

A CRYPTIC HYDROPOLITICAL HISTORY OF THE NILE FOR STUDENTS OF HYDROPOLITICS

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"No regime ever built a monument to itself with tile drains, but it is at that level that Egyptian planners must focus their attention" (Waterbury, 1979:153).

This case study has been recorded from various sources in chronological order so that students of hydropolitics can be introduced to some of the classic dynamics and issues. This case study will reveal the following key hydropolitical issues:

- The effects of colonialism and the anti-colonial sentiment on national decision-making.
- The effects and implications of the legal issue of "prior appropriation".
- The problems of national sovereignty when superimposed on an international river basin.
- The effects of the so-called "sanctioned discourse". This is particularly relevant when states in semi-arid regions need rapid economic development, and the so-called "hydraulic mission" of society is born.
- The problems that result from regime creation in portions of an international river basin.
- The effect that newfound independence in the upper basin had in the form of the Nyerere Doctrine.
- The effect of the Cold War in a region that was characterized by political instability, high levels of refugee movement and a high level of dependence on one shared source of water.
- The use of water as a political tool.

Suggested Analytic Framework:

For the student of hydropolitics, this case study can be best understood by dividing the historic elements into five distinct periods. These are as follows:

- 1891 - 1948. This era can be called the "**Egyptian Colonial Period**". It is characterized by British domination in the affairs of Egypt, and the development of

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basin-wide planning for the Nile River of which the 1928 Nile Waters Agreement is an example.

- 1952 - 1959. This era can be called the "**Bilateral Period**" as it is dominated by political interaction between Egypt and Sudan. It starts with the overthrow of the Egyptian regime by Nasser and the RCC and it ends after considerable turbulence with the 1959 Agreement on the Full Utilization of the Nile Waters between Egypt and Sudan. Other basin states are excluded from this process, even though Ethiopia asserted its right to use the waters of the Blue Nile. This era is often cited as being evidence of a "water war" with the occupation of disputed land between Egypt and Sudan prior to the 1959 Agreement. This era sees the end of the British planned Century Storage Scheme.
- 1960 - 1964. This era can be called the "**Upper Basin Post-Colonial Period**" as it is dominated by the Nyerere Doctrine that is invoked in one form or another by various British colonies on attaining their independence.
- 1964 - 1975. This era can be called the "**Early High Dam Period**" as it spans the time from the first closure of the Nile to the first filling of Lake Nasser. This is a turbulent era where the dynamics of the Cold War become inter-linked with national politics at the basin level. It is characterized by zealous patriotism that sees the full effect of the "High Dam Covenant" on political decision-making, making it a classic for students of hydropolitics.
- 1976 - 2000. This era can be called the "**Post High Dam Period**" as it spans the time after the first filling. It is characterized by a reversal in sentiments in the sense that original criticisms of the Aswan High Dam were re-visited in the light of the complex ecological, hydrological and economic problems that were starting to manifest themselves. This period is also characterized by the disintegration of most of the states south of Egypt, heralding in an era of unprecedented civil war, *coups d'état*, famine, poverty and mass migration of people on a scale that had never been known before. This era also sees the re-emergence of elements of the earlier British sponsored Century Storage Scheme.

Statement of the hydropolitical problem:

- Nile is Egypt's sole source of life, but the control of the water is in the hands of other governments.
- Ethiopia alone controls about 86% of all of the water entering Egypt.
- Egyptian population growth expected to be 75 million in 2000.
- There is no international agreement regarding the use of the Nile for the common benefit of all riparian states.
- Upper basin states are particularly unstable, having faced a series of civil wars, failed governments and major famines. This means that they cannot mobilize the funds to

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develop the upper basin. Some argue that Egypt is fostering this situation as it leaves Egypt in a hegemonic position within the Nile Basin.

- During the colonial era, the Nile was managed as a hydrological unit, but as each basin state gained independence, they claimed riparian sovereignty, ultimately eroding any notion of basin-wide management.
- To date, not one of the riparian states south of Egypt has implemented plans that can threaten the flow of water to Egypt, despite numerous projects being attempted. The root cause of undevelopment is poverty, civil war and political disintegration.
- Politicians have often stated that they are prepared to go to war over the Nile.
- Of the 10 riparian states, 5 are amongst the ten poorest states in the world (Green Cross International, 2000:98).
- There is an asymmetrical power configuration within the Nile Basin, but the control over the river is a matter of national and cultural pride for Egypt (Green Cross International, 2000:98).

Important Hydropolitical Concepts:

- The **Sanctioned Discourse** is the prevailing or dominant discourse that has been legitimized by the discursive elite within the water sector at any moment in time. It represents what may be said, who may say it and how it may be interpreted, thereby leading to the creation of a dominant belief system or paradigm (Turton 2000; Turton & Meissner 2000).
- The **Hydraulic Mission** is the overarching rationale that underpins the state's desire to establish conditions that are conducive to socioeconomic and political stability. As such it can be regarded as a form of ideology in the study of hydropolitics, infusing itself into the dominant or sanctioned discourse, serving to legitimize (and thereby sanction) this discourse (Turton & Meissner 2000).
- The **Hydro-Social Contract** is the unwritten contract that exists between the public and the government (Turton & Ohlsson 1999) that comes into existence when the individual is no longer capable of mobilizing sufficient water for their own personal survival, and that acts as a mandate by which government ultimately takes on and executes this responsibility. The hydro-social contract thus acts as the basis for institutional development, and also determines what the public deems to be fair and legitimate practice such as the desire for ecological sustainability, to which politicians react (Turton 2000; Turton & Meissner 2000).
- **Reclamation** is the term used by hydraulic engineers that refers to the act of reclaiming desert land from nature, usually by developing irrigation projects. As such it formed the central *raison d'être* of the American "hydraulic mission" up to the 1960's. This was the role of the US Bureau of Reclamation (BoR), whose main task was to develop large dams for irrigation purposes. After they "tamed" the Colorado River by building Hoover Dam, they started to export this technology all over the world. With this strongly defined "sanctioned discourse" that was based on the desire

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to control nature, a number of similar projects were spawned all over the world. Kariba, Cahora Bassa and Gariep Dam are examples in Southern Africa. These dams all sought, in some form or other, to control nature and reclaim land that nature had dictated was otherwise unsuitable for the purpose that man wanted to use it for. This rationalization has now changed with the toppling of Floyd Dominy as the BoR Chief. This change has also been reflected worldwide, but on some parts of the planet there are still vestiges of this burning desire to control nature and reclaim land from it.

