

WATER STRATEGIES AND ENVIRONMENTAL IMPACTS OF THE RIVER NILE IN EGYPT

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ABSTRACT

Rivers and valleys are the main sources of fresh water on which man depends on in agriculture, industry, house affairs and civilization. The River Nile as a great river is the source of life in the land of Egypt. Every year the land is inundated with flood and mud that gives fertility to the soil. It provides Egypt with about 95% of water needs, so Aswan Dam and the High Dam were set up on the Nile to make use of water in irrigation, electric generation and to protect the country from the danger of floods.

In this paper, the rise of the Egyptian society during different ages is firstly introduced. The Nile in The Torah, The Gospel and The Qur'an is indicated. Nile descriptions, festivals and their effect in folklore are then given. Major projects along the Nile for the control, regulation and suitable use of its water are also illustrated. Finally, the approach to environmental impact assessment by monitoring, surveillance and the control of pollution as well as the environmental legislative requirements for protection and sustainable development are discussed. Some recommendations and future prospects to improve the understanding and to adopt a suitable economic scientific solution are also proposed.

THE RIVER NILE AND THE RISE OF THE EGYPTIAN SOCIETY

The River Nile attracted the Ancient Egyptians to settle in its valley. The Egyptian society grew around the Nile water, which gave rise to villages, regions and governments. At this ancient time, then Upper and Lower Egypt were united by the governor of the upper region, Mena, in one big country, Egypt. Thus the first state in its first form was declared, and along the river the Egyptians built the first agricultural civilization in the world, a civilization that enjoyed global domination till the industrial revolution in the eighteenth century.

It is he who duly goes and comes. He brings forth good and provision. It is he who comes amidst joy, the dearly beloved lord of the water who brings greenness. In his service people are devoted, and revered is he by the gods.

The Nile and the Ancient Egyptians

"Praise /be to thee O Nile.

Thou who from the earth goeth out and cometh to feed Egypt. Thou art the light that from darkness cometh when thou floodeth, sacrifices are offered to thee and cattle are slain. And for thine honor a big festival is given".

The ancient Egyptians called the Nile "Yoru" (i.e. the sea and the greatest sea), and also call it "Aytrua" (i.e. the great river), and described it as "Lord of bountiful provision", "Lord of Fish", "Father of Lords", "Creator of Beings" and "Giver of life" and called it "Hapi", that is the spirit that lies behind this great river and gushes out its inundation bringing fertility and water. "Hapi" took the shape of the fisherman with the beard characteristic of their traditional gods, and a belly of a pregnant female with breasts full of milk; the head is one time crowned with the plant symbolizing the North and another with that symbolizing the South. The Pharaohs ranked him as high as the biggest of their gods like "Ra", "Ptah" and "Osiris", and even more identified him with Osiris who was patronizing whatever would secure fertility, giving him one of Osiris's names and identifying him with "Khnum" (Lord of pure water).

The Nile (Hapi) and the sun (Ra) occupy a unique status in the religion and mythology of Pharaonic Egypt. The other life was depicted on the model of green valley with the scenery of cultivations, harvest, flowers, perfumes and hunting, and the one who dies drowned was honored by being buried wrapped in flowers. The Nile surface was the scene of the conflict between "Osiris" ruler of the valley and his brother "Set" ruler of the desert (good and evil). "Isis's" tears dropped on Osiris's face and brought back to life. His restoration to life marked the eve of the Nile inundation. The Osiris festival celebrated represents his resurrection and revival - the resurrection, inundation and flood of the Nile. The ancients thought that Osiris was asleep at the Nile sources, and the river ran between his legs. The Greeks knew the Nile and held it in esteem, and for thine honor a big festival is given, and the Greek poet Homer called it "The River emanating from God". The Ptolemaics and the Romans concerned themselves with controlling the Nile water, making canals and bridges, digging wells and constructing the major and subsidiary waterways. They also gave attention to land reclamation growing seeds, fruits and ornamental plants. The Romans dug a gulf connecting the Nile and the Red Sea to promote trade with the South. When the Arabs saw the Nile they thought it had its source in Paradise because of the stupendous mountains and trees along the bank.

