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ENVIRONMENTAL ASPECTS OF WETLAND ECOSYSTEM OF SEISTAN BASIN, SE IRAN

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ABSTRACT : The wet lands comprising two Lakes - Hamoun-e-Saberi and Hamoun-e-Helmand support a variety of components of ecosystem. Various environmental aspects including biological, ecological, hydrological, physical and chemical aspects are discussed in detail. The adverse factors of these wetlands and conservation measures for human use are also discussed. The site has been highlighted with the help of satellite images.

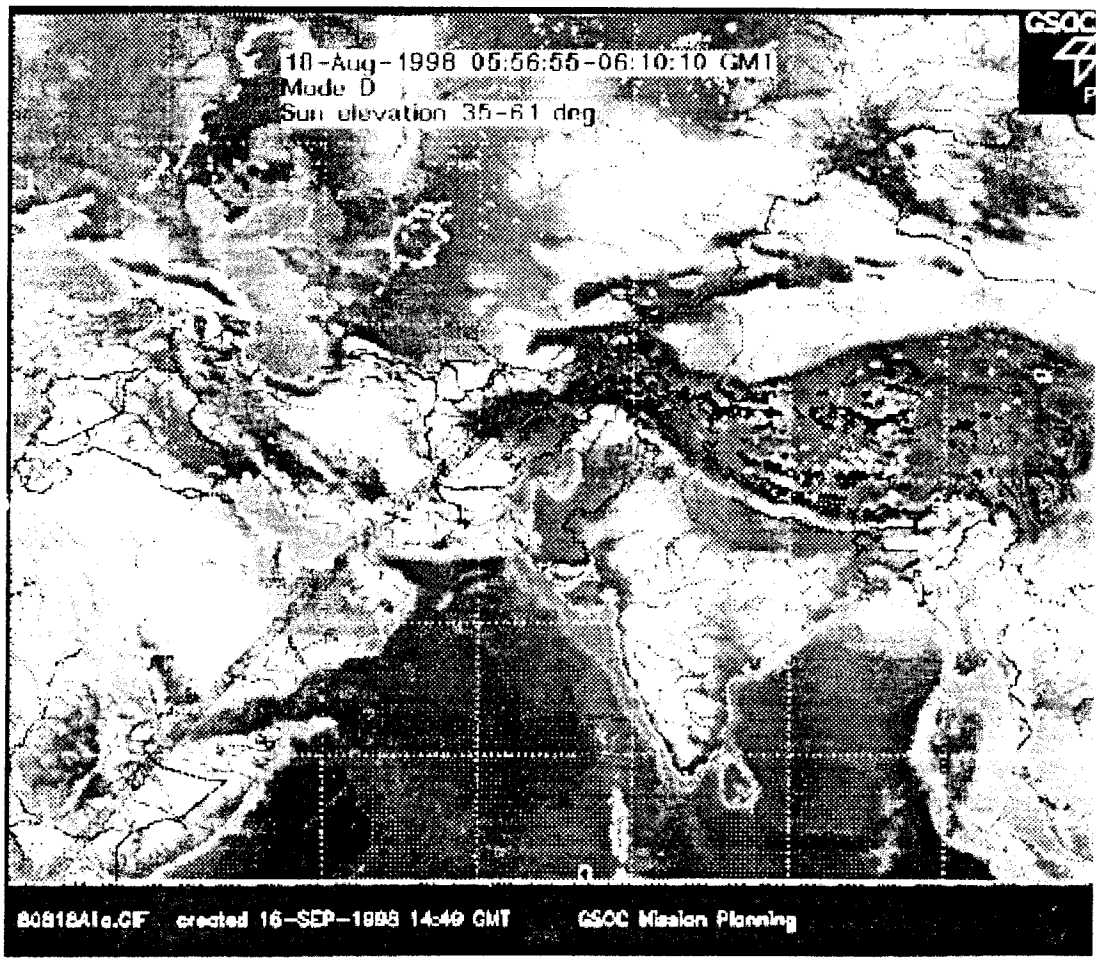
INTRODUCTION

The wetland of seistan basin comprise two permanent water features (Lakes) named Hamoun-e-Saberi and Hamoun-e-Helmand. These lakes are situated in the Province of Seistan & Baluchistan, in the Seistan Basin, northwest, west and southwest of Zabol (Iran). Only half of Hamoun-e-Saberi lies in Iran, the other half is sitauted in Afghanistan. (Map-1).