Crude Indication of Hydropolitical Risk:

- Turkmenistan relies on 98% exogenous water.
- Egypt relies on 97% exogenous water.
- Botswana relies on 94% exogenous water.

Some Basic Statistics:

- Egypt is 98% desert with 2.3 million hectares of irrigated land. All agriculture is irrigated, making Egypt extremely vulnerable.
- Egyptian population grows by approximately 1 million people every 8 months.
- Nile is the world's longest river, stretching over 6,800 km with 9 riparian states (Rwanda, Burundi, DRC, Tanzania, Kenya, Uganda, Ethiopia, Sudan and Egypt).
- Ethiopia is of critical importance as it provides 86% of the total Nile flow. In hydropolitical terms, there is a balance of power situation with Ethiopia and Sudan acting as major variables against Egypt. Ethiopia was in the American sphere of influence under Haile Selassie, but under the Soviet sphere in the post-Selassie era.
- Annual flow of the Nile is 84 bcm as measured at Aswan during the first 60 years of the 1900's, but the means standard variation was 20 bcm for the same period (Waterbury, 1979:87).

TIME SEQUENCE OF HYDROPOLITICALLY RELEVANT EVENTS

Egyptian Colonial Period

1891 - 1948

1891 - With the colonial powers of Britain and Italy, Egypt, as the main user of the Nile, lays the foundation for securing unhindered access (Haftendorn, 2000:58).

1898 - Military conflict ensues between Britain and France when a French expedition attempted to gain control of the headwaters of the White Nile. While the parties ultimately negotiated a settlement to the dispute, the incident has been characterized as having "dramatized Egypt's vulnerable dependence on the Nile and fixed the attitude of Egyptian policy-makers ever since" (Moorhead, 1960 as cited by Gleick, 1998:128).

1902 - Old Aswan Dam was built in Egypt (Waterbury, 1979:94).

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1902 - Egypt consolidates its claim to the Nile Waters (Haftendorn, 2000:58).

1912 - Adrien Daninos, a visionary Greco-Egyptian engineer, tried to convince the Egyptian regime to electrify the Old Aswan Dam in order to stimulate industry. His ideas were turned down (Waterbury, 1979:100). It is possible that this was the result of the belief in Britain that Egypt must not be allowed to become industrially competitive.

1922 - Egypt gets independence from Britain.

1929 - Sennar Dam completed on the Blue Nile in Sudan 350 km upstream of Khartoum with a capacity of .9 bcm and a surface area of 160 square kilometers (Waterbury, 1976:88).

1929 - Nile Waters Agreement between Egypt, Sudan and the British colonies/protectorates in East Africa. Belgium colonies are not signatories to this (Zaire, Rwanda and Burundi). This agreement creates historic legal rights, with Egypt assuming full rights to the entire natural dry season flow of the Nile, relegating Sudan's use to the water that it can store from the end of the seasonal flood. No reference is made to any rights for East African states.

1929 - The 1929 Nile Agreement between the British - representing the Sudan, Kenya, Tanganyika and Uganda - and the Egyptian Governments confirmed the importance of Egypt's right of access to the Nile. Egypt gets 48 cubic km of the flow and full access to the spring flood, while the Sudan only has a claim to 4 cubic km of the river flow (Haftendorn, 2000:58).

1932 - Egyptians agree to the construction of the Jebel Auliya Dam, 40 km upstream of Khartoum on the White Nile (Waterbury, 1979:92).

1933 - Third raising of the Old Aswan Dam in Egypt with a capacity of 5.3 bcm (Waterbury, 1979:88). This was part of the Century Storage Scheme (Waterbury, 1979:94). It had a limited hydroelectric capacity, all of which was consumed subsequently at the Kima Fertilizer Company at Aswan (Waterbury, 1979:147).

1934 - The silt discharge at the Delta begins to shift the tectonic and erosive balance. This is probably the result of the raising of the wall and the associated entrapment of silt (Waterbury, 1979:135).

1935 - Agreement is reached between Egypt and Sudan on the construction of a barrage at Lake Tana. The Italian invasion of Ethiopia precluded an accord with Ethiopia, the party most involved (Waterbury, 1979:93).

1937 - Completion of the Jebel Auliya Dam on the White Nile in Sudan with a storage capacity of 3.5 bcm and a surface area of 600 square kilometers (Waterbury,

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- 1979:88). This gave water to Egypt when Sudan was drawing on the water from Sennar Dam on the Blue Nile.
- 30s - Based on tests that were done in four Egyptian territories in which perennial irrigation had been introduced, bilharzia (schistosomiasis) infection had risen from 7% to 58% of the population in those areas. This rapid increase in infection was ascribed to three facts: (1) perennial irrigation had reduced the fallow season during which the snail host previously died; (2) the increased surface area under irrigation meant larger pools of stagnant water; (3) the amount of time that *felahhin* (peasants) were in the water was increased (Waterbury, 1979:146).
- 1946 - Equatorial Nile Project launched**, involving the dredging of the Jonglei Canal in Sudan. Approximately 34 bcm or 40% of the total Nile flow (50% of the water that flows through the Sudd wetland) is lost to evaporation, so the Jonglei Canal seeks to "conserve" this water by reducing the surface area. This has major ecological and social implications for the nomadic pastoralists (Mandari, Dinka, Nuer & Shiluk) in the region. The total surface area of the Sudd wetland is between 5-6 thousand square kilometers, losing around 14 BCM or 50% of the flow of the Behr el-Jebel, and on average 40 bcm of the total flow of both the main White Nile tributaries (Behr el-Ghazal and Sobat) (Waterbury, 1979:89). This negates the effect of the storage at the Owen Falls Dam.
- 1946 - High flow cycle of the Nile (Waterbury, 1979:87).
- 1946 - Sudan initiates a special Jonglei Investigation Team to devise counter-proposals which were finally presented in 1954 (Waterbury, 1979:92).
- 1946 - The now independent Ethiopians failed to reach an agreement on Lake Tana, putting an end to Egyptian and Sudanese plans (Waterbury, 1979:93). This laid the foundation for the subsequent rationale of the Aswan High Dam.
- 1948 - Start of the Owen Falls Dam** at the exit of Lake Victoria (Waterbury, 1979:89). Egypt paid 1 million pounds Sterling to raise the dam 1 metre higher in order to achieve greater storage.
- 1948 - Adrien Daninos and a colleague conceive of the Aswan High Dam** (Waterbury, 1979:100), but the plans are rejected by the Egyptian regime. The plans were rejected on engineering grounds, because of the high evaporative losses that would occur. In addition to this, the silt that would be trapped would result in downstream scouring and bank erosion. The Century Storage Scheme is officially endorsed instead (Waterbury, 1979:101). This involved a series of impoundments at Lake Victoria, which would be used as a major over-year storage reservoir (Waterbury, 1979:89) along with many other smaller dams and reservoirs, some of which already existed. With a surface area of 67,000 square kilometers and being the second largest lake in the world (after Superior), raising the level by 1 metre would create an additional storage for 67 bcm or 80% of the annual Nile's