The Nile in the Torah, the Gospel and the Qur'an

The Nile is mentioned in the Three Books, the book of "Sacred Khulaji", the Egyptian church chants the water prayers from the second month "Baba", to the ninth month "Ba'una", and in the book "Al-Ligan wa Al-Sajda, the "Lian" of Great Thursday says: "O God of Mercy, look on the earth and give it water by the rising river so it may give good fruit". Prayers in churches say "send Thine favor O lord and bless the river water

this year, and With Thine favor make its height as that of the earth, so that the fields be watered and the yield multiplied".

There is also mention of the River Nile in the Munificent Qur'an. He says, highly glorified be He: "When we inspired unto thy mother that which we inspired, saying cast him in the ark, and cast him into the river, and the river will throw him on the bank, and then an enemy of Mine and an enemy of his will take him up"; the word ""river" here denoting the Nile.

And of Pharaoh, it is found in the Qur'an that he said: "O my people! is not mine the dominion of Egypt and witness yonder rivers flowing underneath me?". There is mention of the Nile in Prophetic Traditions as well. Anas Ibn Malik quoted the Messenger of Allah, may the blessing & peace of Allah be upon him, as saying: I was raised to the "sedra" and there found four rivers: Two were manifest the Nile and the Euphrates, and Two rivers unmanifest in paradise". Sahih al-Bukhari, Book 57, Chapter 12 and Sahih Muslim, Book 51, Hadith No. 26, "Egypt's Nile is Master of rivers", said by Abdulla Ibn Amro Ibn Al Aas, quoted in "The Book of Egypt's conquests & Tidings" P. 149.

The River Nile is uniquely cherished by the Egyptian people throughout the whole history: "We all, past and present, opened our eyes to see the Nile, a delicate stream of melted silver and glittering gold spread over the fields, as wheat and barley that gives life to souls and fruits". The Nile has always been there inspiring the folk artist when he sings and when he narrates, when he gives the proverb invoking his experience and even when he makes puzzles for amusement.

Some Nile proverbs:

- If the Nile comes a deluge put your son under your feet.
- Blessed be you as blessed as Nile water.
- May your standing be raised and your belt made firm.

The ancient Egyptian legislation stipulates that if the Nile reaches 24 cubits it becomes incumbent upon every Egyptian to work for the protection of the country against inundation.

NILE DESCRIPTION

It is to the sun that the Nile owes the annual flow. The sun is the first source of energy that causes the water in the Atlantic Ocean to evaporate. Due to discrepancies of air pressure and rotation of the earth, vapour is driven 2200 miles across Africa till the heights in Ethiopia where torrential rains fall on mountains feet driving with them the muddy earth and making narrow grooves that quickly form small channels taking their routes to Subat rive. Then passing to the Blue Nile and al-Utaira tributary, then to the Mediterranean Sea, and once again the same cycle is forever repeated. The River Nile is the longest of all rivers, flowing 6690 km from Tanganyika Lake to Mediterranean

Sea. It comes from south to north from latitude 4 south of the equator up to 31 north. It covers a distance of 2,900,000 sq. km throughout: Tanzania - Kenya - Burundi - Rwanda - Ethiopia - Uganda - Sudan -Egypt. The Nile carries with it 20% of the rain quantity that falls in the headstreams, the rest is lost through evaporation and leakage in the underground by way of absorption.

