006), nearly 40% of these PAs suffer from livestock grazing and fodder extraction. There are only a handful of PAs having grasslands. Notable ones are Velavador National Park (34 km²) in Gujarat, Desert National Park (3,162 km² but less than 100 km² really

protected), Kaziranga National Park (>500 km², 60% wet grassland), Manas Tiger Reserve (>500 km², 40% under wet grassland), Sailana Florican Sanctuary (2.50 km² grassland) in Gujarat.

Legal protection to grasslands

The grasslands are the most neglected, abused and least protected ecosystems in India. They remain unprotected unless they are notified as Protected Areas under the Wild Life (Protection) Act, 1972 or notified as Protected or Reserve Forest under the Indian Forest Act, 1927. Most of the States have excluded the grasslands and have not identified them as "deemed forest" by the State Expert Committee's pursuant to the landmark order dated 12.12.1996 in the Forest Matter (T. N. Godavarman Thriumalpad V. Union of India and others in W.P. (C) No. 202/95). As per the said order of 12.12.1996, word 'forest' should be given a wide and liberal interpretation. Excluding grasslands and including lands only with tree cover as 'forest' is against the letter and spirit of the said order thereby denying the protection under the Forest (Conservation) Act, 1980 (F. C. Act). In view of the fact that the grasslands have spontaneous natural vegetative growth, these should also be treated as 'forest land' for the purposes of the Forest Conservation Act and restrictions on diversion of such lands for non-forest use should be applicable to these critical ecosystems as well.

The central government should invoke the provisions of the Articles 251 and 254 of the Constitution to direct state governments to instruct Revenue Departments not to divert any grassland identified in the landscape for bustard/florican protection. Such areas can be declared as community or conservation reserves. Some areas can be identified as Ecologically Fragile Zones under Section-5 of the Environment Protection Act, 1986. There should be some legal and social protection of these grasslands from invasion of nomadic graziers, especially during the growing period of the grasses.

Applicability of the provisions of the Environment (Protection) Act, 1986

Section 3 of the Environment Protection Act, 1986 empowers the Central Government to take all such measures as is deemed necessary or expedient for the purpose of protecting and improving the quality of the environment. Further, environment is defined under Section 2A to include "water, air and land and the inter-relationship which exist among and between water, air and land, and human beings, other living creatures, plants, micro-organism and property".

Section 3(3) empowers the Central Government to constitute an authority for exercising the powers and functions under Section 5 of the Act.

Section 5 of the Act empowers the Central Government in the exercise of its powers and performance of its functions under the Act to issue directions in writing to any person, officer or any authority and such person, officer or authority shall be bound to comply with such directions.

The **National Environment Policy 2006** (NEP) states that while conservation of environmental resources is necessary to secure livelihoods and well-being of all, the most secure basis for conservation is to ensure that people dependent on particular resources obtain better livelihoods from the fact of conservation, than from degradation of the resource. While this can be taken as a guideline for further environmental planning, the NEP totally misses out the Grassland Ecosystems. Many of the grasslands in the country are sensitive to climate change, developmental pressures and invasion by alien invasive plants.

By issuing an appropriate notifications under Section 5 of the Environment (Protection) Act, 1986, the Central Government can constitute and declare Ecological Sensitive Areas or zones for the better protection of the environment and in particular with respect to the grasslands. In case such a notification is issued there would be no need to acquire land or shift people, as has been done in the case of Matheran and Mount Abu areas. This procedure has a clear advantage over declaration of national parks and sanctuaries under the Wild Life (Protection), Act 1972.

Recommendations of the Task Force

1. Certain grasslands viz., Shola – grasslands of Nilgiris, Sewan grasslands of Bikaner, Jodhpur and Jaisalmer, semi-arid grasslands of Deccan, Rollapadu grasslands in the semi-arid tracts of Andhra Pradesh, Banni Grasslands of Gujarat and Alpine Grasslands of Sikkim and Western Himalaya be recognized as ecologically sensitive ecosystems and any development projects in these areas will have to undergo stringent environmental impact assessments.