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entire discharge. Supplementing this storage would be Lake Idi Amin and Lake Tana on the Blue Nile. Lakes Kioga and Albert would operate in tandem with Lakes Idi Amin and Victoria to regulate the discharge into the Victoria Nile and Behr el-Jebel River.

1948 - First Arab-Israeli War. USA, Britain and France impose an arms embargo on all belligerents (Waterbury, 1979:104).

Bilateral Period

1952 - 1959

1952 - Nasser comes to power in Egypt. The Egyptian Revolutionary Command Council (RCC) consisting of Nasser and 11 other middle ranking co-conspirators had strong political ideals. Whilst there were no strong ideologues or doctrinaire revolutionaries, they were bound by one thing - an overriding concern for Egypt's independence in all spheres (political, military and economic). It was their belief that the previous regime had criminally neglected to secure these goals, tolerating sham independence from Britain (Waterbury, 1979:98). The RCC thus sought a spectacular project to turn this ideal into reality. Adrien Daninos, having had his past plans rejected by the former Egyptian regime, presented the idea of the Aswan High Dam to the RCC (Waterbury, 1979:100). Within 2 months of coming to power, the visionary "High Dam Covenant" was born and the Century Storage Scheme was officially shelved (Waterbury, 1979:96). There is no evidence that suggests that the RCC ever gave the High Dam issue any thought before coming to power. The whole scheme was therefore never thought out in great detail, and the project became political rather than hydrological from that moment on. It sought to be daring, thrusting Egypt into the vanguard of modern hydraulic engineering (Waterbury, 1979:99). After completion it would become a highly visible and fitting monument. A by-product would be the over-year storage of water that would ensure Egyptian independence once and for all. In one blow, the problems of the classic downstream state would be reversed. The fact that some of the upstream riparians were still under British control (Sudan, Uganda and Kenya) made it all the more imperative for the RCC to treat the Century Storage Scheme with great caution.

1952 - Germany announces its intention to pay Israel 1 billion DM. The Arab states immediately denounce this as direct aid to a hostile state (Waterbury, 1979:102). Two German companies - Hochtief and Dortmund Union - are awarded the contract and they commence work in November 1952.

1953 - A special committee was constituted by the RCC and attached to the National Production Council to oversee the Aswan High Dam Project (Waterbury, 1979:101). The IBRD was approached for funding, agreeing to finance only \$200,000 worth of engineering feasibility studies. Egypt reached a separate agreement with Germany to fund the same study. Leverage for this was Germany's stated intention to pay 1 billion DM to Israel as compensation for

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Jewish suffering during the Holocaust (Waterbury, 1979:102). This tames the hostility of the Arab states towards Germany.

1954 - Owen Falls Dam completed, providing 150 MW of hydroelectric power to Uganda. Survey of the Sudd wetland by the Jonglei Investigation Team indicates that a population of 700,000 pastoralists with over 1 million cattle would be affected by the Jonglei Diversion (Waterbury, 1979:90).

1954 - Egyptian Ministry of Public Works approves of the German design for a clay-core, rock-fill dam 6.5 km upstream of the Old Aswan Dam (Waterbury, 1979:102). The World Bank rejects the recommendations of the German consultants and undertakes its own study of the project.

1954 - Plans for Aswan Dam clash with Sudanese plans for Roseires Dam (Hultin 1995).

1954 - Tensions mount between Egypt and Sudan. Sudan declares the 1929 Agreement void (Hultin 1995).

1955 - Egypt awards the contract to review all design and specifications of the Aswan High Dam to a British company - Sir Alexander Gibb (Waterbury, 1979:102). The lack of an agreement with Sudan now became a stumbling block to implementing the Aswan High Dam. Egypt approached the World Bank for funding. The World Bank was positive about large dam projects at the time, but it was not autonomous however, having to take the foreign policy objectives of its major depositors into consideration. This invariably drew the funding request into the ambit of American Arab-Israeli concerns (Waterbury, 1979:103).

1955 - Dr. Abd al-Aziz Ahmad, a prominent Egyptian engineer, was opposed to the construction of the Aswan High Dam as conceived by Adrien Daninos on technical grounds. **Ahmad presented these views in two technical papers that he submitted to the British Institute of Civil Engineers.** This was fatal because (a) it challenged the High Dam Covenant, and (b) it amounted to airing household matters in the home ground of the former colonial master. The submission of these papers also coincided with the renege on Western funding and the Suez Crisis. Ahmad was branded a traitor to Egypt. He was awarded the State Prize for Outstanding Achievement, but this was overturned by senior politicians and he did not receive the award. He died in 1967 in absolute disgrace (Waterbury, 1979:121). This is evidence of the power of the sanctioned discourse, or in this case the High Dam Covenant. To challenge it with reason can ultimately mean losing your life or career. It is important for students of hydropolitics to grasp the relevance of this factor as it is repeated in many other case studies.