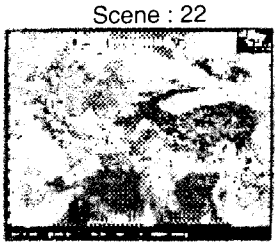
They cover an area of about 50,000 ha, at an elevation of 470m ASL. Hamoun-e-Saberi and Hamoun-e-Helmand are outstanding examples of semi-permanent and seasonal wetlands characteristic of the desert regions of southwest Asia. They play a substantial hydrological and ecological role in the natural functioning of a major river basin shared between Iran and Afghanistan. The wetlands support an extremely diverse wetland flora and fauna, and thus maintain the genetic and ecological diversity of the region. They support two species of globally threatened birds : Pelecanus crispus and Aythya nyroca. They regularly hold over 1% of the regional populations of the waterbirds Pelecanus onocrotalus, Casmerodius albus, Fulica atra, Himantopus himantopus and at least nine species of Anatidae.

Hamoun-e-Saberi and Hamoun-e-Helmand are two large, semi-permanent, fresh to brackish lakes with extensive mudflats, reed-beds, sedge and salt marshes, riverine tamarisk thickets, bare salt flats, and vast sparsely vegatated desertic plains. They are situated at the inland delta of the Helmand (Hirmand) River (Map-2).

These lakes, along with Hamoun-e-Puzak are the main lakes in the Seistan Basin. At the time of peak-flooding, the entire complex of merged lakes can cover over 200,000 ha. Then an abundant submerged aquatic vegetation develops on the floodplain. Since prolonged drought in the 1980s, very little submerged vegetation is growing in the lakes. Recently (after 1992), most of the wetlands were dry.

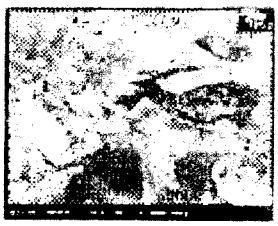


Scene : 22



Longitude : 48.0° ı Canyon in the southern Plateau of Yemen.

Scene : 44



Longitude : 61.9° ı Latitude. 30.9° Desert near the city of Zabol (Iran) : Saltlake Hamun-e Hirmand