2. A coordinated effort towards conservation and management of Alpine Meadows (Bugyals): Most of the alpine areas fall under one or other category of `forested land' or Van Panchayat. However, no concerted efforts have been made towards conservation and management of these areas so far. In some of the high altitude protected areas there

are conflicts between the local people and PA management regarding the rights for livestock grazing and collection of non-timber forest produce. Hence there is a need to (i) rationalize the boundaries or establish Community Reserves to cater the need of villagers as well as threatened wildlife species, (ii) strengthen the existing PAs, (iii) evolve valley/area specific grazing plans in a participatory manner involving the local and migratory graziers, animal husbandry department, tourism department and Indian army as the case may be so that some of the heavily degraded Bugyals could be brought under a recovery plan.

National Grazing Policy

Despite the fact that India has one of the largest livestock populations in the world, with an estimated 520 million heads, we do not have a grazing or grassland policy on ground! Though the Government of India has formulated 'Draft Grazing and Livestock Management Policy (1994)', and 'Draft National Policy for Common Property Resource Lands (CPRLs)', these policies have not been implemented effectively in the field. In the Draft Grazing and Livestock Management Policy, emphasis has been given to develop large blocks of grass reserves away from human habitation for higher production (in arid and semi-arid regions) and as fodder banks for drought years. The CPRLs seeks to provide support to the people and their production systems through restoration, protection, regeneration, upkeep and development of grasslands. There is no sound management plan for the development of pasture land and protection of existing grasslands, some of which are unique and harbour rich fauna. We have not even fully documented the value of these grasslands in terms of their biological diversity. The famous Sewan grasslands of Jaisalmer and Bikaner, and the Banni grassland of Kutch have been neglected, resulting in over-grazing, spread of invasive species such as *Prosopis chilensis* and conversion to agricultural crops with dubious results. The highly productive wet terai grasslands of the Gangetic and Brahmaputra floodplains are under-represented in protected area network of India, except some areas such as Kaziranga, Dudhwa, Jaldapara national parks.

The importance of rotational or seasonal grazing, some control on free ranging animals, total protection of selected grassland plots to serve as nucleus for seed bank, secure tenure for pastoralists (both resident and nomadic) over pastures, and genetic improvement of livestock (using indigenous breeds, not exotics ones) have not been taken in to consideration in animal husbandry programmes of the country. In our country, only livestock is considered as wealth, not the grasslands on which this livestock depends

nor the traditional knowledge that helps maintain this livestock! Interestingly, protection of fodder producing, natural grasslands greatly help in the protection of many endangered species. For example, in Maharashtra, in the late 1970s, a large number of plantation and grassland plots were developed under the Drought-Prone-Areas-Programme (DPAP). The main aim of DPAP was to take conservation measures for the protection of over-used land which was suffering from severe overgrazing and soil erosion. The DPAP not only helped in achieving its aim in certain areas but it also resulted in restoration of wildlife, especially the Great Indian Bustard, Blackbuck and Grey Wolf.

Grasslands are not managed as an ecosystem in their own right by the Forest Department whose interest lies mainly in trees, not by the Agriculture Department who are interested in agriculture crops, nor the Veterinary Department who are concerned with livestock, but not the grass on which the livestock depends. Grasslands are the 'common' lands of the community and while there have been robust traditional institutions ensuring their sustainable management in the past, today due to take-over by government or breakdown of traditional institutions they are the responsibility of none. They are the most productive ecosystems in the Indian Subcontinent, but they belong to all, are controlled by none, and they have no godfathers. Indeed they are often looked at as 'wastelands' on which tree plantations have to be done, or which can be easily diverted for other uses. Such diversions often put even more pressure on adjoining ecosystems for grazing and fodder removal, resulting in a cascading chain of degradation. 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 compound the problem.

The Forest Policy of 1894 was the most elaborate of all the policies in explaining the modalities of grazing in protected forests. The Forest Policy of 1954 was extremely critical of unrestricted and uncontrolled grazing and refuted it as contrary to scientific management of forests. However, it also admitted that in some forest/grassland types, limited grazing does not do much harm, and may actually improve the grassland/forests. Dhebar Commission (Schedule Areas and Schedule Tribes Commission, 1966) recommended that the Forest Department should promote growth of improved varieties of grasses in forest areas and grazing fees should be regulated. The National Commission on Agriculture (NCA) (1976) recommended strict control on grazing and regulation on grazing. It also recommended that grazing by goats in forest should be prohibited and sheep allowed only in specially marked grasslands under strict rotational control. The NCA also recommended the promulgation of grazing rules by each state specifying the grazing rates and providing for the manner in which grazing should be permitted. The

National Forest Policy (1988) is in consonance with the previous policy on the issue of grazing, except for an important qualifier that grazing in forest areas should be regulated with the involvement of the local community. The Expert Committee to review the National Forest Policy 1988, and its implementation under the chairmanship of Mr. C. D. Pandya, IGF (Retd.), also recommended that "A National Grazing Policy should come into effect at the earliest."