1955 - David Ben-Gurion, Israeli Minister of Defense, orders a **surprise attack on an Egyptian army outpost in the Gaza Strip** stating that Egypt was harboring Palestinian guerrillas. The Gaza Raid was an Israeli success, but it delivered a stinging humiliation to Nasser and the RCC. Due to the existence of an American,

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British and French arms embargo, Nasser turns to the USSR as a supplier of weapons (Waterbury, 1979:104). Egypt purchases \$ 80 million worth of arms from the USSR, with Czechoslovakia as the supplier. This was the first time that Soviet arms had entered the Arab world. This made the Americans respond initially by seeking a highly visible project to act as a symbol of American involvement in the region. Both John Foster Dulles (US Secretary of State) and Anthony Eden (British Prime Minister) concur on this. The Soviet Ambassador in Cairo expresses Russia's interest in financing the project (Waterbury, 1979:104). This speeds up the process, with Britain, the USA and the World Bank agreeing to fund the foreign exchange component of the project. The total estimated cost at that time was \$1.3 billion, with \$400 million being needed in foreign exchange. The World Bank agrees to provide \$ 200 million at 5.5% interest, while the USA and Britain promise grants of \$70 million towards the first stage of construction, with the understanding that a further \$130 million would be forthcoming later on (Waterbury, 1979:105). One stipulation was that no cash disbursement would be made before an agreement had been reached with Sudan. Nasser sensed that this overall package would be used as a lever to make peace with Israel and to curb Egypt's newfound nationalist dreams.

1956 - World Bank gives the go ahead for funding, but states that open bidding is required for all contracts. Egypt is unhappy about this as they want to award the contract to Hochtief and Dortmund Union in order to speed up delivery of the project (Waterbury, 1979:104). Enthusiasm for financing the project begins to wane in the West. Some role-players began calling for an International Nile Waters Authority to force Egyptian into collective arrangements. American cotton growers opposed the funding as it would increase competition and the Zionist lobby began to pressurize the US Government (Waterbury, 1979:106). The Nile Valley thus started to become the focal point of the Cold War (Waterbury, 1979:107). Both the US and British Governments withdrew their support for funding. Dulles announces that "We believe that anybody who builds the High Dam will earn the hatred of the Egyptian people, because the [financial] burden will be so crushing". Nasser responds by stating that "this is not simply the withdrawal of an offer; it is an attack on the regime and an invitation to the people of Egypt to bring it down" (Waterbury, 1979:107). One week later Nasser nationalizes the Suez Canal Company and places Engineer Mahmud Yunis in charge, stating that the foreign exchange revenue from the Suez will be used to defray the costs of the High Dam. The Suez Crisis happens. This leads to tension between Britain and Egypt over the repatriation of 70,000 British troops stationed in the Suez Canal Zone (Waterbury, 1979:103). Britain exerts pressure on the World Bank regarding funding for the Aswan High Dam, stating that Western aid should only be considered after an accord had been reached over the Suez issue. By June 1956 all British troops had been safely evacuated, but by then the damage had been done. Egyptian assets were frozen, so the revenue from the Suez Canal was used to pay for the war instead of the dam.

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1956 - Ethiopia asserts their right to use the waters of the Blue Nile for the development of their own people (Hultin 1995).

1956 - Sudanese independence escalates hostilities with Egypt. Sudan announces its intention to assert her sovereign rights over the Blue Nile (Hultin 1995).

1956 - Nasser makes a speech stating that "Egypt's very survival depends on the \$1.3 billion Aswan High Dam project. ... President Nasser [stated] that if the Western proposal were properly revised, he would give categorical assurances against Soviet bloc participation in the High Dam project" (Waterbury, 1979:98).

1957 - Ali Fahty, Professor of Irrigation at Alexandria University and former Supervisor of the Old Aswan reservoir, wrote a memo to Nasser alerting him to the dangers of silt entrapment in the Aswan High Dam (Waterbury, 1979:126-7). Nasser appointed a technical committee that dismissed these claims as being excessive.

1958 - British *Report on the Nile Valley Plan* sees the whole basin being managed as an integral unit. This is the culmination of 50 years of hydrological studies by British consultants. Egyptians dismiss this plan (Hultin 1995).

1958 - Egypt unites with Syria and the United Arab Republic was born (Waterbury, 1979:108).

1958 - Pending negotiations over the Nile, **Egypt sends a military expedition into the disputed territory between Egypt and Sudan.** Tensions finally ease with the collapse of the Sudanese government by means of military coup (Postel, 1999:136; Hultin 1995).

1958 - Egypt mounted an unsuccessful military expedition into disputed Nile riparian territories. Tensions eased when a pro-Egyptian government was elected in Sudan and the Nile Waters Agreement was signed (Wolf, 1998:256).

1958 - Egypt sends an unsuccessful military expedition into disputed territory amidst pending negotiations over the Nile waters. A general election takes place in Sudan. The Egyptians vote on Sudan-Egypt unification. The Nile Water Treaty is signed when a pro-Egyptian government is elected in Sudan (Gleick, 1998:129).

1958 - Krushchev announces the **USSR willingness to advance a credit** of \$ 100 million for the Aswan High Dam. This rekindled the dying Western interest in the project (Waterbury, 1979:109).

1958 - The benefits of the Aswan High Dam were listed as follows (Waterbury, 1979:118):

- To expand Egypt's cultivated area through land reclamation by 1.2 million feddans.

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- To convert 800,000 feddans of basin irrigated land in Upper Egypt to perennial irrigation.
- To expand the area under summer rice cultivation to 1 million feddans.
- To improve cultivation in the Delta by lowering the river level and hence improving drainage.
- To protect the country against the danger of high floods.
- To improve year-round navigation conditions.
- To generate hydroelectric power of 10 billion kWh per annum with major implications for industrialization.
- To improve the economic efficiency of the Old Aswan Dam power station by allowing year-round operation.
- To provide Sudan with enough additional water to increase its cultivated area threefold.

1959 - Bilateral Agreement on the Full Utilization of the Nile Waters between Egypt and Sudan. Total flow of the Nile into the Aswan High dam consists of 84 bcm, which is distributed as follows: Egypt gets 55.5 bcm, Sudan gets 18.5 bcm, with the remaining 10 bcm being lost to evaporation and seepage (Postel, 1999:141). No other riparian state is mentioned or recognized. Wording of agreement is based on the legal concept of "prior appropriation".