Fig. 1 : Orbit : T0940

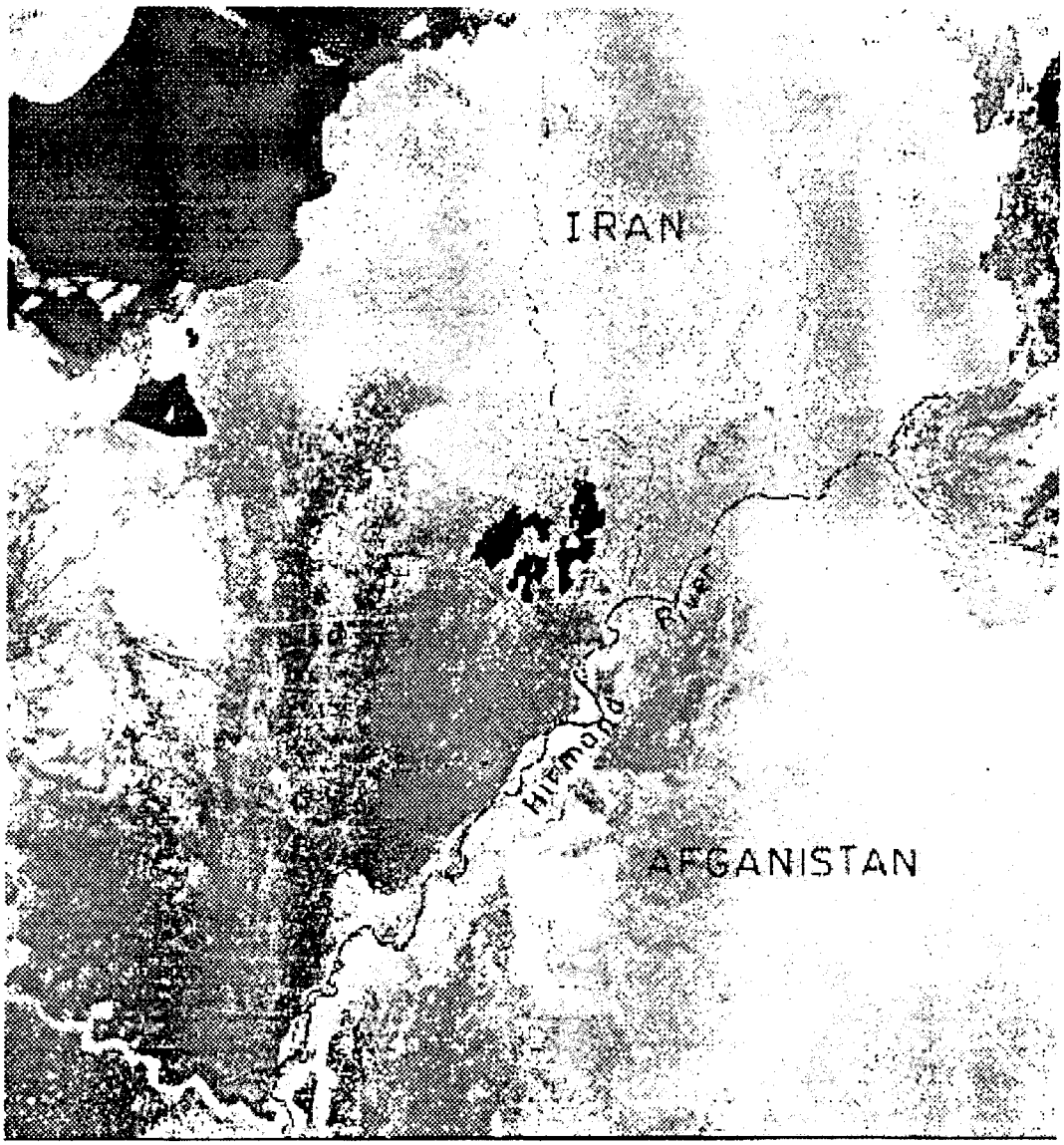


Fig. 2 : Afganistan

BIOLOGICAL/ECOLOGICAL ASPECTS

Hamoun-e-Saberi and Hamoun-e-Helmand support marshes that are predominantly eutrophic. Tamarix thickets grow in the marshes, with reeds Phragmites australis, reedmace Typha sp., and Carex sp. sedges. halophytic vegetation includes Halocnemum strobilaceum, sea lavender Limonium carnosum, glasswort Salsola spp. and the orache Atriplex verruciferum. The wetlands are extremely important as staging and wintering area for waterbirds notably pelicans, herons, dabbling ducks and shorebirds. In years of high water levels, they are also an

important breeding area for many species. In the 1970s, it was found that the numbers of Anatidae wintering in the Seistan Basin vary from almost nil in extremely dry years, to over 700,000 in wet years. It is difficult to compare these figures with current counts. The drought of the early 1990s has resulted in an enormous decline in wintering waterfowl. This has also been attributed to prolonged drought in the early and mid-1980s and large scale degradation of the aquatic vegetation. Common waterfowl species in winter are Pelecanus crispus, Pelecanus onocrotalus, Casmerodius albus, Ardea cinerea, Anser anser, Tadorna ferruginea and T. tadorna, Anas crecca, A. acuta, Aythya ferina, Grus grus and Larus ridibundus. Wintering raptors include Acrocephalus melanopogon, A. stentoreus, Milvus migrans, Circus aeruginosus, Halieetus albicilla, Aquila heliaca, A. clanga. A nepalensis and Aegypius monachus. Mammals that have been recorded around the lakes are wolf Canis lupus, golden jackal, Canis aureus, red fox Vulpes vulpes, striped hyena Hyaena hyaena, caracal Lynx caracal, wild boar Sus scrofa, goitred gazelle Gazella subgutturosa and jebeer gazelle G. dorcas fuscifrons.

