2. Information Sheet on Ramsar Wetlands

Categories approved by Recommendation 4.7 of the Conference of the Contracting Parties.

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

1. Date this sheet was completed/updated:
June 1997

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DD MM YY

Designation date | Site Reference Number

2. Country: Russian Federation

3. Name of wetland: Volga Delta

4. Geographical coordinates: 45°54' N 48°47' E

5. Altitude: 25-27 m below sea level **6. Area:** 800,000 ha

7. Overview: The Volga Delta is predominantly a freshwater riverine wetland complex with permanent and seasonal lakes and riverine floodplains. The site comprises the lower part of the Volga Delta (the largest inland delta in Europe), including the shallow waters of the fore-delta. The wetlands of the delta support a rich and globally significant diversity of habitats and species, in particular fish and migratory birds. The value of biophysical functions they perform is very high as well as their amenity values. Major problems that affect the delta are upstream water pollution from urban and industrial developments, agricultural pollution through application of pesticides and fertilizers in the delta itself, and regulation of the Volga River by dam constructions.

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

inland: (L) · M · N · O · P · (Q) · R · Sp · Ss · Tp · Ts
U · Va · Vt · W · Xf · Xp · Y · Zg · Zk

man-made: 1 · 2 · 3 · 4 · 5 · 6 · 7 · 8 · 9

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

9. Ramsar Criteria: (please circle the applicable criteria; see point 12, next page.)

1a · 1b · (1c) 1d [3] (2a) (2b) (2c) 2d [3] 3a (.) 3b (.) 3c [3] 4a (.) 4b ( )

Please specify the most significant criterion applicable to the site: All are important

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).

11. Name and address of the compilers of this form:

Vitaly G. Krivenko: Research Institute for Nature Conservation, Znamenskoye-Sadki, Moscow 113628, Russia. Tel: +7-095-4232533 Fax: 00-7-095-4232322.
Irina E. Kamennova: Wetlands International-Russia Project Office. PO Box 55. Moscow 125319, Russia. Tel/Fax: +7 095 1564202. E-mail: kamennova@wwfrus.glasnet.ru.
Nikolai N.Moshonkin: Astrakhan Regional Committee for Environmental Protection and Natural Resources: 113 Bakinskaya Street, Astrakhan 414000, Russia

12. Justification of the criteria selected under point 9, on previous page: The Volga Delta is a unique natural feature which plays an extremely important role in the functioning of the 1,380,000 km^2 basin of the longest European river. It supports a rich and globally significant diversity od habitats and species, including rare and threatened species. The delta is of particular importance for migrating and breeding populations of waterbirds and commercially valuable fish species.

13. General location: In Astrakhan Region, 50-100 km south and southeast of the city of Astrakhan, between the well-defined drop-off in the Caspian Sea to the south and herb meadows and agricultural land to the north. To the west and east, the delta borders the western and eastern ilmens: formation of lakes interconnected by canals and separated by dunes.

14. Physical features:

Relief and hydrography

The Volga is the longest river in Europe and its delta is one of the largest deltas in the world, covering a total area of 1.9 million ha. The delta exhibits classic triangular formation extending for 120 km from north to south, and 200 km along the edge of the Caspian Sea . The landscape is predominantly a monotonous and flat plain, slightly tilted towards the Caspian Sea. The majority of the land lies 25-27 m below sea level. The current delta has no palaeo-analogues; its relief and deposits are very young formations, dating from the Late Holocene, and it is undergoing continuous change under the influence of two systems: the Volga river and the Caspian Sea. The surface of the lowland is dominated by alluvial-marine, lake-marine and lake-alluvial soils.

According to the peculiarities of relief, hydrography and hydrological regime, the Volga Delta can be subdivided into two portions: the upper (emerged) part of the delta and the lower or fore-delta area. In the lower part, the kultuk area (brackish to freshwater bays overgrown with emergent and submerged plants) is usually distinguished from the fore-delta itself.