1959 - Nasser reviewed land reclamation efforts since 1952 and was dismayed to find that only 50,000 feddans were in the initial stages of reclamation (Waterbury, 1979:137). He demanded that at least 100,000 feddans per year must be reclaimed in readiness for the water that the Aswan High Dam would yield. Horizontal expansion thus became Egypt's top priority. There was no concern at this stage with vertical reclamation.

Upper Basin Post-Colonial Period

1960 - 1964

1960 - Zaire gets independence from Belgium.

1960 - Somalia gets independence from UN.

1960 - Eritrea becomes a province of Ethiopia and civil war breaks out. The Eritrean War of Secession lasts for 30 years.

1960 - Egypt signs a funding agreement with USSR for \$120 million for the second stage of the High Dam project (Waterbury, 1979:109). Construction on the Aswan High Dam commences, but with the Hochtief and Dortmund Union designs being altered to make the project cheaper. Prior to this, all Nile storage was seasonal in nature. The High Dam was an attempt to store the flood over successive years (Waterbury, 1979:88).

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1960 - Egypt's five year agricultural plan is launched with an emphasis on horizontal reclamation. No mention is made of vertical reclamation (Waterbury, 1979:137).

1961 - United Arab Republic between Egypt and Syria dissolves (Waterbury, 1979:108)

1961 - Tanzania gets independence from Britain.

Nyerere Doctrine: "Former colonial countries had no role in the formulation and conclusion of treaties made during the colonial era, and therefore they must not be assumed to automatically succeed to those treaties" (Collins, 1990; Hultin, 1995; Ohlsson, 1995:33).

1962 - Tanganyika Government informs Great Britain, Egypt and Sudan of its position citing the Nyerere Doctrine and **rejects the 1929 Agreement**. Egypt announces that it still regards the 1929 Agreement as being valid (Hultin 1995).

1962 - Burundi and Rwanda get their independence from UN. Uganda gets its independence from Britain.

1962 - Studies of the seepage losses of the Aswan High Dam that were being conducted by Claire Sterling suggested alarmingly that seepage losses were infinite, and the dam may not fill for 200 years. Sterling reported that "Lake Nasser is losing more than a third of the water flowing into it, 30 bcm yearly. Downstream, the Egyptians are getting nearly 10 bcm less than they used to, 53.7 bcm instead of 63 bcm" (Waterbury, 1979:124).

1962 - Egypt's sardine catch was 12,500 tonnes (Waterbury, 1979:146).

1963 - Kenya gets independence and immediately invokes the Nyerere Doctrine, rejecting the 1929 Agreement. (Uganda rejects the 1929 Agreement but does not cite the Nyerere Doctrine. Zaire, Rwanda and Burundi were never bound to this as they were under Belgium rule at the time).

1963 - Between 1963 and 1964, border skirmishes between Somalia and Ethiopia erupted over territories in the Ogaden Desert, which included some critical water (and oil) resources. Several hundred deaths occurred before the cease-fire (Postel, 1999:136). One element of this was the fact that the 1948 boundary had left Somali nomads under Ethiopian rule (Wolf, 1998:256; Gleick, 1998:129).

60's - USA supports Emperor Haile Selassie in Ethiopia, and the Bureau of Reclamation jointly develop an Ethiopian Master Plan for 29 irrigation and hydro-electric projects on the Blue Nile. This will store a total of 50 bcm per annum, almost equal to the total annual flow of the Nile, and would reduce the total streamflow by 4-8 bcm per annum. Total irrigated land in Ethiopia would equal 17% of all irrigated land in Egypt (Hultin 1995).

Early High Dam Period

1964 - 1975

- 1964** - At the **first closure of the Aswan High Dam Site**, President Nasser makes his famous speech on 14 May. "Here are joined the political, social, national and military battles of the Egyptian people, welded together like the gigantic mass of rock that has blocked the course of the ancient Nile. Its waters now spill into the largest lake shaped by human kind and which will be an everlasting source of prosperity" (Waterbury, 1979:98). Present at the closure was Nikita Krushchev (Waterbury, 1979:109).
- 1964 - Egyptian brick production, using silt that the river deposited annually, is around 1 billion bricks per year (Waterbury, 1979:131).
- 1964 - FAO survey covers 14 million feddans of irrigated land in Egypt. Of the area surveyed, a little over 2 million feddans were designated as suitable for reclamation. A subsequent USAID survey indicates that 70% of reclaimed land was on Class IV soil, and 25% was on Class III soil, with the remaining land being on Class II soils. Soil Classes III and IV have severe crop production limitations. Class IV soils require special treatment to obtain moderate yields at high cost (Waterbury, 1979:139). This sobering reality is a stark contrast to the optimistic yields that the High Dam Covenant promised originally.
- 1965 - During the Egyptian Presidential elections, the crowds started chanting the slogan "Nasser, Nasser, we come to salute you; after the Dam our land will be paradise. Nasser, Nasser, our beloved, next time [lead us] to Tel Aviv" (Waterbury, 1979:116). The High Dam Covenant was deeply entrenched in the overall Egyptian political psyche. So deep in fact that it causes engineers and scientists to collectively overlook any signs of soil infertility as a side effect of the Dam. The High Dam Covenant is defined as "a psychological state born of political and other circumstances which has cloaked the project from its very inception" (Waterbury, 1979:116).
- 1965 - Bilharzia (schistosomiasis) infection stands at 40% of the entire Egyptian population (Waterbury, 1979:146). This disease is associated with slow flowing water.
- 1966 - Roseires Dam was completed in Sudan 620 km upstream of Khartoum initially with World Bank and German funding. It was finally paid entirely by the Sudanese Government (Waterbury, 1979:94). This had a storage capacity of 3.0 bcm and a surface area of 290 square kilometers (Waterbury, 1979:88).
- 1966 - Completion of the Khashm al-Girba Dam at Atbara in Sudan with a storage capacity of 1.2 bcm and a surface area of 150 square kilometers (Waterbury, 1979:88).

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1966 - The fish production from Lake Burullus, one of the northern lakes in the Delta region, was 60,000 tonnes (Waterbury, 1979:145). This is an important wetland area that receives the majority of the drainage from various farmlands.

1966 - A study claimed that on average the High Dam power station would generate 5.7 billion kWh a year (Waterbury, 1979:149).

