



FRESHWATER ISSUES IN MONGOLIA

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Water resources of Mongolia are limited and unevenly distributed within the country and there are three main hydrological Basins: Arctic Ocean basin, Pacific Ocean basin and Central Asian Internal Drainage basin. The Central Asian Internal Drainage basin is the largest one and includes the Great Lakes Depression, including Uvs Lake, Khar-Us Lake, Khar Lake, and Khyargas Lake.

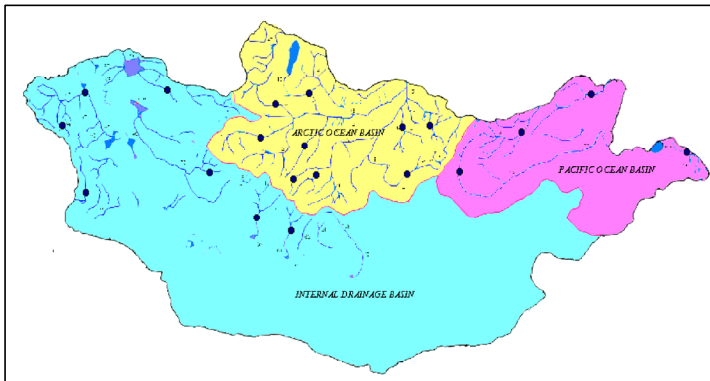


Figure 1. Main Hydrological basins of Mongolia

Water resources of Mongolia are highly vulnerable to climatic conditions. Mongolia has harsh continental climate with four distinctive seasons, high annual temperature

fluctuations, and low rainfall. Average annual temperature ranges between 8.5°C in the Gobi and -7.8°C in high mountain regions of Mongolian Altai, Khangai and Khentei. Average annual precipitation is low (200-220 mm) and represents a range between 38.4 mm in the Gobi Desert and 389 mm in the North (*Mongolia's Initial National Communication, 2001*). Total water resource of Mongolia is estimated as 599 km³, from which 83.7% is located in 3500 lakes, 10.5% in 262 glaciers and 5.8 % in 3811 rivers (*Surface water of Mongolia, 1999*).

CONSERVATION IMPORTANCE OF FRESHWATER ECOSYSTEMS

Mongolia is at ecological crossroads of Asia where the great Siberian coniferous taiga forests meet the vast Asian high-altitude grasslands (steppes) and the forbidding, arid expanses of the Great Gobi Desert.

The territory of Mongolia is covered by two out of the three major waterfowl flyways in the Asia-Pacific region (Central Asian-Indian Flyway and

There are 426 bird species registered in Mongolia (State of the Environment, 2002):

- 108 species of passage migrants,
- 74 species of residents,
- 231 species of summer visitors
- 30 species of winter visitors that breed in Siberia.

East Asian-Australian Flyway). Mongolia has joined the East Asia Crane Network and the Anatidae Site Network in the Asian Flyway and designated two Ramsar Sites for the Anatidae Network.

The lakes, rivers, streams, marshes, oases and other wetlands support their own distinctive flora and fauna. The Central Asian closed drainage basin, ecologically isolated for centuries, is a habitat of *Oreoleuciscus potanini* - an endemic species of fish.

In terms of conservation importance, there are a number of freshwater basins in the Altai-Sayan ecoregion with unique biodiversity such as Great Lakes Basin, Khovsgol Lake, Darkhad Depression and Bulgan River Basin.

1. **The Great Lakes Depression (Basin)** contains the most important wetlands of Central Asia. These wetlands are characterized by shallow and interconnected lakes with an extensive reed belt fringing its shores. Located in a desert steppe environment the lakes are key to survival of many residents, rare and endangered migrating birds, such as Eurasian Spoonbill (*Platalea leucorodia*), Black Stork (*Ciconia nigra*), Osprey (*Pandion haliaetus*), White-tailed Eagle (*Haliaeetus albicilla*), Swan Goose (*Cygnopsis cygnoides*), and Bar-headed Goose (*Anser indicus*). Only a few individuals of Pelican remain in the Great Lakes Basin in Mongolia. They nest in catchment areas of rivers and lakes that have abundant fish and vegetation.