The upper part of delta is an extensive network of channels (the largest are Bakhtemir and Buzan discharging 70% of the Volga water) and smaller streams, which divide the lawland into a great number of islands with areas ranging from 200 to 2,000 ha. The banks of the streams are usually higher than the interior of the islands due to the load of suspended sediments along them.

The present lower part of delta was formed during the hot-dry stage of the climatic cycle (between 1930 and 1940), when the level of the Caspian Sea dropped by 2.3 m and extensive shallows were created. The kultuk area is a line of bays with slow-flowing water and a large number of small islands, which extends along the edge of the emerged part of delta. It varies from one km to several km in width. The bays are between 0.4 and 1.3 m deep at low water, and between 1.0 and 2.3 m deep at high water (i.e. during the spring flood period). The fore-delta comprises extensive shallow area with a great number of low islands. Water depths vary between1.0 and 1.7 m (occasionally 2.5 m) at low water, and increase by 0.7-1.5 m at high water.

Hydrology

The hydrological regime is determined by the flow of the Volga River, and is characterized by a pronounced spring-summer flood, summer-autumn low water and winter high water. A considerable increase in the water level (usually1.0-2.5 m, but occasionally up to 5 m) sometimes occurs as a result of strong winds from the Caspian Sea. The natural hydrological regime has been altered by the construction of hydro-electric power stations upstream on the Volga.

The hydrological regime of the delta is also characterized by long-term cyclical changes. These cycles develop over periods of 30 to 45 years (the intra-century cycle) and 70 to 90 years (the century cycle). The last hot and dry period (of the intra-century cycle) occurred between 1951 and 1978. Since 1979, the cool-humid stage of the century cycle has been developing. It is expected to be changed to the hot-dry in 2008-2010.

At the apex of the delta, the mean annual flow of the Volga is about 250 cubic km. The recording of annual flows began in 1881; the maximum recorded annual flow is 390 cubic km in 1926 and the minimum 161 cubic km in 1937. In the current period of the development of the cool-humid stage of the century climatic cycle, the mean annual flow of the Volga has exceeded 300 cubic km, and the level of the Caspian Sea has risen by two metres. The majority of the river flow occurs during the spring floods, between late April and early June. Before the dams were constructed along the Volga, spring floods comprised 60% of the annual flow. Under the current regulated conditions this has decreased by about one third.

Regulation of the Volga River, for the production of hydro-electricity, has resulted in a reduction in the volume and period of spring flooding as the amount of water discharged from the reservoirs during winter has increased. This increased winter flooding has caused the erosion of channel banks, flooding of parts of the delta and ice blockages of the channels. A large part of the sediment carried by the river is now deposited in the reservoirs of the Volga-Kama Cascade, instead of being carried downstream into the Volga Delta, where the annual load of suspended sediments has decreased from 13 million to 6 million tonnes.

Climate

The delta has an arid, continental climate, with local influences from the Caspian Sea, extensive water surfaces and aquatic vegetation. The annual air temperatures vary from a minimum of -40°C to a maximum of +45°C. The warm period, when the temperature is above zero, lasts for 235-260 days. The ice period lasts for 70-113 days. Annual precipitation varies from 160-180 mm on the coast of the Caspian Sea to 240-310 mm in the north of Astrakhan Region. Evaporation is strongly seasonal; it is low in winter and rises to 175-200 mm per month in summer. The annual potential evaporation is approximately 1,050 mm. The prevailing winds are easterly, southeasterly, and less often northeasterly.

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15. Hydrological values: The delta acts as a vast filter between the Volga River and the Caspian Sea. The water of the Volga which flows through the delta comprises 90% of the surface run-off entering the Caspian Sea, and therefore determines the hydrological regime of this inland sea.

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16. Ecological features: The upper part of the delta contains three dominant habitat types:

- islands with herb meadows (mainly *Veronica anagallis-aquatica, Carex acuta* and *Polygonum amphibium*) and reeds *Phragmites australis*. Channels amongst the islands are overgrown with bur-reed *Sparganium ramosum*, pondweeds (*Potamogeton perfoliatus* and *Potamogeton lucens*), *Limnanthemum nymphaeoides, Nymphaea alba* and other emergent and submerged plants;
- islands with dense reedbeds of *Typha angustifolia* and *Pharagmites australis*, covering 90-100% of their surface area. *Pharagmites* ranges in height from 3.5 to 5.6 m and *Typha* from 1.5 to 2.5 m;
- islands of 50 to 300 ha in extent with forests (mainly willows *Salix triandra* and *Salix alba*) on raised banks, and reedbeds.