1967 - Egyptian brick production fell by a third of the 1964 level, due to the entrapment of silt behind the Aswan High Dam (Waterbury, 1979:131). This leads brick-makers to start buying topsoil from peasants, with the price of topsoil rapidly rising. The economic implications were that a peasant could make 100 Egyptian Pounds net from his crops on 1 feddan, whereas he could sell the topsoil to the depth of 1 metre, which would bring him 800 Egyptian Pounds per feddan. The designers and builders of the dam did not anticipate this major side effect.

1967 - The freshwater fish catch is 781 tonnes (Waterbury, 1979:146). Believers in the High Dam Covenant say that this will increase to offset the loss in saltwater production.

1969 - World Bank funding is secured to start introducing covered drainage tiles to the irrigated fields in Egypt. Only 200,000 feddans are drained. At the projected rate, by the year 2000 1.4 million feddans in Upper Egypt, and 2.5 million feddans in the Delta should be drained (Waterbury, 1979:134).

1969 - Studies show that in the Delta area, design of the field delivery system was based on a 10-day watering cycle. The soil is too permeable to retain water for that long however. This means that plant roots are too dry for long periods, and the excessive initial volumes that are delivered causes the water table to rise. A study showed that the water table rose at a rate of 4 metres per year from 1969-72. The unwanted result of this is that underground water flow was now reversed, with new lands draining into the Nile after traversing lower-lying older lands. This has also meant that the water level has risen in some parts to the root zone, waterlogging fields. This in turn mobilizes dissolved salts and carried them to low lying lands. This groundwater now has a salinity level of 3,000 ppm (compared with 300 ppm at Cairo) and is returned into the river (Waterbury, 1979:141-2).

1970 - Muhammad Hassanein Heikal, one of Nasser's closest confidants, predicts that Egypt's cultivated surface area would be 9 million feddans: 6 million already cultivated plus 2 million from reclamation projects using the Nile Water, and 1 million using artesian water in the Western Desert. In reality, cultivated acreage was closer to 5.9 million feddans (Waterbury, 1979:137). This is a typical hydropolitical phenomenon, with the benefits from irrigation almost always being overestimated. An element of this is the impact of the sanctioned discourse or "High Dam Covenant" which does not allow for objective reasoning. Any person bringing news or information of under-performance, is branded as being anti-nationalistic or a traitor to the cause. Another concept used for this is the

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"hydraulic mission". Mark Reisner (1993) refers to this when presenting the hydropolitical history of the American West.

1970 - Nasser dies without seeing the completion of Aswan High Dam and is succeeded by Anwar Sadat (Hultin 1995).

1970 - The death of Nasser ushers in a new hydropolitical era based on two processes. Firstly, the negative side effects of the High Dam were becoming manifest. Secondly, new evidence that the Nasser "pyramid" might be the cause of Egypt's economic problems added fuel to the fire. The 1950's critics of the dam, once chastised and accused of engaging in anti Egyptian activities, now became quasi-cult heroes (Waterbury, 1979:117). This resulted in the politicization of the dam's side effects.

1970 - Egypt's total fish production was 100,000 tonnes annually during the 1960s, of which 25,000 tonnes were taken from the sea. Half of the 25,000 tonnes consisted of sardines, while the remaining 75,000 tonnes were taken from the Red Sea, the Delta Lakes and the Nile River (Waterbury, 1979:146).

1971 - Egypt's sardine catch has dropped from 12,500 tonnes in 1962 to 1,500 tonnes in 1971 (Waterbury, 1979:146). Defenders of the High Dam argue that lost production will be replaced by increased fish production in Lake Nasser. This is a typical hydropolitical issue as dam builders almost always argue that their structures will increase fishery and tourist activities.

1971 - Soviet-Egyptian Friendship Treaty is signed (Waterbury, 1979:113).

1971 - Completion of Aswan High Dam with a storage capacity of 164 bcm and a surface area of 4,000 square kilometers (Waterbury, 1979:88). This could theoretically store 2 average floods. The completed dam was 1 km wide at the base, with a crest height of 111 metres. The length of the crest was 3,6 km and was 40 metres wide (Waterbury, 1979:111). At the opening ceremony, Sadat's official speech castigated the USA by saying that "America's broken promise [of 1956] is neither the first nor will it be the last. And Soviet support in building the High Dam is neither the first nor will it be the last, for it is an expression of aspirations for freedom and peace for peoples eager for them and who resist colonialist exploitation and imperial subjugation. America's broken promise is but one link in an unending chain that leaves us no alternative but to believe it represents a political plan designed to thwart the aspirations of the Arab people. ... For each of America's broken promises - O my brethren - there is a Soviet promise fulfilled or on its way to fulfillment; in every sphere of hope and work; in industry, in land reclamation, in electrification, in armaments, in training, in unconditional and unlimited diplomatic support. For the Soviet Union is confident that its stance is one of defense of liberty and defense of peace" (Waterbury, 1979:113).

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1971 - Official Egyptian figures on the performance of the Aswan High Dam show annual losses of 11.4 bcm, with 9.4 bcm being attributed to evaporation and the remaining 2 bcm being ascribed to seepage. This seems implausible against the figures that were released by Taher Abu Wafa and Aziz Hanna Labib (senior officials in the High Dam Authority) which show a vertical seepage loss of 48 bcm in the first 8 year period until the substrate was saturated, followed by 6 bcm thereafter. In addition to this, 1 bcm losses were taking place horizontally. Thus according to these two officials, in recent years one would anticipate at least 5 bcm seepage loss over and above the evaporation losses (Waterbury, 1979:125). Thus the official loss figures were being underreported by around 14.4 bcm (9.4 bcm "official" evaporation loss and 5 bcm seepage loss). In sum, more than half of Egypt's incremental gain from the construction of the Aswan High Dam will be lost in storage (Waterbury, 1979:125).