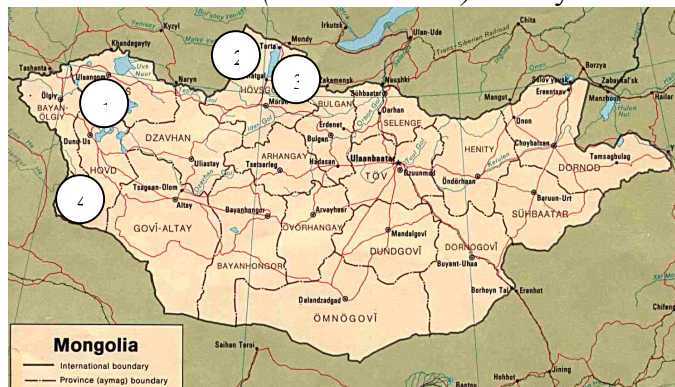


Figure 3. Some important freshwater basins in Altai-Sayan ecoregion, Mongolia

2. **Darkhad depression:** The Shishigt River contributes to the Arctic Drainage Basin and runs through the Darkhad depression, a valley with many lakes. Most of the lakes in Darkhad valley are 5 to 8 m deep, and are similar to each other in terms of water quality, chemical composition, flora fauna diversity and biomass. The fish fauna consists of 13 species; among them the world’s biggest Salmonid – the Hucho taimen.
3. **Khovsgol lake** is the second biggest freshwater lake in Asia, and its waters contribute to Baikal lake. All together 9 species of fish occur in Khovsgol lake, of which 6 species are game fish. According to ornithological studies, 251 bird species live here during the summer months, with only 2 of them staying during the winter. Among them are rare, very rare and globally threatened birds such as the Whooper Swan, Bar-headed Goose, Black Stork, Altai Snowcock, Osprey, Golden Eagle, Imperial Eagle, Greater spotted Eagle, White-tailed Sea Eagle, Vulture and Saker Falcon.

4. **Bulgan River Basin** is located in the Trans-Altai Mountain range in the Altai-Sayan ecoregion. In total, 12 species of fish are registered in this river basin. The lower part of this river basin is one of the last refuges of Asiatic Beaver.

STATUS OF WETLANDS CONSERVATION IN MONGOLIA AND THE RAMSAR CONVENTION

Since 1998 when Mongolia joined the RAMSAR Convention as the 106th Contracting Party, six RAMSAR sites (wetlands of international importance) have designated in Mongolia.

A short description of the RAMSAR sites in Mongolia is given below:

1. **Mongol Daguur (Mongolian Dauria)**. Mongolia's first Wetland of International Importance (210,000 ha) in Dornod aimag, in Eastern Mongolia, near the border with Russia.
2. **Valley of Lakes**. The site (45,600 ha) is located at the foot of Gobi Altai Mts. and encompasses four lakes (Boon Tsagaan, Taatsiin Tsagaan, Adgiin Tsagaan and Orog). These lakes are an important staging area for migratory waterfowl. The area supports breeding populations of a variety of other species including *Pelicanus crispus*, *Phalacrocorax carbo*, *Ardea cinerea* etc. The fish fauna includes species of *Oreoleuciscus* and *Thymallus brevirostris* endemic to Western Mongolia.