Coming out of Lake Victoria, the river is obstructed by rocky falls called "Obion" then further meets Nuera slopes and Marshion falls and keeps going up and down heights, then goes smoothly in a navigable course until it reaches Lake Albert and makes Bahr-el-Jebel,

- Bahr-el-Jebel from Lake Albert to el-Sobat is 1287 km long.
- The White Nile is at the junction of Bahr-el-Jebel and Bahr-el-Ghazal and constitutes the major source for water reaching Egypt during spring and early summer.
- The Blue Nile has its source in Lake Tana till it reaches Sudan at el-Rawsaris. It is the principal cause of the river's inundation as it contains the quantity of water running the river to Egyptian lands in the period August-September, and it also has the flood sediment that forms the soil as a result of the Ethiopian mountain mud carried over by water.
- The junction of the White Nile and the Blue Nile is Khartoum where the main river heads north to meet Atbara River.
- The River Nile crosses the Nubian Desert through a big S curve.
- From Khartoum to Aswan, the Nile runs 1885 km along which it meets six cataracts.
- From Aswan to Muhammad Ali Barrages north Cairo, the Nile runs 986 km in an average width of 900 meters.
- From Muhammad Ali Barrages to Mediterranean, it branches to Damietta and Rosetta channels with an average length of 236 km - each.

NILE FESTIVALS

A- The Nile Bride Celebration:

Most Arab authors, notably Ibn Abdulhakam, said that when Amro Ibn Al-Aas conquered Egypt, people came and told him that it was their custom to bring a beautiful girl and dress her in the best attire and adorn her most lavishly so as to throw her to the Nile on the 12th day of Ba'una seeking the Nile's satisfaction. Amro disapproved and Omar Ibn Al-Khattab supported him, and sent a letter addressed by him to be thrown in the Nile which read: "From the bondman of Allah, commander of the faithful to the Nile of Egypt to begin: If you are running of your own do not run, but if it is Allah The One, The Omnipotent who makes you run, so we ask Allah to make you run".

The authenticity of this story is a controversial point, for most probably this custom was not observed neither during the Christian era nor the Pharaonic one, as the Egyptians were not known to offer human sacrifices. Moreover, historians like Herodotus, Deodort and Strabon who visited Egypt made no mention of such custom.

B- Epiphany Eve:

A Christian feast on the Nile bank and one of the established traditions was that he who dives in the Nile water in the eve of Tuba 11th would be immune from disease. That feast was usually celebrated by both Muslims and Christians alike. Some would go to the Nile water, while others would stay at home or go to the river bank with food, drink and in the best attire. It is reported by Al-mamun that it was a mark of state dues that on Epiphany Eve, citron, lemon, sugar cane and mullet were distributed in apportioned lots to writers and soldiers and that this practice was discontinued by Mamelukes.

C- Inundation Festivals:

A follow up the daily, increase in Nile water is reported to wait the day the Nile is full and attains inundation. This is done in upper Egypt and good news are reached to Cairo when it is up to 16 cubits and they wait for the inundation in Cairo after three days to attain 14 cubits. It is called the Sultan's water for which tax was paid and the inundation festival starts.

When the Nile water increases, people go to Mosque with the aromatic plants in their hands make a circle and call out that Allah, Mighty and Majestic be He had increased the Nile water, and so they rejoice and praise Allah. People kept on celebrating this way until the conquest of the Fatimids when the Dam of Amir-al-Mu'mineen gulf was first broken. The Dam was at the Barrages built by Abdulaziz Ib Marawan in Fum-al-Khaleej. In the morning, the Caliph would go out to perfume the Nilometer with musk and saffron. On the third and fourth day the preparation for breaking the dam reaching full swing, the Caliph used to go out in a great procession.

When the French conquered Egypt, they shared with the people the Nile celebrations. Ali Pasha describes the Nile inundation 1213 A.H. - 1798 A.D. and there Napoleon attended with him the Dewan members. They went to the nilometer at 6.00 in the morning where the guns shot and music were heard. Then the dam was broken when the Nile reached 14 cubits, coins given to the people and good news were sent to all regions, people rejoicing and picnicking in Nile boats, the poets composing poems and folksongs.