1971 - Hydroelectric power station completed at the Aswan High Dam with an installed capacity of 10 billion kWh annually from 12 Russian turbines. This ignored the fact that both head and flow rates varied. These in turn are governed by other factors, the most important of which is matching the competing needs of electricity generation and irrigation. The bottom line is that rate of release and available head are not synonymous. E.G. It is practice to minimize water release in January and February when agricultural demands are low so that drainage and irrigation canals can be cleared and maintained. This lasts for 40 days with daily releases down to 85-90 mcm. This means that the turbines cannot function at capacity, and with industrial demands high, this period has been reduced to 21 days during which 3bcm are released to satisfy nonagricultural demands. With the releases being determined largely by the agricultural sector, the level of electricity generation is often insufficient, although the installed capacity exists. The trade-off between the two is highly complex (Waterbury, 1979:147-9). As a result, the most power that both the Old Aswan Dam and the Aswan High Dam generate together is 9 billion kWh, of which the Old Dam's share is 2 billion. A 1966 study claimed that on average the High Dam power station would generate 5.7 billion kWh a year (Waterbury, 1979:149).

1972 - Sadat purged his regime of those closest to the USSR, expelling all of the Soviet military advisors in July (Waterbury, 1979:113). The vagaries of Egyptian politics had again raised its head.

1972 - The Nile River was in a low flow regime (Waterbury, 1979:151). The over-year storage of the High Dam was crucial to agricultural production.

1974 - Ethiopian Emperor Haile Selassie is deposed and the country becomes a republic under General Aman Andom who is subsequently executed by General Teferi Benti. This ends American influence in the area. The Ethiopian army undergoes vigorous 10-fold growth, ultimately becoming the largest in Sub Saharan Africa. Ethiopia starts purchasing arms to the value of 5.5 billion US\$, becoming the world's 8th largest recipient of Soviet arms.

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- 1974 - Water in the city of Cairo turned murky with an unpleasant smell to it. Investigation reveals that it is caused by eutrophication and associated phytoplankton and algae blooms in Lake Nasser. This had clogged the filtration system of the city (Waterbury, 1979:144).
- 1974 - The electric power generated at Aswan High Dam reached 4.4 billion kWh which is less than half of the installed capacity, but slightly more than half of all electricity generated in Egypt (Waterbury, 1979:149).
- 1975 - Lake Nasser reaches its full supply level (FSL)** in October for the first time, with a surface area of around 5,000 squared kilometers and a volume of 162 bcm, of which 30 bcm are dead storage and for receiving sediments, 90 bcm for live storage and 37 bcm for storing excess floods (Waterbury, 1979:112).
- 1975 - The Specialized National Committee stated that "studies are now being made to estimate the overall erosion,** with the object of determining the protective structures to be erected all along the Nile from Aswan to the Delta barrages. The importance of protecting the barrages against erosion can hardly be exaggerated. The Council draws attention to the need to conclude all protective measures satisfactorily in good time, and to support these measures at every stage with a proper plan of researches and studies" (Waterbury, 1979:128).
- 1975 - With the dam now full, and the effects of silt entrapment on downstream scouring, worries start to surface that if a second flood occurs in 1976, then large releases of high velocity silt-free water will result in major scouring downstream as the silt-starved river tries to gain equilibrium again (Waterbury, 1979:129). This raises the use of the Tushka Depression as the key to security against this particular calamity.
- 1975 - Decision is made to use herbicides on 50,000 km of canals and drains to kill heavy concentrations of Water Hyacinth. This increased load of toxic agricultural entered the water cycle as a result (Waterbury, 1979:144). This impacted later on the aquatic ecosystem functioning in the Delta area.
- 1975 - Fish production in Lake Burullus in the Northern Delta had dropped to 14,000 tonnes. This is the result of deteriorating water quality, disturbed fish breeding cycles, periodic closure of sea inlets and attempts at reclaiming some of the lake for agricultural purposes (Waterbury, 1979:145). Production of freshwater fish in Lake Nasser has risen from 781 tonnes in 1967 to 15,000 tonnes in 1975. The problem is that freshwater fish do not shoal like seawater fish, so they are more difficult to catch. The fleet is primitive with no refrigeration, so the increased supply of freshwater fish does not offset the lost production of saltwater fish (Waterbury, 1979:146).

Post High Dam Period

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1976 - Present

1976 - Sadat unilaterally abrogated the Soviet-Egyptian Friendship Treaty (Waterbury, 1979:113).

1976 - Dr. Abd al-Aziz Ahmad was awarded the State Achievement Prize by the Academy of Scientific Research posthumously (Waterbury, 1979:121). Most of the technical criticisms that Ahmad had raised in 1955 were by now clearly manifest and recognized by all civil engineers and aquatic ecologists. Central to Ahmad's argument were three crucial issues:

- **Evaporative losses** from the Aswan High Dam, when taking wind velocity into consideration, would equal 40% of storage capacity or 4 bcm. This is relevant when the original calculation was that Egypt would gain an additional 7.5 bcm annually from the High Dam as agreed with Sudan. This meant that the gains were in fact much lower than originally anticipated (Waterbury, 1979:122).
- **Seepage losses** were also under-estimated. For example, when the Old Aswan Dam was filled in 1902, the reservoir initially lost 120% of its capacity, declining over a 30-year period to about 9% of capacity. This was caused by the loose and porous nature of the underlying soils and rock. Ahmad assumed that the same would happen at the High Dam, and assuming the live storage capacity to be 100 bcm, he estimated that for at least 20 years total losses due to seepage and evaporation would be 124% of reservoir capacity. This was expected to stabilize at around 17% per annum after 30 years when the substrate reached saturation point (Waterbury, 1979:122).
- **Changes in hydrostatic pressure** on the underground water table would change the overall water balance (Waterbury, 1979:122). What this means is that by building a dam which raises the water table above the prevailing level in geological areas that are characterized by fissures and permeable beds, one reverses the flow of groundwater. Under normal conditions, water flows from the ground to the river, but once a dam is built and the water level is increased, water now flows from the river into the ground, being channeled away in underground fissures and being lost to the overall water balance of the basin.

1976 - A USAID report states that 4.2 million feddans were undergoing slight to severe effects from inadequate drainage, and unless something was done, all irrigated lands would be severely affected (Waterbury, 1979:133).

1976 - The High Dam power station generated 6.6 billion kWh with an additional 2 billion kWh coming from the Old Aswan and nearly 5 billion kWh coming from thermal generators (Waterbury, 1979:149). The installed capacity is 10 billion kWh.

