Information Sheet on Ramsar Wetlands (RIS)

Categories approved by Recommendation 4.7 of the Conference of the Contracting Parties
[Français] [Español]

Note: It is important that you read the accompanying Explanatory Note and Guidelines document before completing this form.

1. **Date this sheet was updated**: 19th August 2002.

2. **Country**: INDIA

3. **Name of wetland**: **TSOMORIRI**

4. **Geographical coordinates**: 32^0 54'N Latitude, 78^0 18 E Longitude.

5. **Elevation**: (average and/or maximum and minimum) : 4,595 m above MSL

6. **Area**: (in hectares): 12000 ha

7. **Overview**: (general summary, in two or three sentences, of the wetland's principal characteristics)

Tsomoriri is a fresh to brackish water lake (<_5.85 g/l NaC1 measured in mid-summer, spread over an area of ca. 120 km^2 with a maximum depth of 40 m. Wet meadows and borax loaded wetlands covering ca. 10 km^2 border its Northern and Southern shores. The **Nuro Sumdo** wetland lies 5 km further South and forms part of the catchment of the Pare Chu river which flows 20 km South of Tsomoriri. Tsomoriri represents the only breeding ground outside China for one of the most endangered crane – Black necked crane and the only breeding ground of Bar headed geese in India.

8. **Wetland Type**: (please circle the applicable codes for wetland types as listed in Annex I of the Explanatory Note and Guidelines document)

marine-coastal:	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**Zk(a)**
inland:	**L**	**M**	**N**	**O**	**P**	[**Q**]	**R**	**Sp**	**Ss**	**Tp**	**Ts**	
	U	**Va**	**Vt**	**W**	**Xf**	**Xp**	**Y**	**Zg**	**Zk(b)**			
human-made:	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Zk(c)**		

Please now rank these wetland types by listing them from the most to the least dominant:
Q

9. **Ramsar Criteria**: (please circle the applicable criteria; see point 12 below)

[**1**] [**2**] **3** [**4**] **5** **6** **7** **8**

Please specify the most significant criterion applicable to this site: 1

10. **Map of site included**? Please tick **YES** --or-- **NO**
(Please refer to the *Explanatory Note and Guidelines* document for information regarding desirable map traits.)

Yes

11. **Name and address of the compiler of this form**:

World Wide Fund for Nature- India,
Secretariat, 172-B, Lodi Estate
New Delhi- 110 003
Website: www.wwfindia.org
Tel: 91(11)4616532, 4691760-62

With inputs from:

- Dr. Brij Gopal, School of Environmental Sciences Jawahar Lal Nehru University, New Delhi.

12. **Justification of the criteria selected under point 9, on previous page**. (Please refer to Annex II in the *Explanatory Note and Guidelines* document).

(i) Criterion 1:

- Tsomoriri is a unique example of a natural wetland type in the Trans-himalayan biogeographic region. Tsomoriri, one of the highest lake in the world lies in the Changthang region, between 4000-5000m altitude. Changthang region, literally meaning, northern plains, lies in Leh and Nyoma blocks of Leh District in Southeastern Ladakh. Changthangs most striking feature is the absence of a consistent slope, which would enable water to drain away. Rather the undulating land forms itself into huge basins, into which snowmelt streams flow, and finding no outlet settle into the great brakish lakes,like Tsomoriri.

(ii) Criterion 2:

- Unique faunal assemblages with high diversity, endemism and number of rare or vulnerable species These include at least 3 bird species: Black-necked crane, *Grus nigricollis*(endangered.), Ferruginous pochard, *Aythya nyroca* (Vul.), Black-necked grebe, *Podiceps nigricollis* (rare), species of large ungulates the Great Tibetan Sheep, *Ovis ammon hogdsoni* (Vul) and Tibetan Wild Ass, *Equus kiang* (data deficient) both endemic to the Tibetan Plateau plus possibly a third, the Tibetan gazelle, *Procapra picticaudata* (threatened) . Also included are a number of smaller herbivores species endemic to the region: one species of vole, *Alticola roylei*, three species of mouse hares, *Ochotona macrotis,* O. *curzoniae*, *O. ladacensis*, one species of hare, *Lepus oistolus* and one species of marmot, *Marmota himalayana.*

(iii) Criterion 4:

- Vital role as breeding grounds and key staging posts on migration routes for over 40 species of water birds belonging to 6 families indicative of wetland diversity and productivity (Podicipedidae, Ardeidae, Anatidae, Gruidae, Charadriidae and Sternidae plus the two raptor families Accipitridae & Falconidae).