Fodder grasslands of northwest India

The traditional utilisation of grasslands in Saurashtra, Kutch, eastern Gujarat, western Madhya Pradesh and southeastern Rajasthan, a drought prone area, evolved to cater to two basic needs – fodder and grazing. Traditionally every village or cluster of villages used to set aside certain areas for livestock grazing, called goucher, and protected other areas from grazing, where the grass was allowed to grow long, to be subsequently harvested and stored for later use. These protected grasslands were called *vidi*, *veeds*, *bheeds* or *rakhals*. They were crucial to rural economy as the fodder produced was used both during the lean summer months and to tide over drought periods. With the promulgation of Land Ceiling Act, after India's Independence, and population pressures, the land use practices have been altered. Land set aside for grazing (*goucher*) has been encroached upon for agriculture, industrial development and urbanization, as a result of which protected fodder producing grasslands came under increasing pressure of livestock grazing. Despite these pressures, there are still some extant grasslands, especially in Gujarat and eastern Rajasthan. For instance, in Saurashtra and Kutch there are 137 reserved *vidis* covering a total area of 63,292 ha. The reserved *vidis* are managed by the Forest Department while the non-reserved vidis are given to various agencies for protection, e.g. *Gaushalas* and *panjrapoles* (trusts that maintain aged cattle), Maldhris cooperative societies, village *panchayats* and milk cooperatives. There are 471 non-reserved *vidis* in Saurashtra and Kutch, covering an area of 57,602 ha. While the condition of reserved vidis is generally good (e.g. Rampura grassland in Dahod), the non-reserved *vidis* are in terrible condition due to mismanagement, corruption and neglect.

Recommendations of the Task Force

1. *Currently "The Cattle Trespassers Act' formulated in 1871 is the only Act applicable to regulate grazing in public and forest land. As the existing Act is outdated and inadequate, there is an urgent need for a* ***National Grazing Policy*** *to ensure the sustainable use of grasslands.*

2. *Plantation of Prosopis juliflora in all grassland habitat must be completely banned, as this exotic spreads very rapidly and covers the grassland.*
3. *Grass growers co-operatives on the lines of Tree Grower Co-operative and Milk Co-operatives should be started.*
4. *The Department of Animal Husbandry must encourage and implement schemes that promote the concept of fewer but better quality livestock, particularly in areas which have protected grasslands to reduce grazing pressure.*
5. *There should be strict laws to stop encroachment of goucher land.*
6. *Fodder produced from reserved vidis (as in Gujarat) should be given to local people on priority basis, before it is exported to other districts/regions. Once the local people benefit, they would develop a stake in protection of grasslands.*
7. *Map all critical grasslands and desert habitats as a comprehensive land/water use plan of the country.*
8. *Build in to a policy statement that critical habitats identified in such mapping will not be converted to tree plantations, will not be classified as 'wastelands' and thereby given over to all kinds of developmental activities, and will not be redistributed for relocation or under land reforms.*
9. *Provide a range of incentives to farmers and pastoralists to continue traditional practices that are beneficial for wildlife and help in sustainable use of grasslands and deserts.*
10. *Encourage and provide appropriate legal backing to community conserved areas containing grasslands and deserts (e.g. Blackbuck protection by Vishnois).*
11. *Assist communities in regenerating and restoring degrading grasslands/deserts.*

The National Forestry Commission has recently given recommendation for the conservation of grasslands and deserts. We fully endorse these recommendations:

Recommendations of the National Forestry Commission on Grasslands (p. 61)

5.5 Recommendations

[1] As a statewide application may not be feasible to implement, it is recommended that specific crucial grasslands be selected for effective conservation, as part of the Protected Area network, or as a part of watershed management under the EPA. Grazing would have to be regulated and fires prevented. Each area must have prescribed management practices, the emphasis being on harvesting grass rather than grazing it, which would result in augmentation of both the generation of grass as well as its nutrition value.

[2] A policy should be formulated to regulate inter-state movement of livestock to enable the States to control grazing pressure on eco-sensitive areas.

[3] The animal husbandry departments should relate the number of goats and sheep to the availability of natural fodder especially in such areas where these animals could cause further degradation to natural ecosystems.