Table 1. RAMSAR Sites in Mongolia (by August 2003)

	Wetland names	Coordinates	Area, ha	Elevation, m	Designated
1	Mongol daguur	49°42'N 115°06'E	210000	597 - 821	1997
2	Valley of Lakes	45°18'N 100°07'E	45600	1,100 - 1,235	1998
3	Lake Terkhiin- tsagaan	48°10'N 099°43'E	6110	2060	1998
4	Lake Ugii	47°46'N 102°46'E	2510	1280	1998
5	Khar-Us Nuur NP	92 50'E 47 58'N	321360	1132 - 1157	1999
6	Lake Airag	93 25'E 48 53'N	45000	1030	1999
	TOTAL		630580		

3. **Terkhiin Tsagaan Lake**. The site (6,110 ha) is located in the valley of the Suman River, a tributary of Selenge River, in Arkhangai aimag. The site includes the Khorgo-Terkhiin Tsagaan Nuur Natural Park, which was established within the protected areas system in 1995. The buffer zone was established in 1996.
4. **Ugii Lake**. The site (2,510 ha) is located in the valley of Orkhon River, north of the main range of Khangai Mountains. It has an extensive alluvial area of

- grasslands, river channels, pools and marshes at the western end and is surrounded by grassy steppe. The site is a very important breeding and staging area for a wide variety of waterfowl, particularly Anatidae.
5. **Khar-Us Nuur National Park.** The Ramsar site (321,360 ha) encompasses three large but shallow lakes – Har-Us, Har and Dorgon. The area was set aside as a National Park in 1997. Vast reed beds and extensive aquatic plant communities provide a suitable habitat for a large number of breeding and migratory waterbirds, including the globally threatened *Anser cygnoides*, *Aythya nyroca*, White-headed Duck *Oxyura leucocephala* and Relict Gull *Larus relictus*. Three species of fish endemic to Western Mongolia occur in these lakes.
 6. **Airag (Ayrag) Lake.** This is a shallow freshwater lake in the Mongolian Great Lakes Depression. Total area of the site is 45,000 ha and it is an exceptionally important breeding and resting place for a variety of waterfowl and the only remaining place in Mongolia where the Dalmatian Pelican *Pelecanus crispus* regularly comes to breed.

MAIN THREATS TO FRESHWATER ECOSYSTEMS

Freshwater ecosystems of Mongolia are subject to increasing and multiplying threats, including overgrazing, dams and irrigation systems, mining and gravel extraction, climate change impact and lack of water management policies and institutional framework.

1. Overgrazing. In most of the freshwater ecosystems and wetlands, overgrazing by livestock of the pastureland threatens the plant communities around the wetlands, and disturbs breeding birds.

Traditionally, nomadic herders have grazed the vast but fragile grassland by rotating animals over shared pasture in a seasonal species segregated pattern. Co-operation among herders was common, such as the traditional *Khot-ail* (group of nomadic families), for sharing labor resources and controlling grazing use without degrading the environment.

Political and economic changes associated with the shift from command economy to market economy since 1991 have had a significant impact on herders and pasture land. Following privatization of livestock, people left urban areas to become herders again, doubling the number of pastoral households and leading to competition and conflict for grazing area. As a result, the traditional rotation pattern became almost non-existent in fear of pasture occupation by neighboring families. The increase in herder households was accompanied by a considerable increase in livestock numbers. Traditional herd composition has also shifted and the number of goats almost doubled.

It is widely known that the goats have the most negative impact on grazing land due to their natural grazing behavior which involves uprooting the vegetation. This leads to almost irreversible degradation of pastures. It is recommended to maintain a sheep to goat ratio 1:4 and the herd size corresponding to grazing capacity. During the last years the goat to sheep ratio became 1:1.2 and the herd sizes are too big to prevent overgrazing with its detrimental effects. The Great Lakes Basin is considered to be overstocked with livestock by approximately five times.

Increasing number of goats are bred in order to collect cashmere. In addition to economic benefit, goats are better adapted to desert like environment than sheep and this adaptation makes it easier for them to cope better with a degrading environment.

Increase of herders, livestock numbers and herding behavior/grazing patterns and breaking of wells has resulted in an overuse of pasture land and an expansion of grazing grounds into formerly unused areas, including protected areas. Overgrazing favors unpalatable plant species, reduces the vegetation cover and thereby reduces the moisture storage in the soil, leading to acceleration of desertification processes.

2. Deforestation of watersheds, due to high grazing impact, firewood and timber extraction. An example is the Khar-Us Nuur National Park where herders have started to cut down birch forest along the slopes of Jargalant Mountain to complement dung for heating and cooking.