Some Qur'an commentators say the Nile Inundation Day is the day which Pharaoh promised Moses to meet Allah; glorified be He says: "Your appointment in the gala day, and that people be gathered in the afternoon". Surat Taha - verse 59. If the Nile inundation did not occur in due time, the judges and the people would go out to offer prayers for rainfall, praying Allah that he would graciously bring the inundation as the case was in 866 A.H.

NILE INUNDATION AND THE EGYPTIAN CALENDAR

Since time immemorial, Egyptians observed that Nile came to a rise on a given day when a certain star was sighted over the city of Memphis. This day was taken to mark the beginning of the agricultural year, which is divided into three seasons for flooding, seeding and harvesting. In all, there were twelve months of thirty days each, and at the end of the year, a period of time was added which marked the festivity in honor of the deities.

Egyptian life and economy were as strongly affected then by the Nile as they are at present: the cultivated area and the volume of crops produced were very much determined by the amount of water flooding the land. The river became the center of attention and people marveled that the Nile over flowed at a time each year when all other rivers did not. Deodor Al-Seqqdi says: "The flooding of the Nile is indeed a strange phenomenon, for as all rivers throughout the world run low during the summer solstice; the Nile alone begins to rise".

The Nile rises gradually through July, August and September, stabilizes in October, November and slowly decreases over April, May and June (the low months). Egyptians base their predictions or astronomical phenomena, practical experiments and observations from which they could speculate on the nature of the flood. They tied the Nile flood to the movement of the planets. Other explanations are given by Copts, Al-Maqrizi, where it is of great concern regarding the rise and fall of the Nile and its effect on irrigation.

Famous Gauges: Since ancient times Egyptians built numerous gauges with the purpose of measuring the increase in the Nile waters.

Before Islam:

- Prophet Youssef built a gauge in Memphis, which remained in use after Islam.
- The old queen Dluca built another in Akhmim and was also said to have erected one in Esna

After Islam:

- Amro Ibn Al-Aas built several gauges at Aswan, Dandara, Esna, and Albegedly at Helwan.
- Abdulaziz Ib-Marawan Ruler of Egypt has one built at Helwan in 80 A.H.
- Osama Ib-Zayed Al-Tenoukhi, tax collector of Egypt, had one with only palm trees standing out and with the villages all transformed into small islands surrounded by water. This remained the case until dams and reservoirs were built with the aim of protecting the country against the danger of floods.