13. **General location**: (include the nearest large town and its administrative region)

Tsomoriri is located 215 km Southeast of Leh town in Eastern Ladakh, Jammu & Kashmir.

14. **Physical features**: (e.g. geology, geomorphology; origins - natural or artificial; hydrology; soil type; water quality; water depth water permanence; fluctuations in water level; tidal variations; catchment area; downstream area; climate)

Geographically, Eastern Ladakh (where Tsomoriri is located) represents the Western most extension of the Northern Tibetan Plateau or Changthang (Northern plains). The Changthang represents the portion of Tibetan Plateau which extends into India in Ladakh. With average elevations between 4500-5000 in the plains, annual precipitations of 100 mm and temperature ranges of 0-30^{0}C in summer, -10 to –40^{0}C in winter, the area is a high altitude cold desert. Following the ancient trade route, and now major trekking route, linking Spiti to Rupshu, one travels, as it were, backwards in

geological time, retracing along the way, in the well preserved rock and fossil record, major stages of Himalayan tectonic history: from the "recent" sedimentary formations of Upper Spiti (mesozoic) to the Cambrian/Pre-Cambrian terrains of the Tsomoriri lake and upper Indus region.

Tsomoriri is about 25 km long, 5-7 km (max. 8.6 km) wide and more than 30 m deep at the deepest point. The surface area of the lake is 148.8 sq km. Maximum depth was in the southeastern corner of 75.5m

15. **Hydrological values**: (groundwater recharge, flood control, sediment trapping, shoreline stabilization, etc.)

- Six major lakes and riverine wetlands including Tsomoriri and Tsokar basins are clustered in South Eastern Ladakh within the upper-catchment of the rivers Indus and Sutlej. As such these important water bodies, still practically undisturbed, form an essential part of the hydrology of two of Asia's largest rivers providing fresh water to millions of people in India and Pakistan.

- Tsomoriri receives water from several small mountain streams, notably one from the north which enters the lake through pasture land at Peldo Le. A single village, Korzok lies on the western shore. Another stream, the Phirsa flows into the lake from the north-west, creating a wide, sloping plain or fan, which is bounded by a low ridge. The Phirsa wanders across the plain, at times reaching the lake, at others debouching into the Para river. The creation of the fan by the Phirsa stream is seen as the reason for the creation of the lake itself, by some scientists.

- The lake is considered to be a relict of the ice age, formed by meltwaters of ice masses left behind by retreating glaciers. Waters from surrounding areas drain into the lake, though the lake has no outflow. Due to desert like conditions, huge amounts of water evaporated very fast from the surface of the lake, changing, what had originally been a fresh water lake into a brackish, and finally saline water lake. During winters the surface of the lake freezes. The shoreline is mainly stony with some sand at the northern end near the Peldo-le estuary.

16. **Ecological features**: (main habitats and vegetation types)

- The Changthang's wetlands represent oases of productivity in an otherwise arid steppe environment. They thus play a key ecological role in sustaining a locally important vegetation cover, the main (and in winter quasi sole) source of food for wildlife and livestock. While there appears to be no vegetation in the deeper part of the lakes and little macrophytic vegetation along their margins, the surrounding wet meadows and bogs have an abundant plant life including several species of sedge (Carex) and grasses, *Pedicularis, Primula*, etc.

- Among the wet meadows which are also fertile pastureland for wild and tame ungulates, the Nuro Sumdo wetland and Kiang dam pasture at the southern end of Tsomoriri, and the Korzok maidan land along the Korzok stream at the northern end are important, also as habitat for burrowing mammals and the insect fauna. They are also the centre of Chang-pa existence and are in effect managed pasturelands. The agricultural fields and nearby marshlands at the confluence of the lake and streams that flow into the lake from the village side serve as important feeding habitats for birds.