The lower part of delta (the kultuk area and the shallows of the fore-delta) contain the following habitat types:

- three types of reedbed formations which differ according to the degree of basal coverage: 'kurtina' reed-beds, with small isolated stands of reeds covering 20-40% of the occupied area; bands of accreted kurtinas covering 50-60% of the surface area; and massive stands of reeds covering 70-80% of the surface area of the water bodies. Areas without reeds are occupied by bur-reed *Sparganium ramosum* and other emergent and submerged plant communities dominated by caltrop *Trapa natans*, *Salvinia natans, Limnanthemum nymphaeoides*, pondweeds *Potamogeton* spp., *Vallisneria spiralis, Myriophillum verticullatum* and *Nitella* sp. The three types of reedbeds are transitional communities resulting from the process of succession;
- beds of branched bur-reed *Sparganium ramosum* with a basal cover of 50-70%. In recent years, these beds have decreased in extent because of the increased water depths;
- islands with dense stands of cat-tail *Typha angustifolia* and reed-beds, with a basal cover of 90-100%. White willows *Salix alba,* 20-40 years old, line some of the channels and oxbow lakes;

- areas of open water among the islands and near the Caspian Sea (up to the drop-off), with a depth of 0.7-2.5 m. These are overgrown with *Vallisneria spiralis, Myriophillum verticullatum* and *Nitella* sp.

The total area of each of the major habitats is given in Table 1.

Table 1: Dominant habitat types in the Volga Delta (within the boundaries of the Ramsar site)

Habitat type	Area, in thousands of ha	%
Upper part of the Delta:		
Islands with herb meadows	92.0	11.5
Islands with *Typha angustifolia* and reedbeds	106.0	13.2
Islands with forest	17.0	2.1
Agricultural land	32.0	4.0
Lower part of the delta		
I. Kultuk areas		
'Kurtina' reed-beds	4.3	0.5
Bands of 'kurtina' reedbeds	21.3	2.7
Massive stands of reeds	7.0	0.9
Beds of *Sparganium ramosum*	7.5	0.9
Islands with *Typha angustifolia* and reed-beds	139.8	17.4
II. Fore-delta		
'Kurtina' reedbeds	90.0	11.3
Bands of 'kurtina' reed-beds	59.3	7.5
Massive stands of reeds	16.5	2.0
Islands with forest	9.0	1.2
Beds of *Sparganium ramosum*	14.0	1.8
Open waters 0.7-2.5 m deep	184.0	23.0
Total area	800.0	100.0

17. Noteworthy flora: The complex of terrestrial and aquatic habitats in the Lower Volga supports a rich diversity of vegetation, with over 400 plant species from 256 genera and 82 families. Herbaceous communities and reed-beds (common reed *Phragmites australis*) are the most widespread. A rare relic plant lotus lily *Nelumbo nucifera*, currently listed in the Russian Red Data Book, covers increasing areas in the delta (2,000 ha only within the Astrakhan Biosphere Reserve). Until recently, caltrop *Trapa natans* (also included in the Russian Red Data Book) was widely distributed in the delta, but there has been a reduction in the kultuk areas occupied by this plant in recent years. *Marilea aegyptiaca* and *Aldrovanda vesiculosa* occur seldom. The diverse formations of emergent and submerged aquatic plants in the delta act as centres of distribution for these species, helping to maintain the wetland plant communities in water bodies in adjacent arid areas. *Myriophillum verticullatum, Vallisneria spiralis* and *Potamogeton lucens* are of particular importance for biodiversity conservation.