MAJOR PROJECTS ALONG THE NILE

- The Lahon Dam: was undertaken by Imhotep III in Fayoum with the aim of regulating irrigation.
- The lake Morris Reservoir: the lake was fenced by a 100 m bridge and linked to the Nile by two barrages.
- The Alexandria Canal: was dug by Alexander the Great in the canopian branch of the Nile, started at Shedyia and branched off into two at Albozis (the present Alhedra), was cleared several times at the hands of Al-Hareth Ben-Yakan, the judge of Egypt in 139 A.H., and Ahmed Ibn-Tolun in 259 A.H. The canal was redug in 826 A.H. at the orders of Al-Nasser M. Ibn-Qualawon hence the name Al-Nasseri Bay - and again on the command of M. Ali - when it was renamed Al-Mahmoudeya canal after the Ottoman Sultan Mahmoud.
- The Sisostris canal: was redug by the order of Amro Ibn-Al-Aas linking the Nile to the Red Sea.
- The Abulmanga Bay: was dug in 206 A.H. on the Nile at Basous at the hands of the wazir Al-Faddel on the advice given by Abulmanga Ben-Shee'a, the Jew. It was completed within two years and played a major role in reviving the part of the country through which it ran.
- Al-Mahmoudeya canal: was redug in 1820 A.D. by order of M. Ali. Water was stored in the Zarqoun depression, but as the reservoir filled with alluvium, it went into disuse and a patch of 50 thousand feddans of the richest terrain came into being as a result.
- The Barrages: were built in 1861 A.D. by M. Ali with the aim of transforming basin irrigation lands into perennial. Incapable, as they stood, of holding the water, irrigation remained strongly dependent on canals which were constantly deepened so as to allow the water in during the summer time. The barrages were built across the two Nile branches and were considered the first of their kind worldwide. Shortcomings detected on operation were corrected in 1890 A.D.
- 112 Canals: were dug, the overall total of which ran to 13, 440 km. The most prominent of these are the Ibrahimiya and Ismaileya canals which together with the others had brought to one and a half million feddans the total area of land cultivated throughout Egypt within the period from 1863 to 1865.
- The Aswan Dam: the first of its kind was built 1901 across the first cataract, operates at a one-billion-cubic-meter capacity, with the storage level set at 106 meters. The Dam was raised several times and a power station inaugurated in 1950.
- The barrages at Zefta (1901), Assiut (1902), Esna (1908) and Neg'a Hammadi (1920). The barrages erected at Alqanater Al-Khaireya were also replaced in 1939.
- The Senar Reservoir: was built in 1925 on the Blue Nile 55 km south of Khartoum and is considered the principal water source supplying the 100 million feddans of land in the Gazira region trapped between the white Nile and the Blue.
- The Jabal Al-Anlia Dam: was built in 1937, 25 km south of Khartoum, stores up to 3.25 billion cubic meters and was initially conceived as a means of preserving water in the White Nile during the high season of the Blue Nile.
- The Rasras Dam: was built at a distance from the Senar Reservoir on the Blue Nile with a view to catering for the new agricultural lands in Sudan.

- The Genid project: has been implemented on the eastern bank of the Blue Nile and is considered the largest direct pumping station on the river.
- The High Dam: was completed on 1970, stands south of Aswan and has helped:
 - a- Transform 836 thousand feddans from basin to potential irrigation.
 - b- Reclaim 850 thousand feddans of new lands,
 - c- Generate some 10 billion kWh of electricity annually, and
 - d- Protect the country against high flood so wasteful of both effort and funds.
- The Congli canal: work began on the project in 1976. Part of the White Nile is channeled south of Sudan to run into a canal 360 km long, a process that would ultimately help minimize water waste.

Each state of the Nile basin countries has its geographical, geophysical and social conditions. For instance, Egypt's need of the Nile is mainly for irrigation purposes because of the rare of rain. Irrigation in the Sudan, on the other hand, is only relatively dependent on the river, but much more largely so on rains falling in great quantities sufficient to cover the needs of the country. Ethiopia and other Nile-basin countries use the river for hydraulic power generation and for navigation purposes.

The African Economic Organization calls for concerted efforts among countries on a continent holding some 54 rivers and lakes covering 40 per cent of its total area.

Aggravating matters were the large amount of water wasted in the long trek covered by the Nile from Lake Tana to the High Dam together with the enormous increase in consumption. As a result, water level recorded in 1987 in the High Dam reservoir decreased to a low of 150 meters as against the 1979 figure of 170 meters. The year 1979 marked the beginning of drought in Ethiopia. Aiming to counter drought, Nile-basin countries are currently contemplating a project, to be undertaken in cooperation with Italy, for using Lake Tana as a reservoir for Nile waters. Another project is also being studied which would be implemented on the Sabat in cooperation with the Russians.

Moreover, contacts are under way with Ethiopia and other Nile basin countries in a fervent effort to minimize water waste in accordance with the provisions of International Law and of OAU constituent documents particularly the Lagos Plan of Action which calls for enhanced regional cooperation among diverse African river-basin countries regarding projects executed in future. In this regard, Egyptian experts recommend the following:

- 1- Developing new patterns for water, electricity and food consumption.
- 2- Making use of available hydraulic energy - generating projects particularly those undertaken at the Nile Barrages, the Qattara depression and Jabb al Attaga,
- 3- Harnessing new and renewable energy sources e.g. wind, solar and subterranean energy.
- 4- Developing new irrigation systems and salinity resisting types of cotton seeds.
- 5- Developing new cost-saving sea water desalination techniques.