17. **Noteworthy flora**: (indicating, e.g., which species/communities are unique, rare, endangered or biogeographically important, etc.)

- There does not appear to be any vegetation in the deeper parts of the lake, but in the shallower areas *Potamogeton sps*., have been reported. Various species of sedges and reeds grow in the marshes, notably *Carex, Caragana and Astragalus sps.*, typical of the surrounding arid steppe vegetation.

- The phytoplankton were limited to a species of *Oocystis* and its density was 900 cells/1 with little change to a depth of 25 m. A few specimens of the diatom Cyclotella were also recorded.

18. **Noteworthy fauna**: (indicating, e.g., which species are unique, rare, endangered, abundant or biogeographically important; include count data, etc.)

- Tsomoriri and Tsokar wetlands represent the only breeding ground of the Bar-headed goose, *Anser indicus* in India, and the only breeding ground for the globally threatened Black-necked crane, *Grus nigricollis*, outside China. The largest of these lakes within Indian territory is the Tsomoriri which, together with neighbouring Tsokar, is believed to be the most important breeding locality for water fowl in Ladakh. Other than the Bar-headed goose, the main water bird species breeding in the area include: the Ruddy shelduck, *Tadorna ferruginea*, Common redshank *Tringa totanus*, Brown-headed gull, *Larus brunnicephalus*, Lesser sand plover, *Charadrius mongolus* and Great crested grebe, *Podiceps cristatus*.

List of water birds in Tsomoriri

	Species
1	Barheaded goose (*Anser indicus)*
2	Ruddy shell duck (*Tadorna ferruginea)*
3	Gargeney (*Anas querquedula)*
4	Northern shoveller (*Anas querquedula)*
5	Red creasted pochard (*Rhodonessa rufina)*
6	Common pochard (*Aythya fuligula)*
7	Tufted duck (*Aythya fuligula)*
8	Ferruginous pochard (*Aythya nyroca)*
9	Common merganser *Mergus merganser)*
10	Unidentified ducks
11	Common coot (*Fulica atra)*
12	Common redshank (*Tringa totanus)*
13	Common greenshank (*T.nebularia)*
14	Green sandpiper (*T. ochropus)*
15	Common sandpiper (*Actitis hypoleucos)*
16	Temminck's stint (*C. temminckii)*
17	Black winged stilt (*Himantopus himantopus*)
18	Lesser sand plover (*Charadrius mongolus)*
19	Brown headed gull (*Larus brunnicephalus)*
20	Pallas;s gull (*L. ichtyaetus*)
21	Commen tern (*Sterna hirundo)*
22	Great creasted grebe (*Podiceps cristatus)*

- Of the smaller mammals, marmots (the Himalayan marmot) are plentiful on the hill slopes surrounding the lakes and even along roadsides. The increase of vehicular traffic in Rupshu, however, is considered to have the potential to damage and destroy their burrows. Voles, hares and numerous species of pikka or the mouse-hare are plentiful though also affected by habitat damage.

- Zooplankton were more varied than the phytoplankton, and their composition in the lake differed greatly from that in the inflowing stream at Peldo-le. Fishes were totally absent.

S.No.	Species	Family
1	*Keratella quadrata* (Muller)	
2	Arctodiaptomus (Stenodiaptomus) stewartianus *(Brehm)* *	Copepoda
3	*Cyclops ladakanus* Kiefer	Copepoda
4	Daphnia	Copepoda
	Stream at Peldo-le	
5	*Pompholyx sulcata* Hudson	Rotifera
6	*Alona guttata* Sars	Cladocera
7	*Alona rectangula* Sars	Cladocera
8	*Alona ladacensis* Brehm	Cladocera
9	*Eucyclops serrulatus* (Fischr)	Copepoda
10	*Eucyclops (?) productus* Kiefer	Copepoda
11	*Megacyclops* prob. *Viridus* (Jurine)	Copepoda
12	*Gammarus pules* (Linn.) *	

* common to both the lake and the stream

19. **Social and cultural values**: (e.g., fisheries production, forestry, religious importance, archaeological site, etc.)