18. Noteworthy fauna:

Zooplankton

846 species of zooplankton have been recorded in the water bodies in the Volga Delta; these comprise 136 protozoa, 418 rotifers, 145 cladocerans, 70 copepods and 77 others. The basis of the zooplankton population in the delta is made up of species common throughout the Lower Volga region: *Brachionus calyciflorus, Bosmina longirostris, Euchlanis dilatata, Keratella quadrata* and many others. Species with a more tropical affinity are also found, *e.g. Sinautherina spinosa, Sexapholeberis kingii, Oxyurella sigalensis, etc*. The zooplankton in the fore-delta comprise more benthic species, and also many species associated with the macrophytic vegetation.

Benthos

Approximately 530 benthic and bentho-nektonic animals inhabit the lower reaches of the Volga Delta. This includes plychaetes (1 family, 2 species), oligochaetes (3 families, 24 species), insects (55 families, 368 species), crustaceans (7 families, 41 species), bivalves (4 families, 44 species) and gastropods (10 families, 36 species).

Fish

The fish in the Volga comprise 124 species and sub-species from 17 families and 8 orders. These fish have great commercial value, with 25 of the 33 commercial species found in the Caspian Sea being caught in the Volga. The main species are Russian sturgeon *Acipenser gueldenstaedti*, beluga sturgeon *Huso huso*, stellate sturgeon *Acipenser stellatus*, sterlet *Acipenser ruthenus*, carp *Cyprinus carpio*, bream *Abramis brama*, pikeperch *Stizostedion lucioperca*, catfish *Silurus glanis*, Caspian roach *Rutilus rutilus caspicus*, pike *Esox lucius*, chub *Leuciscus cephalus*, rudd *Scardinius erythrophthalmus* and tench *Tinca tinca*. The fish in the Caspian Sea can be divided into saltwater, migratory, semi-migratory and freshwater categories. The populations of migratory and semi-migratory species are those which have been affected most by the construction of dams. Spawning grounds of sturgeons, the most valuable commercial species and those with the longest migrations up the Volga River, have reduced from 3600 ha to 430 ha. Only about 1% of the spawning grounds of the beluga sturgeon remains accessible to the fish. To compensate for this, sturgeon hatcheries have been developed, and millions of juvenile sturgeons are released into the Volga each year. However the population is still in decline. As sturgeon grow very slowly and take about 10 years to mature, it is a long time before depleted stocks can recover.

Mammals

Some 30 species of mammals occur in the Volga Delta. The most numerous are racoon dog *Nyctereutes procyonoides* (c. 4,500 individuals), wild boar *Sus scrofa* (400-1000), American mink *Mustela vison* (c. 3,000), muskrat *Ondatra zibethicus* (7,000-25,000), and stoat *Mustela erminea*. The common otter *Lutra lutra*, European beaver *Castor fiber*, and red fox *Vulpes vulpes* also occur. The Caspian seal *Phoca caspica* is common in delta areas bordering on the sea. Bats (Chiroptera) include Leisler's bat *Nyctalus leisleri* and noctule bat *Nyctalus noctula*.

Birds

The delta is one of the richest habitats for waterbirds in the world. 264 bird species have been recorded in the Lower Volga area, including 11 species of Ciconiiformes, 29 Anseriformes, 21 Falconiformes, 11 Gruiformes, 52 Charadriiformes and 101 Passeriformes.

(a) Breeding species

The collection of data on the colonial waterbirds of the Volga Delta over many years has demonstrated the relationship between the state of the habitat and the size of the bird populations. In the 1930s, the fall in the level of the Caspian Sea resulted in an increase in the area of the emerged part of delta and shallow waters, and the numbers of colonial birds increased rapidly. In the 1940s, waterbird numbers were high and the species composition in the colonies was very rich. In the 1950s, the sea level continued to fall, and tall gallery forests became dominant. Herons, spoonbill *Platalea leucorodia*, glossy ibis *Plegadis falcinellus* and some other species showed a marked decline. In the early 1970s, the fall in the level of the Caspian Sea reached its maximum at 29 m below sea level. A decrease in the area of forest resulted in some decrease in the numbers of most Ciconiiformes species. This tendency was partly compensated for by the formation of small patches of forest on the fore-delta islands. Extensive