3. Dams and irrigation systems. During the last years increased threats from planned dams for electricity and irrigation systems in river basins, especially those located in the arid Internal Closed Drainage Basins. For instance, reliable energy supply for three western provinces of Mongolia has been the most challenging issue for the Government of Mongolia in the last decade and continues to be so. Many research projects have been carried out on this issue and several options have been considered to achieve this.

A hydropower plant near Durgon sum (Durgon HPP) is one of the options. The intention is to supply the people of western Mongolia with electric energy, thus reducing dependence on energy imports from Russia. According to the plan, Durgon HPP would be built in the gorge of the Chono-Kharaikh River. The river is a part of the buffer zone of the Khar Us Lake National Park which in turn is part of the worldwide recognized Altai Sayan Ecoregion, a region rich in culture and biological diversity. With respect to the development of this hydropower project, a number of tangible socio-economic, environmental and legal issues are touched.

The environmental impact assessment on the lake and the assessment on socio-economic risks of a hydropower dam near Durgon soum (IUS-Weisser & Ness, 2000), and socio-economic cost-benefit analysis (Baatar, 2002) strongly caution against proceeding with the project.

In general, planned construction of large dams for power generation such as Durgon Hydropower Plant, and several other plans to build dams in the river basin constitute one of the major threats to freshwater systems.

4. Mining, gravel extraction and pollution During the last years, exploration of natural resources, e.g. gold mining and gravel extraction have been rapidly increasing. Accordingly, threat from mining pollution has been increasing. Besides the pollution aspects, expected morphological changes and increased water use will have a major impact.

Mongolia has a remarkable and diverse geological structure abundant with minerals and non-ferrous metals. At present, there is little mining activity in the Altai-Sayan ecoregion, but even in this small scale the negative environmental impact is obvious. There are several areas in the region, which are considered to have reserves that are big enough to

be exploited. Some of these reserves, especially gold, are close to rivers or in river beds, imposing an immediate threat to the environment if exploitation is done with inadequate techniques.

5. Climate change impacts. Seasonal and annual distribution of water resources is changing due to climate change impacts. Melting of high mountain glaciers has increased Uvs and Khyargas lake levels by 1-2 m during the last 40 years (Figure 3.)

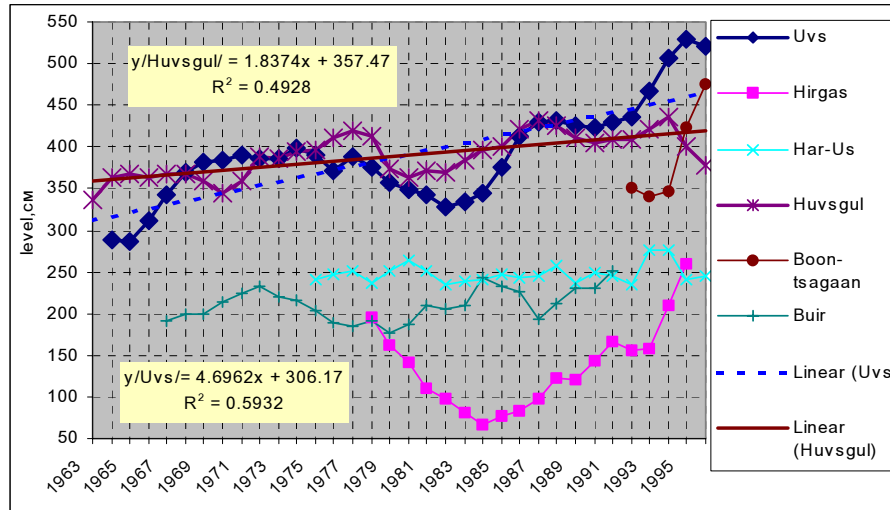
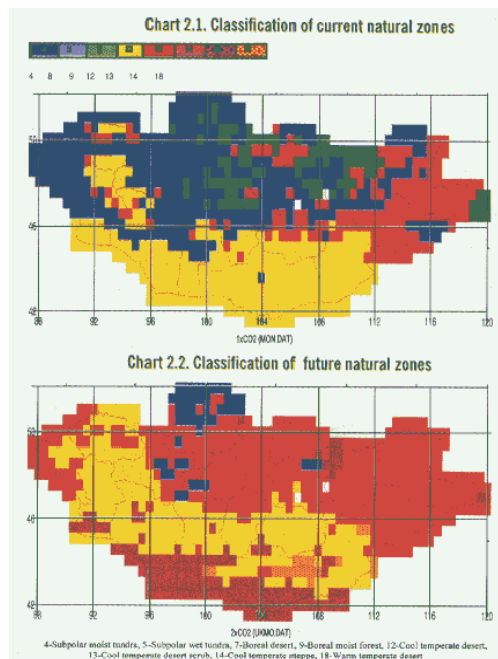