[4] Efforts be enhanced to improve cattle quality, as it is proven that improved varieties tend to be stall-fed and sent less to free-graze on rangelands.

[5] The provision of a sustainable supply of fuel be undertaken by a newly created Fuelwood Mission. Not only will this mitigate the drudgery of millions of women who have no option but to forage for every possible scrap of fuel, but also will reduce pressure on trees and shrubs whereby our remaining forest and trees will be well-protected This can be started initially with a phased programme in and around forests and Protected Areas.

[6] Alternative sources of fuel, especially LPG connections, need to be provided to rural areas in and around forests. Solar energy also needs to be given a much greater impetus, especially in the mountainous and other areas where energy needs are greater and the sunshine available for a greater number of days in a year.

[7] The sale of fuelwood head loads from forests by individual sellers must stop. Headloads should only be permitted for bonafide personal use of the local communities, as earlier. The forest departments should bring out fuelwood to depots and supply wood to those who are the current head loader-seller and who derive their livelihood from such sale, at subsidized / no loss basis, rather than the head-loaders being allowed to go into the forest.

[8] In the interest of the survival of the land, people, forests and the practice of shifting cultivation itself, jhum be regulated to a more sustainable level. This can only be achieved by the State Governments themselves, with active assistance of the Government of India.

[9] Some young members of the present generation of tribals are not keen to continue with jhum in many areas, and jhuming itself is becoming less and less remunerative. People are looking for

alternatives like settled agriculture, horticulture and animal husbandry, which must be extended to them forthwith.

[10] The main objective of forest management should be ecological security. For assessing the effectiveness of forests in contributing to ecological security on the basis of a number of parameters and paradigms such as volume of growing stock, biodiversity, health of forest soil, soil moisture, hydrology, carbon sequestration and crown density, the scope of work of the Forest Survey of India (FSI), Dehradun should be expanded and adequate infrastructure be provided for this purpose. Monitoring of ecological security should be done at five year's interval and a national level report should be published by the FSI. In addition, the FSI should undertake research required to conduct necessary forest surveys and assessments.

Improving Fodder Scenario in India: Grassland/Range Management Options

Rangeland is a broader term than grasslands, including regions where even woody vegetation is dominant. It is a term looking at the land from the viewpoint of livestock production. It also serves as a habitat for wildlife. The main floral component of rangelands is grass or grass like vegetation. At a global level, rangelands provide fodder for over 360 million cattle and 600 million sheep and goat, accounting 9 per cent of world's beef and 30 per cent of sheep and goat meat. It offers livelihood to an estimated 100 million people in arid areas and probably a similar number in other zones through livestock production.

In India, grazing based livestock husbandry continues to play an important role in rural economy of the country as around 50 per cent animals depend on grazing in forests and other grazing areas in many parts of the country. Total area available for grazing in the country is in the range of about 40 per cent of the land area. In states like Himachal Pradesh, Uttaranchal, Jammu & Kashmir, Meghalaya, Nagaland and Arunachal Pradesh over 70 per cent of land area is utilized as grazing ground. In the states like Rajasthan, Madhya Pradesh, Maharashtra and Karnataka also vast areas are used for grazing.

Since India is characterized by tropical monsoon climate and active growth in grazing lands occur only during monsoon months, there is surplus fodder during rainy months and deficits of various levels in other months. Thus there is already growing emphasis on **animal feed security systems** and **fodder banks** to overcome such problems. The surplus production from grasslands during rainy season is to be carefully preserved in various forms to meet the forage requirements of the lean periods. The post harvest technologies such as biomass processing, enrichment and densification appear to be the key for better animal husbandry in the deficit zone.

Under poor soil, water and nutrient situations where cropping is not possible *Silvipasture Systems*, integrating woody perennials and pasture species, can serve the twin purpose of forage and firewood production and ecosystem conservation. ***It has been possible to increase land productivity from 0.5-1.5 t/ha/yr to about 10 t/ha/yr on a rotation of 10 years through such interventions***.

In order to reduce grazing pressure, the concept of **hortipasture**, utilizing land in the orchards by developing pasture stands, should be encouraged.

The prevailing view of looking at grasslands as a single use (forage for domestic animals or wildlife habitat) should be replaced by looking them for multiple uses, incorporating sustainable use, ecosystem functions and biodiversity conservation.