reedbeds provided nesting sites for grey heron *Ardea cinerea* and large egret *Egretta alba*. Between 1979 and 1993, the level of the Caspian Sea was rising rapidly (up to 2 m). In the early stage of this process (until 1987), an increase in depth of lakes, channels and streams in the delta had a positive effect on colonial birds, providing them with new feeding and nesting sites. At this time, there were 44 breeding colonies in the delta, containing 56,800 breeding pairs. However, as the depth of water has increased, conditions have deteriorated, due in part to a decline in the area of reed-beds and forests. The total number of Ciconiiformes has now decreased to 7,800 pairs; many birds have moved away from the delta, and species diversity has been reduced. The total numbers of colonial waterbirds are presented in Table 2.

Table 2: Population of colonial waterbirds in the Volga Delta

Year	Numbers of birds, in thousands of pairs								
	Ardea cinerea	*Egretta alba*	*Egretta garzetta*	*Nycticorax nycticorax*	*Ardeola ralloides*	*Platalea leucorodia*	*Plegadis falcinellus*	*Total Ciconi-iformes*	*Phalac-rocorax carbo*
1980	4.0	6.0	3.6	4.3	4.0	1.2	4.5	27.4	18.0
1987	3.9	5.0	2.7	2.5	5.2	0.4	4.5	24.3	32.5
1991	0.7	1.5	1.4	1.0	0.1	0.1	0.5	5.3	25.5
1994	0.5	1.0	1.4	1.4	0.1	0.1	0.5	5.0	26.4

The delta is also an important breeding area for Anatidae and coots, although their numbers have been declining as a result of the recent rise in sea level. During the last 10 years, the number of breeding pairs of greylag goose *Anser anser* has decresed from 13,000 to 9,000, that of mallard *Anas platyrhynchos* from 12,000 to 7,000, that of red-crested pochard *Netta rufina* from 4,000 to 2,000, that of mute swan *Cygnus olor* from 9,000 to 7,000, and that of common coot *Fulica atra* from 170,000 to 130,000. Reed habitats are the most important habitats for these species during the breeding season. Banks of streams in the upper part of delta are also of great importance for *Anas platyrhynchos* .

(b) Migrating and moulting species

The delta lies on a major migration route, with many thousands of waterbirds from breeding areas in Western Siberia, Northern Kazakhstan and other regions passing through the area in spring and autumn. However, the importance of the delta for migrating birds has declined in recent years, mainly due to the rise in the level of the Caspian Sea.

The spring migration of ducks begins in early March. Mallard *Anas platyrhynchos* and northern pintail *A. acuta* migrate through the delta mainly in the second half of March; common teal *Anas crecca* and tufted duck *Aythya fuligula* in late March and early April. The greylag goose *Anser anser* is one of the first migrants to arrive in spring. Most of these are birds breeding locally. The whooper swan *Cygnus cygnus* passes through the delta in large flocks in early March. A pronounced migration of mute swan *Cygnus olor* occurs after mid-March, and involves mainly local breeders and the Kazakhstan population. The total number of birds migrating through the delta in spring is estimated at seven million individuals. Most of these birds use the delta wetlands as a staging area, concentrating in the shallow areas of the fore-delta overgrown with reeds and *Sparganium.*

The autumn migration begins in early October, and the main passage takes place between the middle of October and the end of November. The autumn migration is less pronounced than that in spring, except in the case of whooper swan and white-fronted goose *Anser albifrons*. The total number of migrating birds in autumn varies from year to year, and is estimated at between five and ten million individuals.

For several centuries, the Volga Delta has been renowned for its importance for moulting dabbling ducks, migrating to the delta from the extensive breeding areas in Western Siberia, northern and central Kazakhstan and central areas of European Russia. In the early 1980s, the total number of moulting ducks was estimated at 400,000 individuals. Changes in the hydrological regime have caused degradation of the habitat for ducks in summer, and this has resulted in a reduction in numbers of moulting birds.