HYDROLOGICAL/PHYSICAL ASPECTS

Hamoun-e-Saberi and Hamoun-e-Helmand are unusual in that they are predominantly frshwater lakes, although they lie within an inland drainage basin. During years of heavy rainfall, the floodwater sweeps through all the lakes and overflows into a vast salt waste to the southeast, flushing the salts out of the system. Hamoun-e-Saberi receives its water from the Fara Rud, which enters in the northeast, and from overflow of Hamoun-e-Puzak to the east. Hamoun-e-Helmand receives its water from the southern branch of the Helmand river, and from overflow of Hamoun-e-Saberi to the north. In wet years the average water depth is about 50cm, and the maximum depth is about 1.5m. The bottom of the lakes consists of alluvial silts. The climate in this part of the country is hot and dry.

CHEMICAL ASPECTS

The water samples of Hamoun Lakes were analysed for chemical characters including CO^{2-}_3, HCO_3^- , EC, pH, NO_2^-, CI, TH and TDS. These parameters have been compared with freshwater of Hirmand River. The amount of these parameters is higher in Lake water. The data is expressed in Table 1.

Human Use: Reedbeds play a significant role in the local economy of the villages along the shoreline. The reeds are used for a number of purposes : as forage for domestic livestock, for boats, for fabricating wind-breaks for houses and gardens, and as a source of fuel. The rich fishery at the lake is used as a supplement to the income of the village people. The Ornithology Unit of the Department of the Environment has carried

Table No. 1

Characteristic of Water From Hamon Lake & Hirmand River

No.	Factor	Unite	Hamoun Lake	Hirmand River
1	CO_3^{2-}	Meq/Lit	18	0
2	HCO_3	Meq/Lit	23.6	3.5
3	EC	Mmhos/cm	14.740	0.527
4	pH	–	9.23	8.1
5	NO_2^-	ppm	818.8	
6	$C1^-$	mg/lit	3133	0.8
7	T.H.	mg $CaCO_3$	2164	$CaCO_3$
8	T.D.S.	mgr	18000	337.28

out annual mid-winter censuses since 1970, and breeding season surveys on several other occasions. The Department of the Environment has embarked upon a study of the wetlands, as a part of its nation-wide inventory of wetlands.

Conservation Measures : The western half of both lakes and a large area of desert were designated as a protected region in August 1967. This was enlarged in 1969, and reduced again in the 1970s, and it was upgraded to a wildlife refuge. It has since been downgraded to a protected area. Since July 1990, all three Hamouns are placed on the Montreux Record. A Ramsar Management Guidance Procedure Mission visited the area in January 1992.

Adverse Factors Affecting the Ecology of the Lakes : Irrigation schemes in both Iran and Afghanistan have reduced the flow of water into the Hamouns. As a consequence, the wetlands are completely filled only in very wet years. An average flow rate that was agreed upon by the two governments did not result in any improvements, since the "average" flow was given in winter in bulk, not as a continuous flow. Floods in 1991 destroyed a large dam and damaged the irrigation projects in Afghanistan, so, for the time being the inflow of water has increased again. However, there is already a proposal to build a new, larger dam , the Kamal Kham Dam. Aquatic vegetation is almost absent. In the 1970s it would immediately recover after a dry period, but the dry period in the 1980s lasted much longer than normal. Excavation of tubers for fuel and massive stocking of the lakes with herbivorous fishes may also have contributed to the problem. Local pastoralists are concerned about the lack of aquatic vegetation as a source of grazing for thier cattle and water buffalo. The majority of them have moved to the Hamoun-e-Puzak marshes on the Afghan border. Increasing soil salinity is becoming a very serious problem in the agricultural land bordering the wetlands. Some areas have been abandoned and others produce extremely low yields. An asphalt road has been constructed that passes between the two lakes. A new canal that connects the two lakes will have a major effect on the hydrology of the system. A major unexplained kill of fish, pelicans, flamingos and shorebirds occurred in 1994.

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