Recommendations of the Task Force for grassland and desert management:

1. Detailed and updated GIS based inventory of degraded rangelands in each agro-ecological zone and also measurement of the impact of rehabilitation programmes.
2. Higher priority on generation of information on temperate grasslands with emphasis on (i) low input, clover based sheep grazing system; (ii) ideal pasture for mixed grazing systems; (iii) inventory of grazing routes and grazing systems; (iv) designing of suitable production system for migratory graziers of Himalaya and the *Thar* desert.
3. To develop a policy of regulated grazing that is managed on scientific principles so that desirable vegetation development could be ensured. As the grazing policy alone can not mitigate the problems of forage availability in the country, a matching approach on fodder production, agro-waste-use and fodder trees should be brought under one umbrella in form of a national fodder mission.
4. Development of Common Property Resources (CPRs) available with village *Panchyats* through improved pasture/silvipasture systems is undertaken by dairy/livestock cooperatives/associations.
5. The practice of stall-feeding should be encouraged among livestock owners in order to prevent over grazing consequent depletion of available forest fodder resources. This should be one of the main issues in the forests being developed under Joint Forest Management programmes (JFMs).

6. In arid and semiarid regions of the country, large blocks of lands away from human habitations could be developed as grass reserve and their production may be preserved in form of hay in fodder banks. The technology of densified bales or enrichment in form of feed blocks may be practiced for ease in transport and enhancing forage quality.

7. In undertaking large-scale range and pasture development programmes, poor availability of quality seeds of range species is often a critical problem. The focus should be on:

   - Research on forage seed standards and seed technology including emphasis on pure germinating seeds (PGS) in grasses.
   - Encouragement and incentives to farmers with small farm holding for forage seed production in a participatory mode.
   - Establishment of a nodal agency to coordinate production and marketing of quality range seeds, both at regional and national levels, involving commercial seed companies, NGOs and farmers' cooperatives etc.

8. There is a need of capacity building at various levels for the rangeland development and seed production of range species activities with the objective of restoring range health.

9. Demonstration of range improvement and management technologies at different locations should receive higher priority and the feed back from the actual beneficiaries and the farmers in the vicinity should be properly accounted for further refinements in the technology.

TOR 2: Institutional and individual capacities to address the issues of grasslands and deserts…

IGFRI and CAZRI exclusively deal with grassland and desert ecosystems respectively. They have adequate capacities and capabilities to address the respective issues. However, their geographical coverage and overall approach (ecosystem services and intrinsic values) needs to be broadened. Gujarat based GUIDE has come up recently to deal with desert ecosystems. However, it is inadequately funded and has limited manpower. Other Institutes and individuals such as BNHS, WII, Universities, BHU, and some of the State Forest Research Institutes have taken up short term studies in some of the grasslands. Despite the available expertise within the existing institutes and with individuals, there

are no long term ecological studies and monitoring programmes for representative grasslands.

Recommendations of the Task Force

It is recommended that a network of grassland ecologists be established and a country wide Long Term Ecological Research (LTER) needs to be initiated in representative biogeographic zones. These LTER sites could then serve as ecological benchmarks for future training, teaching as well as monitoring sites. Simultaneously the nodal agencies need to take up the new dimensions of grassland ecology including impact of climate change and land use practices within and around grassland and desert ecosystems.

TOR 3: Integrating various sectors…

As many as 11 Central Ministries through their research and development institutes, several autonomous bodies and community institutions, universities, local, national and international NGOs have a stake on the conservation, development and utilization of natural resources of grasslands and desert ecosystems (Table).

Table: Various Ministries, Corresponding R & D Institutions and Key areas of work:

SN	Ministries / Sectors	Major Institutions	Key Areas of R & D
1	M/o E & F	ICFRE, BSI, ZSI, WII, FSI, GBPIHED	Basic inventory of Flora and Fauna, Ecology
2	M/o Science & Technology	DBT, DST, CSIR, IIRS, WIHG, Universities, Institutes	Resource Use, Technological Intervention
3	M/o Defence	DRDO, Eco-Task Force, Adventure Cell	Protection of boundaries and areas adjacent to international boundaries
4	M/o Agriculture	ICAR, DARE, AHDP	Development of Agriculture and Animal Husbandry
5	M/o Tourism & Culture	Culture, Tourism	Develop tourism and cultural heritage
6	M/o HRD	Schools, Colleges, Universities, IITs	Academic Activities