- 6- Harnessing rainfall over Sinai and North cost with a view to creating new agricultural communities in which Bedouins could settle.
- 7- Proliferating use of the subterranean reservoir and of reprocessed drainage water.
- 8- Making good use of international cooperation in that field.

PROTECTING THE RIVER NILE FROM POLLUTION

As the Nile stand over very lifeline, so also is the need pressing for protecting it against pollution and maintaining it good for use particularly now as population increase stands unchecked, with the number of urban communities constantly on the rise and industrial movement in full swing. Added to this is the noted use of chemicals in agricultural and other fields. Thus, in June 1982, and as a proper translation of an enlightened environment education, a law of an issued protecting the Nile and other water courses against pollution. It contained the following features:

- 1- The Ministry of Irrigation shall, in cooperation with the Ministry of Health, specifies the measures and criteria governing discharge of waste into water courses.
- 2- The Ministry of Health shall, at its own laboratories undertake routine analysis of samples of waste discharged into water courses and make sure that it is within the permitted measures.
- 3- The Water Surfaces Police Department shall make routine inspections over the entire length of water courses with a view to assisting irrigation engineers in finding out contraventions and in eliminating the causes of pollution.
- 4- Establishments producing waste dischargeable into water courses must be approved firstly by the Ministry of Environment and guarantee the means of treatment of waste in accordance with the specifications and criteria permitted. Establishments already in existence shall be granted the period of one year renewable.
- 5- Pesticides and/or chemicals used for fighting water weeds may not be used over water courses.
- 6- Offenders shall be imprisoned for a period not exceeding one year and/or pay a sum not less than L.E. 500. Penalty shall multiply in case of recurrence of contravention.

Water Management for Sustainable Development

As the United National Economic and Development Conference (UNCED) in Rio de Janeiro in 1992, government made or commitment to a programme of action for sustainable development worldwide called "Agenda 21". In 1997, delegates from more than 165 countries adopted the programme for further implementation of Agenda 21. A target date of 2002 was set for the introduction of sustainable development strategies in all countries. Regarding the sustainable development planning process, it includes the need to:

- (a) Encourage strategic thinking and policy analysis,
- (b) Prioritise sustainable development action plans,
- (c) Increase interministerial consultation and coordination in practice,
- (d) Build capacity in formulating sustainable development plans, increasing public involvement, and enforcing environmental regulations,

- (e) Encourage compliance with environmental regulations through economic instruments,
- (f) Strengthen consultation and cooperation between the public and private sectors,
- (g) Increase funding for sustainable development planning and implementation.

Progress in policy formulation through National Sustainable Development Strategy (NSDS), National Environmental Strategy (NES), and National Environmental Action Plan (NEAP) have been wide spread in Egypt by completing environmental baseline studies and strategies that can serve as the basis for sustainable development planning. The country is nearly entirely dependent on the Nile River for its freshwater, whose quality and quantity are directly correlated to growth in its agricultural and industrial sectors, as well as the welfare of its people. There are many action plans and comprehensive efforts in the field of water management for sustainability to conserve natural resources and to economize in the use of water.