The wetland provides rich pastures for domestic livestock. The area has recently been opened to foreign tourists, thereby providing locals direct as well as indirect employment. Korzok monastery in Korzok village, some 400 years old unlike most of gompas in Ladakh is built on gentle slope and is not multistoreyed.and attracts many. tourists. The wetland is considered 'Sacred' by the local Buddhist community and the water of the wetland is not used by them. At the WWF Annual Conference, Nepal, Nov;2000, Tsomoriri was committed as a 'Sacred Gift for a Living Planet' by the local community. This was possible mainly due to WWF-India's efforts and trust building with local community.

20. **Land tenure/ownership of**: (a) site (b) surrounding area

(a) Site:

- The lake is owned by the Government of Jammu and Kashmir and is part of the proposed Changthang Sanctuary.

(b) Surrounding:

- Surrounding area is largely State owned and the army establishments have taken possession of some area. Most of the land of the village Korzok near the lake is owned by the locals.

21. **Current land use**: (a) site (b) surroundings/catchment

(a) Site:

- The lake is held scared by local community and not used. Couple of years back tour operators held a 'regatta' in which boating etc. was organised. But this is not a regular feature.

(b) Surroundings:

- The marshes and pasturelands around lakes are grazed by domestic and nomadic livestock. These high altitude pasturelands of Changthang are historically the home of Pashmina Goat and main centre for production and supply of Pashmina wool from these areas to the Indian plains and Kashmir valley. Several species of Ungulates and big herds of *Kiang* also depend on these pasturelands for grazing A small portion on the periphery is used by the people of Korzok village

for agriculture. The barley fields at Korzok are considered to be the highest cultivated land in the world. The construction of a rough road going through the marshes along the lake has opened up this remote basin to tourism. The new land use emerging out of this is the camping by tourists right near the lake shore. In a recent survey 66 tents and 640 sheep and goats in an estimated pasture area of less than 20 sq km at Korzok Fu, which is the main summer settlement upstream of Korzok village were recorded.

22. **Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land use and development projects**: (a) at the site (b) around the site

(a) Site:

- The construction of a road rightup to the lake has opened up this once remote basin for tourism and economic activities. The increased human activity is likely to affect the breeding waterfowl population.
- Tsomoriri lake region is experiencing a rapid and considerable development of tourism ever since it was opened up to outside visitors in 1992,93, lying as it does at the confluence of three important trade and now tourist routes: Spiti in the South, the Tsokar basin accessible from the Manali-Leh road in the North West and the jeepable road leading to Upshi and Leh in the North East. The vast majority of tourists come from Western countries attracted by the area's remoteness and novelty, "a recently opened and unspoilt destination", its pristine high desert landscape and lively cultural tradition, all widely advertised by a number of tourism agencies and adventure tour operators.
- Direct disturbance, wilful or not, is another serious threat closely associated with uncontrolled tourist access to areas of high biodiversity e.g. Kiang chasing by jeep safari, disturbance of the Black-necked crane in its feeding and breeding grounds. Increasing pollution levels in areas of tourist concentration like trekking routes and campsites is gradually becoming a problem, in places a serious one, affecting both people and wildlife. In the absence of garbage disposal facilities, the practice of dumping garbage into nearby streams as well as marmot, mouse hare or vole burrows, has become generalized in recent years.

(b) Surroundings:

- During the WWF survey period and peak trekking season (26.7-31.8 1999), , 21 groups (average size = 8) totaling 178 people comprising of 95 trekkers and 83 staff were recorded on the Spiti – Tsomoriri route. By comparison the number of groups encountered during the same period the previous year were only 6 (av.size 10) totaling 53 people (26 trekkers + 27 staff). This represents a more than three fold increase within a span of one year.

- One of the characteristics of tourism, mountain tourism in particular, is a high degree of seasonality, which tends to concentrate and enhance its adverse impact on the environment. This is especially true of fragile high altitude ecosystems such as Spiti and Ladakh where tourist access is essentially restricted to the summer months, which is also the peak period of biological activity and breeding season for much of the bird and other fauna. Direct impact of tourism are many: overgrazing, disturbance of wildlife, pollution.... They can be severe especially when, as is the case here, tourism development is sudden, massive and the area totally unprepared for it.