Figure 3. Long-term changes of lake levels and their linear trends



In the meantime, water level in other lakes and runoff from rivers in some areas where there is not sufficient input from glaciers have been decreasing. The ground water table is decreasing in arid regions, and degradation and desertification of land cover due to shortage of water and precipitation have been intensifying.

Figure 4. Classification of current (upper map) and future (lower map) natural zones (Source: MAP-21: The Mongolian Action Programme for the 21st century, 1998)

Global climate change will have a severe impact on Altai Sayan Ecosystems with predicted changes higher than average. The desert steppe zones will be especially affected by desertification. Vegetation zones will shift further northward, reducing forest cover and

fertile alpine vegetation. Shifting vegetation in stationary protected areas will reduce the size of suitable habitat in the protected areas.

According to modeling results (MAP-21), under twice the amount of CO₂ conditions or in the middle of 2050 the following general features of natural zones are forecast (Fig. 4):

- high mountainous tundra, taiga and mountainous steppe zones will fully disappear
- desert areas will increase from 2% to 13 %
- the area of steppe and forest-steppe zones will expand.

More research results on future climate change scenarios can be found in the book “Climate change and its impacts in Mongolia”, 2000.

(website: www.mongolclimate.mn)

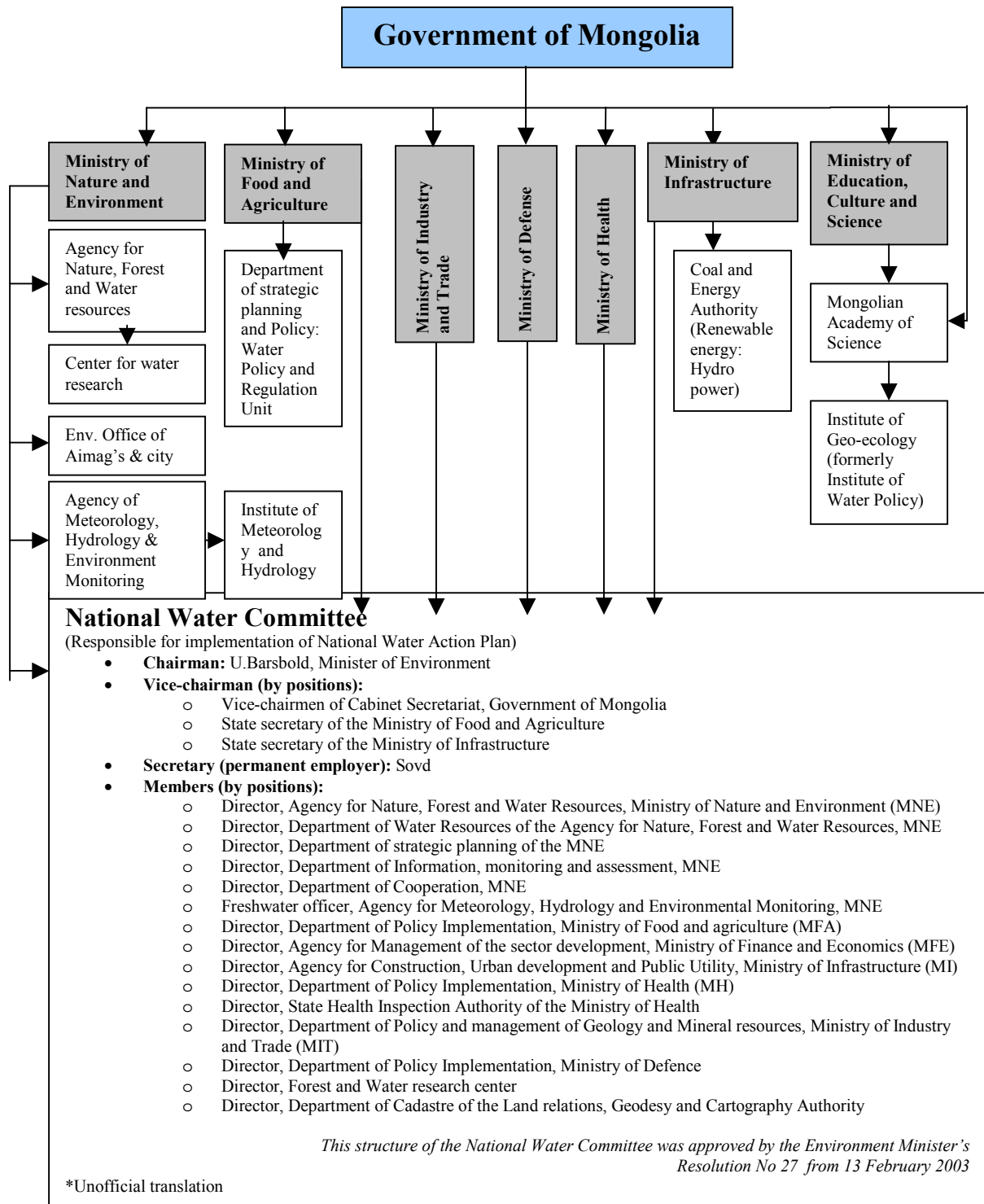