CONCLUSION

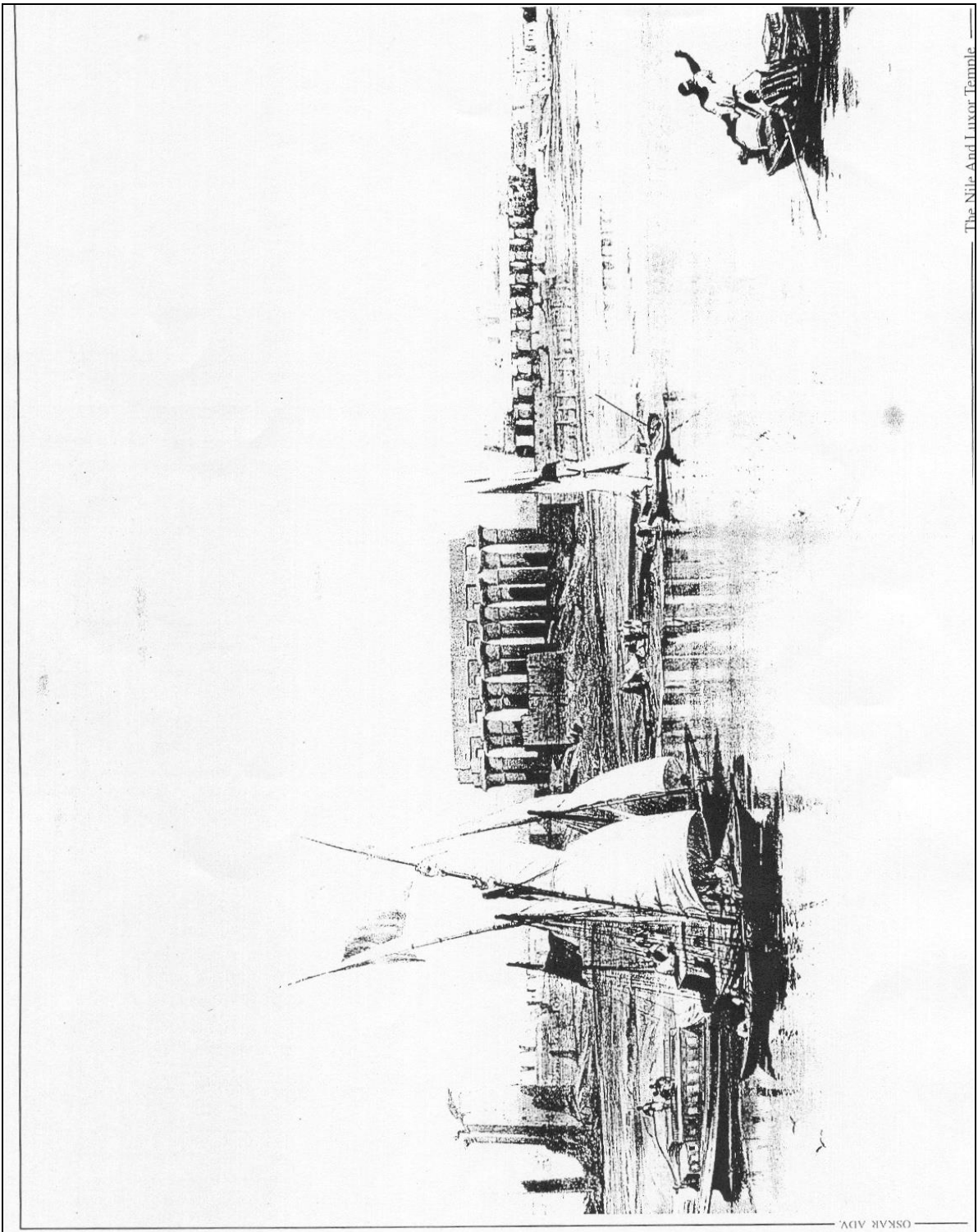
As it is seen in this paper that the River Nile as a great source of life in the land of Egypt has to be better managed, conserved and used efficiently for preserving the environment. Firstly, the River Nile and the rise of the Egyptian society from the Ancient Egyptians till the modern ages are introduced. Then, the Nile in the Torah, the Gospel, the Qur'an and in references and encyclopedia is given. Nile festival folklore, songs and proverbs are also indicated. Description and inundation with respect to the Egyptian Calendar are clarified as well as the most important projects during different ages. Finally, the protection of the River Nile from pollution, water technology and management for sustainable development are also discussed.

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The Nile And Luxor Temple