(c) Rare and threatened species

Two globally threatened species of birds currently listed in the IUCN Red Data Book occur in the Volga Delta:

- Dalmatian pelican *Pelecanus crispus:* a breeding species with a population of 30 to 240 pairs. This species has been declining in the last years.
- Siberian crane *Grus leucogeranus:* a rare passage migrant.

A further 12 species occurring in the delta are listed in the Russian Red Data Book:

- Pygmy cormorant *Phalacrocorax pygmaeus:* a rare breeding species with a population of 5-15 pairs.
- Cattle egret *Bubulcus ibis:* a rare breeding species, only 2-6 pairs.
- Eurasian spoonbill *Platalea leucorodia:* a breeding species with a population of 250-350 pairs. This species has been declining in recent years.
- Glossy ibis *Plegadis falcinellus:* a breeding species with a population of 470-1,400 pairs.
- Osprey *Pandion haliaeetus:* a common breeding species with a stable population of 20-25 pairs.
- White-tailed eagle *Haliaeetus albicilla:* a common breeding species, with a stable population of 150-160 pairs.
- Great black-headed gull *Larus ichthyaeetus:* a rare breeding species. There a large colony of *L. ichthyaeetus* on Zhemchuzhny Island, 80 km from the coast. This lies outside the Ramsar site, but the birds use the delta as a feeding area in spring and autumn.
- Bewick's swan *Cygnus columbianus bewickii*, white-headed duck *Oxyura leucocephala*, peregrine falcon *Falco peregrinus*, black-winged stilt *Himantopus himantopus* and avocet *Recurvirostra avosetta:* rare passage migrants.

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19. Social and cultural values: The delta supports highly productive spawning, nursery and feeding areas for many species of fish, 20 of which are of commercial value. About 50% of beluga and 80% of the world catch of Russian sturgeon come from the Lower Volga. The delta also supports large populations of waterbirds. Waterfowl hunting is a major activity throughout the region, providing significant economic benefits to local communities. Reeds are traditionally used for building materials.

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20. Land tenure/ownership of: There are two major forms of land ownership at the site: state and communal. State lands are represented by the Astrakhan Biosphere Nature Reserve. The country is in a transition with respect to land ownership, and it is difficult at the present time to indicate precisely which areas have become the property of local communities (collective farms). Small plots of land are in private ownership.

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21. Current land use:

(a) Land use at the Ramsar site

Traditional activities in the delta have relied on the sustainable harvest of wildlife, particularly fish and waterfowl, and the harvesting of reeds. In some areas of the upper part of the delta, production of rice and vegetables has been developed. Rice growing has had the most adverse effect on the delta ecosystems, resulting in pollution of the wetlands with pesticides and fertilizers. Cattle grazing takes place on the highest islands in the upper part of the delta. Reed harvesting practices which have resulted in the degradation of reed habitats have largely decreased in recent years. Commercial fishing takes place in the upper part of the delta, where sweep-nets are used during the spring and autumn migrations of sturgeons and anadromous fish. The upstream area outside the Ramsar site is experiencing major pressure from fishing activities. In the lower part of delta, fishing is limited. Waterfowl hunting is a

major activity throughout the Lower Volga during a period of 2.5 months in autumn. Limits have been set on the number of visits which hunters may make and the number of birds that may be shot. Pressure from other recreational activities is relatively low, and ecotourism is a new activity in the Volga Delta.

(b) Land use in the catchment area

Over 65% of the land in the Astrakhan Region is used for agricultural purposes. Of the 393,000 ha of arable land, 240,000 ha are under irrigation. In 1989, cereal crops occupied almost half of the cultivated area. In recent years this has decreased by 74,400 ha due to a change to more irrigated crops and a reduction on the area of low-yielding cereals. Livestock production is low, and fails to meet the local demand for meat and milk. The production of vegetables, water melons, rice and eggs are profitable enterprises, whereas the production of beef, mutton, pork and milk production are unprofitable. The seasonally flooded meadows are mown for hay, ploughed for cultivation, and used for irrigation. Reeds are cut for a variety of purposes, in particular for building materials and cellulose manufacturing. The economic value of the fishing industry is very high, with about 50% of the world catch of beluga and 80% of Russian sturgeon coming from the Caspian Sea and its tributaries, especially the Volga River. In recent years, a large industrial complex has been established on the basis of the Astrakhan gas condensate deposit. It is expected that this complex will produce elementary sulphur, gas and a variety of petroleum fuels. The first phase of the gas processing plant has been in operation since 1986.