SN	Ministries / Sectors	Major Institutions	Key Areas of R & D
7	M/o Rural Development	Land Resource, Water Development, Rural Development	Land and Water Resource Utilization, Rural Development
8	M/o Health	NMPB	Medicinal Plants and Health
9	M/o Tribal Affairs		Tribal Development
10	M/o Mines	GSI	Geological Exploration
11	M/o Commerce & Industry		Industrial Development
12	State Departments	Forest, Agriculture, Animal Husbandry, Rural Development	Livelihoods and BD Conservation
13	NGOs	Local, National, International	Conservation of featured species

Recommendations of the Task Force

Considering a wide range of activities and programmes under each Ministry and R & D Institutions, it would be extremely important to identify some of the cross cutting themes and launching the **integrated research and development programmes** in the grasslands and deserts. Some of the programmes which involve multiple stakeholders are as follows:

i. **Rangeland Management**: Key stake holders being Wildlife Departments, Animal Husbandry, Rural Development, culture and tourism.

ii. **Integrated Watershed Development:** Integrate soil and water conservation, NTFPs, Biodiversity Conservation and rural livelihoods.

iii. **Project Snow Leopard:** Taking Snow Leopard as an apex species of trans-Himalayan Ecosystems, all the programmes of Ministry of Defence, Animal Husbandry and Forest / Wildlife Departments need to be integrated.

iv. **Project Bustard:** Taking four bustards species as flagship species of grasslands, Project Bustard should be started involving Agriculture, Forestry, Wildlife Conservation, Animal Husbandry Departments.

TOR 4: Review of EIA Practices, Procedures

The MoEF has issued new EIA guidelines in September 2006 by modifying the earlier EIA notification of dated 27.01.1994. The new EIA guidelines have become stringent for the larger projects and rather soft for the smaller development projects. For example, in earlier guidelines, EIA was mandatory for all tourism projects in the mountain areas (above 1000 m MSL) with investment of more than Rs. 5 crores. However, in the new guidelines this requirement has been withdrawn. While it may facilitate early clearance of tourism project in the mountain areas, but in ecologically fragile areas such as Ladakh, such a project may appear to be small but actual impact of tourism development such as diversion of water courses, modification of wildlife habitat may have severe environmental implications.

Recommendations of the Task Force

1. Necessary modification would be required in the new EIA guidelines by including ecologically fragile and environmentally sensitive areas where prior EIAs will have to be made mandatory. Also, presence of representatives from identified institutions and experts should be made mandatory during public hearing whenever an EIA is done in the grassland and desert ecosystems so as to review the identified impacts, prediction and mitigation.