- Increased pressure on grazing lands on par with the exponential rise in the numbers of trekkers and pack animals, is of particular concern since the prospects for pasture regeneration are severely limited by the extreme climatic conditions obtaining in the region. Such impact is not limited to trekkers' grazing animals but also result from the increasing popularity of jeep safari in the high plains and few wet meadows of the Changthang. Soil compaction and deep barren jeep tracks are an increasingly common sight around popular camping grounds in Korzok (Tsomoriri) and Tsokar meadows for instance. Pasture degradation ensues which also affects wildlife especially wild herbivores (marmots, hares, ungulates), which may be driven off the most severely affected areas.

- Though trends in livestock holdings in Eastern Ladakh are not well documented, overstocking has been reported in the region at least from the 80s. The high levels of mortality that occurred then (Darokhan 1986) as well as more recently, including in 1999, in the survey area, are thought to be a manifestation of deteriorating pasture quality combined with particularly severe weather conditions. Still, the rising prices of the high quality "pashmina" or cashmere wool, the winter under fur of the local high altitude Changra goat, is a strong incentive to further increase stocking rates.

- The growing number of Tibetan refugees, many of them herders from the Tibetan Changthang, who have acquired livestock, mostly sheep and goats, over the last decades, is adding further pressure on Eastern Ladakh rangelands. Finally, the rapid development of trekking tourism in recent years and the substantial number of pack animals that it introduces into the region during the summer season is the last in a series of developments likely to affect Changthang's rangeland.

23. **Conservation measures taken**: (national category and legal status of protected areas - including any boundary changes which have been made: management practices; whether an officially approved management plan exists and whether it has been implemented)

Tsomoriri is administratively designated as a Wetland Reserve. Shooting wildlife is strictly prohibited. A check post has been established by the State Department of Wildlife near Mahe, bridge from where tourists enter towards the lake.

24. **Conservation measures proposed but not yet implemented**: (e.g, management plan in preparation; officially proposed as a protected area, etc.)

- The mentioned threats to the integrity of the region's ecosystems and to the well being of its population are very serious but so are the prospects to mitigate them and to promote sustainable development if corrective measures based on local needs and support are initiated rapidly. Most important in this respect is the fact that degradation especially in terms of pollution and wildlife disturbance is still in its initial stage and limited to a few tourism hot spots. Equally important is the existence of traditional management systems such as low intensity pastoralism, which have made it possible for the wild fauna to survive *in toto* till to' day. The lake lies within the boundaries of the proposed High Altitude Cold Desert National Park in Eastern Ladakh.

- Since indigenous management systems including grazing reserves play an important role in preservation of the concerned ecosystems, the selection of management categories for the proposed Protected Area should be done in close consultation with local communities. This is in order to ensure that these systems are maintained or adapted. Designation categories, which do not allow this (e.g. National Park) should be avoided. One of the main management objectives, and challenge, of this first level of conservation areas will be to try and turn the problem of increased outsiders' access and impact into an opportunity for increased benefits to the local communities and enhanced ecosystem protection.

So how could such exercise be initiated?

- The first effort could be undertaken at the local level during discussion with local communities regarding conservation of their own area. As a next step, basic training in wildlife and conservation, environmental problems deriving from tourism, overgrazing etc. could be imparted to local youths and others like horsemen & guides who accompany tourist groups. Such training could be provided by resource persons working in the area environmental NGOs, researchers, Forest and Wildlife Department...). It would help create a local capacity for nature tourism in the region and could generate new employment opportunities for local people. Similar forms of

training could be organised, perhaps by the associations of tour operators themselves, with some external assistance if required, for tour guides and staff operating from the main tourist centres.