The status of the delta wetlands is highly dependant on land-use activities in the catchment area of the Volga River. Only a small amount of pollution that reaches the Volga Delta originates from within the delta. The vast catchment area of the Volga is characterized by extensive industrial, urban and agricultural developments. Large industrial cities are located along the river, and these support oil refineries, chemical and petrochemical factories, cellulose processing plants, steel refineries and other metal processing industries.

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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

Threats at the site include illegal hunting, excessive harvesting of reeds and overgrazing. Legislation and administrative structures to govern hunting are in place, but are not sufficient to safeguard the resource from illegal practices and poaching. Further funding of monitoring and regulatory activities is needed if they are to be effective in determining population sizes and controlling poaching and other illegal activities. The cutting of reeds for the manufacture of cellulose is the most damaging practice. The cutting of large areas of reeds at too frequent intervals not only destroys the reeds themselves, but also eliminates valuable wildlife habitat, including shelter and food resources for quarry species.

(b) around the site

The greatest impact on the delta has been caused by hydro-electrical installations (regulation of the Volga River), agriculture (application of pesticides and fertilizers), industrial wastewater releases and water transport (oil pollution). Regulation of the Volga River flow for the production of hydro-electricity has resulted in alterations in the the timing, duration and level of flooding. The storage of up to 60 cubic km of spring flood waters in the reservoirs for use during the summer-autumn period virtually prevents a natural spring flood from occurring. The load of suspended sediments has greatly decreased, with most sediment now being trapped in the reservoirs. Small streams in the delta area dry up in years when the flood level is low. Dams prevent both the upstream and downstream movements of fish through the delta to their spawning grounds, some of which are located a further 1500 km upstream.

Along its 3690 km length, the Volga River annually receives about 12 cubic km of polluted industrial, domestic and other drainage water. The drainage water contains 387,000 tonnes of organic

materials, 13,000 t of petroleum products, 396,000 t of suspended matter, and considerable quantities of phenols, pesticides, heavy metals and other pollutants.
Air pollution from Astrakhan and nearby industrial facilities could well aggravate the water pollution problems. The most important atmospheric pollutants are dust, carbon monoxide, hydrogen sulphide, sulphur dioxide, petroleum products, copper, zinc, phenols and nitrite.

Agriculture such as rice-growing and the cultivation of tomatos in the vicinity of Astrakhan, contributes large quantities of pollutants to the Volga. The main threat is the use of pesticides on a large scale, especially non-biodegradable herbicides in the rice fields. The application of pesticides in the Astrakhan Region has decreased in recent years from 1400 t in 1988 to 620 t in 1990, mainly due to changes in the methods of growing rice. Excessive application of fertilizers has caused eutrophication in the wetlands. The amount of organic matter deposited annually in the delta has increased from about 3.5 t in the 1960s to 6-7 t in recent years. Oxygen deficits are a common feature in the western portion of the northern Caspian Sea during summer. This is mainly confined to water less than 1 m deep, but periodically extends into water 3-5 m deep.

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23. Conservation measures taken: The entire area was designated as a Ramsar site by the Government of the USSR on 25 December 1975 (Decree No 1049), and this designation was reconfirmed by the Government of the Russian Federation on 13 September 1994. The biota of the Volga Delta are protected in several protected areas. The Astrakhan Biosphere Nature Reserve was established in 1919. This now consists of three separate sites which together provide strict protection to a total of 66,816 ha. Two of the sites also have buffer zones totalling 31,000 ha. Protected areas of other types include four wildlife refuges ('zakazniks') totalling 38,200 ha: the Krestovy, Tunanka, Teplushka and Zhirotopka; and four nature monuments: one of these is an important fish spawning area of 300 ha, and the other three are breeding colonies of Ciconiiformes, totalling 17 ha. In other parts of the Ramsar site, various activities such as recreation, agriculture and hunting may take place. However, it is forbidden to carry out any activities which might threaten the existence of the wetland ecosystems. In 1991, a Strategy and Action Plan to conserve the wetlands of the Lower Volga was developed at an International Workshop held in the city of Astrakhan and organized by IWRB, WWF and Russian conservation agencies.