Appendix I

Species to benefit through better protection of Grasslands/Deserts

Species	Schedule of WPA	Habitat
Tibetan Antelope	I	Cold Desert
Tibetan Gazelle	I	Cold Desert
Tibetan Wolf	I	Cold Desert
Red Fox	I	Cold Desert
Black-necked Crane	I	Cold Desert, Grassland
Blackbuck *Antelope cervicapra*	I	Short grass plains
Chinkara *Gazella bennettii*	I	Desert, open scrub
Brow-antlered Deer *Cervus eldi*	I	Wet grassland
Swamp Deer *Cervus duvauceli*	I	Wet grassland
Hog Deer *Axis porcinus*	III	Wet grassland
Caracal *Felis caracal*	I	Hot Desert, grassland
Desert Cat *Felis libyca*	I	Hot Desert
Jungle Cat *Felis chaus*	II	Hot Desert, scrub jungle
Desert Fox *Vulpes vulpes*	II	Hot Desert
Indian Fox *Vulpes bengalensis*	II	Hot Desert, grassland
Hispid Hare *Caprolagus hispidus*	I	Wet grassland
Wild Ass *Equus khur*	I	Hot Desert
Grey Wolf *Canis lupus*	I	Hot Desert, grasslands
Golden Jackal *Canis aureus*	II	Hot Desert, grassland, etc
Pygmy Hog *Sus salvinius*	I	Wet grassland
One-horned Rhinoceros *Rhinoceros unicornis*	I	Wet grassland
Wild Buffalo *Bubalus bubalis*	I	Wet grassland, Forest
Agra Monitor Lizard *Varanus griseus*	I	Hot Desert, grassland
Spiny-tailed Lizard *Uromastix hardwickii*	II	Hot Desert, grassland
Great Indian Bustard *Ardeotis nigriceps*	I	Hot Desert, grassland
Lesser Florican *Sypheotides indica*	I	Grassland
Bengal Florican *Houbaropsis bengalensis*	I	Wet grassland
Houbara *Chlamydotis macqueeni*	I	Hot Desert
Swamp Francolin *Francolinus gularis*	IV	Wet grassland
Laggar Falcon *Falco jugger*	I	Hot Desert, grassland
Saker Falcon Falco cherrug	I	Hot Desert, grassland
Peregrine Falcon *Falco peregrinus*	I	Hot Desert, grassland, etc
Red-headed Falcon *Falco chicquera*	I	Hot Desert, grassland
Lesser Kestrel *Falco naumanni*	IV	Hot Desert, grassland, etc
Tawny Eagle *Aquila rapax*	IV	Hot Desert, grassland, etc
Steppe Eagle *Aquila nipalensis*	IV	Hot Desert, grassland, etc
Imperial Eagle *Aquila heliaca*	IV	Hot Desert, grassland, etc
Lesser Spotted Eagle *Aquila pomarina*	IV	Hot Desert, grassland, etc
Common Buzzard *Buteo buteo*	IV	Hot Desert, grassland, etc
Long-legged Buzzard *Buteo rufinus*	IV	Hot Desert, grassland, etc
Upland Buzzard *Buteo hemilasius*	IV	Hot Desert, grassland, etc
All species of Harriers *Circus* spp.	IV	Hot Desert, grassland, etc
Short-toed Snake Eagle *Circaetus gallicus*	IV	Hot Desert, grassland, etc
Red-headed Vulture *Sarcogyps calvus*	IV	Hot Desert, grassland, etc
White-backed Vulture *Gyps bengalensis*	I	Hot Desert, grassland, etc

Long-billed Vulture *Gyps indicus*	I	Hot Desert, grassland, etc
Slender-billed Vulture *Gyps tenuirostris*	I	Hot Grassland, Forests etc
Eurasian Griffon *Gyps fulvus*	IV	Hot Desert, grassland, etc
Egyptian Vulture *Neophron percnopterus*	IV	Hot Desert, grassland, etc
Lesser Adjutant *Leptoptilos javanicus*	IV	Wet grassland
Greater Adjutant *Leptoptilos dubius*	IV	Wet grassland
Jerdon's Babbler *Chrysomma altirostre*	IV	Wet grassland
Black-breasted Parrotbill *Paradoxornis flavirostris*	*IV*	Wet grassland
Marsh Babbler *Pellorneum palustre*	IV	Wet grassland
Finn's Baya *Ploceus megarhynchus*	IV	Wet grassland
Nilgiri Tahr	I	Shola grassland

****

Appendix II

Ecosystems and Habitats to benefit from Protection of Grasslands/Deserts

Habitats/Ecosystems	**States**
Cold Desert	Jammu & Kashmir, Uttranchal, Himachal, Sikkim, Arunachal
Dry Grasslands	Rajasthan, Gujarat, Punjab and Haryana
Hot Desert	Rajasthan, Gujarat, Punjab and Haryana
Tropical short grass plains	Rajasthan, Gujarat, Madhya Pradesh, Maharashtra Andhra Pradesh, Karnataka
Wet grasslands	Uttar Pradesh, Bihar, West Bengal, Assam, Arunachal
Shola Grasslands	Kerala, Tamilnadu, Karnataka, Maharashtra

Appendix III

Protected Areas to get greater benefit from Protection of Grasslands/Deserts

States	**Name of national park/sanctuary**
Rajasthan	Desert NP, Talchapper, Gajner
Gujarat	Desert Wildlife Sanctuary, Narayan Sarovar, Lala and Naliya, Wild Ass Sanctuary, Velavador
Madhya Pradesh	Sailana, Sardarpur, Dahod grasslands
Maharashtra	Bustard Sanctuary, Rehukuri
Karnataka	Rannibennur,
Andhra Pradesh	Rollapadu,
Uttar Pradesh	Dudwa, Katerniaghat, Kishenpur, Sohagi-Barwa
Bihar	Valmiki Tiger Reserve
West Bengal	Jaldapara, Gorumara
Assam	Manas, Kaziranga, Pobitora, Laokhowa-Burachapori, Orang, Sonai-Rupai
Arunachal Pradesh	D'Ering Memorial Sanctuary