6. Weak water management policies and institutional framework. At present, there are no fully developed integrated institutional infrastructures on River Basin Management issues in Mongolia. There are also different governmental ministries taking responsibility for water issues eg. Ministry of Nature and the Environment is responsible for conservation and the Ministry of Agriculture and Food is responsible for rural water supply. Government structure on present water policy is shown in Figure 5.

Solving the stressed present freshwater situation in Mongolia would require a coordinated approach of governmental institutions, donors, NGOs and key stakeholder groups on river basin level. However, at present, there are no fully developed integrated institutional and legal infrastructures on Integrated River Basin Management (IRBM) issues in Mongolia. Thus, there is an urgent need to consider implementing the IRBM principles for sustainable water management.

Table 2. Mongolian water related legislations

No	Laws	Approved on	Entered into force	Amendments
1	Environmental protection law of Mongolia	1995.03.30	1995.06.05	19 April,2002
2	Law on fees for use of water springs & spa	1995.05.22	1995.07.01	-
3	Environmental impact assessment law	1998.01.22	1998.02.20	22 November2001
4	Water law of Mongolia	1995.04.13	1995.06.05	-
No	National programmes	Approved by/on		
1	Mongolian action programme for the 21st century (MAP-21)	ЗГ-ЫН 1998 ОНЫ 82-р ТОГТООЛ		
2	National Water Programme	ЗГ-ЫН 1999 ОНЫ 43-р ТОГТООЛ		
3	National Action Programme on climate change.	ЗГ-ЫН 2000 ОНЫ 120-р ТОГТООЛ		

No	International Conventions	Ratified by the Mongolian parliament	Accessed	Entered into force
1	UN framework convention on climate change	01.06.1993	30.09.1993	21.03.1994
2	Convention on wetlands of International importance especially as waterfowl habitat (RAMSAR)	05.06.1997		08.04.1998



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