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24. Conservation measures proposed but not yet implemented: The Strategy and Action Plan to conserve the wetlands of the Lower Volga identifies the general and specific directions that need to be taken. Several detailed projects which are required to achieve the objectives of the Action Plan are under preparation.

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25. Current scientific research and facilities: Research on the Volga Delta began 150 years ago, *e.g.* Becker (1853), Bogdanov (1871) and Bostanzhoglo (1911). Regular monitoring of the delta ecosystems, in particular fish and waterbird populations, has been conducted for more then 70 years, since the Astrakhan Nature Reserve was established. In 1968, the Caspian Ornithological Station was established for coordinating research on waterfowl in the Lower Volga. Several research institutes of the Russian Academy of Science and the State Committee of Environment Protection, Moscow University and other academic institutions take part in the research.

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26. Current conservation education: The Astrakhan Biosphere Nature Reserve has a natural history museum and there is a museum of local history in the city of Astrakhan which gives great emphasis to education matters. The Nature Reserve has published a large number of posters, leaflets and reports about the Volga Delta and its conservation. Several films aimed at raising public awareness of the delta have been produced.

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27. Current recreation and tourism: The Volga Delta has immense potential for the development of tourism. In recent years, foreign tourism has been promoted with hunting, fishing, birdwatching and photography as the main activities (c.500 foreign tourists annually).

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28. Jurisdiction: Territorial: Administration of Astrakhan Region (15 Sovetskaya Street, Astrakhan 414008, Russia).
Functional: State Committee of the Russian Federation for Environmental Protection (4/6 Bolshaya Gruzinskaya Street, Moscow 123812, Russia).

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29. Management authority: Regional Committee for Environmental Protection and Natural Resources (113 Bakinskaya Street, Astrakhan 414000, Russia) and Astrakhan Biosphere Nature Reserve (199 Tsarev River St., Astrakhan 414021, Russia).

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30. Bibliographical references:

Astrakhan Nature Reserve. 1991. Moscow. Agropromizdat Publishers. (In Russian)

Chuikov, Y.S. and V.Fisher (Ed.). 1991. Status of the environment in the Volga Delta, Volga-Akhtuba floodplain and Western Ilmen area. IWRB Spec.Publ. Slimbridge, U.K. (In Russian)

Chuikov, Y.S. 1993. The Volga Delta. IWRB Spec.Publ. Slimbridge, U.K. 33 pp. (In Russian)

Finlayson, C.M. (Ed.). 1992. A Strategy and Action Plan to conserve the wetlands of the Lower Volga. Developed at an International Workshop, held in the Russian city of Astrakhan during October 1991. IWRB. Slimbridge, U.K. 26 pp.

Finlayson, C.M., Y.S. Chuikov, R.C. Prentice and W. Fisher (Eds.). 1993. Biogeography of the Lower Volga, Russia: an overview. IWRB Spec.Publ.28, Slimbridge, U.K. 16pp.

Krivenko, V.G. 1991. Water birds and their conservation. Moscow. Agropromizdat Publishers. (In Russian)

Krivenko, V.G. 1994. Register of waterfowl populations in the Volga Delta. Unpublished Internal Report. (In Russian)

Krivonosov, G.A. and A.F.Zhivoglyad. 1989. Astrakhan Nature Reserve. *In:* Zapovedniks of the European Part of RSFSR. Vol.2. Moscow: Mysl Publishers. (In Russian)

Skokova, N.N., V.G. Vinogradov. 1986. Conservation of waterfowl habitats. Moscow, Agropromizdat Publishers. 240pp. (In Russian)