- As regards the tourists themselves, general information on natural/cultural history and environmental concerns could be provided in the form of pamphlets, signboards... at the points of entry into the region (Simla, Manali, Leh) and main staging posts of trekking groups (Kaza, Kibber in Spiti, Korzok in Rupshu).
- Clear and practical guidelines listing environmental/cultural dos and don'ts would also form a key component of the information effort. Contrary to the standard practice of designing guidelines at the higher administrative echelons, such guidelines would be far more effective and comprehensive if first prepared at the grass root level (local community, tour guides and operators, etc.). As above, assistance in the framing of such guidelines could be provided by NGOs, Gos and others.
- Since visitors need to acquire a restricted area permit to enter the region, these guidelines should be distributed by Government offices issuing such permits and their endorsement by tourists should actually be made conditional to granting the permit. They could also be displayed at the different check posts maintained by the State administration in the region.
- Setting up small seasonal tourist information centres managed by local persons at a few key locations (e.g. Kibber, Korzok,), could be achieved at low cost and could play an important role in raising visitors' awareness of environment concerns and cultural sensitivity.
- Creation, based on local initiative, of small museums documenting the region's natural and cultural heritage, would fulfil similar objectives with a broader perspective and for the benefit of both visitors and local communities.
- Reducing pressure on pastures situated along main trekking routes is a first priority. Measures already in force in some areas such as charging a fee for pack animals, represent a benefit for local communities and may also act as a disincentive for bringing in large numbers of animals. These could be generalized and adapted to include jeep safari. "Off track" driving should be banned altogether. To avoid conflicts between neighbouring communities such fees could be charged only to outsiders i.e. tourist groups.
- In the absence of garbage disposal systems in either human settlements or, a fortiori, at campsites, pollution control is becoming an urgent priority. Seasonal clean up operations are not a practical proposition other than in villages and perhaps a few campsites in their vicinity and in any case offer no long term solution. Similarly, with the exponential increase of tourism the oft-recommended practice of compacting solid waste and burying it on the spot, is no solution either. In these conditions there is really no other practical alternative than packing non-biodegradable wastes and tacking them back to the tourist centres where they were acquired in the first place. This is entirely feasible and at no extra cost as groups return to base much lighter than they came and with plenty of storage capcity.
- Particular attention needs also be paid to the growing risk of water pollution by human waste. Simple preventive measures such as locating campsites away from water bodies and construction of dry pit toilets, both of which are traditional practices in the area, would already go some way in helping to check this risk.
- Pollution control should figure prominently in discussion with those concerned (local communities, tourist groups and operators, administrative authorities etc.) and in environmental guidelines and management plans.

25. **Current scientific research and facilities**: (e.g., details of current projects; existence of field station, etc.)

Under WWF-India Project 'Conservation of High Altitude Wetlands in Ladakh Region' a field office has been established at Tsomoriri. The field office will carry out surveys, interact with tourists, tourguides, act as information centre and conduct education awareness programmes for locals, tourists etc. Wildlife Institute of India has recently established a field station at Leh to conduct scientific research in the region.

26. **Current conservation education**: (e.g., visitors centre, hides, information booklet, facilities for school visits, etc.)

Under WWF-India project a Conservation Committee has been formed for Korzok village with locals. Nature clubs have also been established by WWF-India. Under the education and awareness component of WWF-India project, information booklet on Tsomoriri has already been prepared. Few posters in English and local language are being planned on biodiversity of the region.

27. **Current recreation and tourism**: (state if wetland is used for recreation/tourism; indicate type and frequency/intensity)

Tsomoriri is a major tourist attraction for tourists to Ladakh. Currently approx. 2500 tourists visit Tsomoriri in tourist season (May – September), tented accommodation is provided to the tourists by the local tour operators besides the two bed room PWD guest house close to the lake. Locals have also started constructing small private lodges at Korzok to provide accommodation to the tourists.

28. **Jurisdiction**: (territorial, e.g., state/region and functional, e.g., Dept. of Agriculture/Dept. of Environment etc.)

Territorial: Indian State of Jammu & Kashmir
Functional: Wildlife Department, Govt. of Jammu & Kashmir, India.

29. **Management authority**: (name and address of local body directly responsible for managing the wetland)

Wildlife Warden, Leh
Wildlife Department
Govt. of Jammu & Kashmir
Leh, Ladakh

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