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1977 - At the **United Nations Water Conference at Mar del Plata** in Argentina, a report tabled by the Economic Commission for Africa stated that "the evaporation from Lake Nasser in Egypt represents about a quarter of the flow of the River Nile at Aswan" (Waterbury, 1979:123). Egypt compiled this data so it is being contested. Prevailing scientific belief in non-Egyptian circles is that the evaporative losses are higher at around 21 bcm. The 1959 Agreement allows for 10 bcm losses. The overall yield of the dam was thus grossly overestimated.

1977 - Ethiopian purge and Lt-Col Mengistu Haile Mariam orders the execution of Gen. Benti.

1978 - Egypt announces that repayment of all loans for the Aswan High Dam have been made (Waterbury, 1979:112). The final cost was three times greater than expected, but actual costs have never been made public and it is probable that in truth the full cost has still not been paid in 2000.

1978 - The Egyptian Minister of Irrigation estimates that the total cost of field drains through to 1985 would cost twice as much as the cost of the Aswan High Dam itself (Waterbury, 1979:134). This is a common hydropolitical phenomenon, where the cost of drainage is seldom factored into the initial cost of building the dam, simply because it would then make the dam economically unviable.

1978 - The five-year agricultural plan (1978-82) declared total outlays for the reclamation of 912,000 feddans from 1954-75 at 865 million Egyptian Pounds. The breakdown was LE 383 million for preparation, LE 340 million for initial cultivation, LE 141 million for drainage (vertical reclamation), resulting in an average cost of LE 950 per feddan. The same reclaimed land only contributed 3% of the total value of agricultural output, and this return does not cover annual operating expenses (Waterbury, 1979:139). The failure to account for the need of vertical reclamation is a typical hydropolitical issue. The sanctioned discourse usually discourages studies that include the cost of drainage too.

1978 - Ethiopia's proposed construction of dams on the headwaters of the Blue Nile leads Egypt to repeatedly declare the vital importance of water (Gleick, 1998:129). (See Sadat's speech in 1979 and Boutros Ghali's speech in 1988).

1979 - Anwar Sadat makes his speech saying, "the only matter that could take Egypt to war again is water" (Gleick, 1998:129).

70's - **Ali Fahty advocates the return of the annual flood on the Nile**. This would see the High Dam being bypassed by two main diversion canals for flood control purposes. Over-year storage would be transferred to the Equatorial Lakes. Siltation would restore soil fertility. This proposed return to the Century Storage Scheme would again make Egypt vulnerable to the whims of upstream riparians, and would also mean the loss of hydroelectricity on which Egyptian industry depends (Waterbury, 1979:134). The wheel has turned almost full circle, with the

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engineering and technical problems being recognized, at least in some circles, and the whole viability of the politically-driven project being questioned for the first time.

1979 - Egypt and Israel sign a formal peace agreement. Anwar Sadat announces that "the only matter that could take Egypt to war again is water" (Hultin in Ohlsson, 1995). This becomes the origin of the "Water Wars Discourse" and is repeated often after this. **The "water wars" debate is officially born.**

1983 - Jonglei project is stopped due to the civil war in Sudan (Hultin 1995). It is never resumed, and in modern times would not be funded as wetland destruction is now strongly opposed by major donor agencies.

1984 - Major famine in Ethiopia. The military government announces plans to forcibly relocate 1.5 million people. The plan fails. In spite of this, the forced resettlement is later claimed as a national priority by the military government with forced resettlement peaking in the 1984/85 famine. This political concept is called "**garrison socialism**" (Hultin, 1995:41). This is an important concept for scholars to understand, as this is a major driving force of political instability for many decades.

1987 - Ethiopia becomes a single party state under Mengistu Haile Mariam.

1988 - Boutros Ghali makes a speech saying, "the next war in our region will be over the waters of the Nile, not politics" (Gleick, 1998:129).

1989 - Ethiopian government abandons the resettlement policy with only 4% of the planned irrigation land being developed. Egypt becomes afraid of renewed plans to develop these irrigation lands and this aspect becomes part of the Egyptian security paradigm (Hultin 1995).

1990 - From 1974 to 1990, Ethiopian military expenditure had risen to 10% of GNP, at a time when GNP/capita was US\$110, making it the world's poorest state (Hultin 1995).

1990 - Boutros Ghali, in his capacity as the Egyptian Foreign Minister, says in a speech that "the national security of Egypt which is based on the waters of the Nile, is in the hands of other countries. ... The next war in the region will be over the waters of the Nile" (Hultin 1995). This gives the "water wars" debate a stronger impetus.

1990 - Egypt announces that Israel is supporting an Ethiopian dam project on Lake Tana (Hultin 1995).

1990 - The Horn of Africa becomes the region with the second largest refugee numbers in the world after Afghanistan (Hultin 1995).

- Ethiopia had 360,000 refugees from Somalia and 385,000 from Sudan.

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- There were over 1 million refugees from Ethiopia in the neighboring states, with 700,000 alone in Eastern Sudan.
- Sudan had an additional 70,000 refugees from Chad as well as 240,000 refugees from Uganda.

1991 - The Siyad Barre regime collapses in Sudan as the result of civil war and amidst widespread famine (Hultin 1995). Ali Mahdi Mohammed becomes President.

1991 - The Mengistu Regime collapses in Ethiopia, partly as the result of massive military spending. The Ethiopian economy collapses after a series of famines and bouts of acute social instability. The Eritrean War stops. The rebel movement splits in Sudan. This heralds in an era of détente in Ethiopian-Sudanese relations (Hultin 1995).

1991 - Gulf War means a reduction in hard currency flowing into the Horn of Africa from workers in the Gulf states (Hultin 1995).

1991 - An agreement is signed between the Sudan and Ethiopia over the joint use of the Nile waters. The Ethiopian Government also announces that it has plans to construct a number of dams in the Ethiopian highlands. This triggers Egyptian fears that its access to the Nile could be in jeopardy (Haftendorn, 2000:59).

1992 - The 10 riparian states meet to launch the Nile River Basic Action Plan (NRBAP). One of the elements of this is to establish a cooperative scheme for the management of the Nile (Green Cross International, 2000:98).

1993 - Riparian States of the Upper Nile meet to foster cooperation within the basin. This becomes an annual event (Hultin 1995).

1995 - Sudan threatens to cut off the flow of Nile water to Egypt as tensions flare. These are linked with the assassination attempt on President Mubarak while he was attending a meeting in Addis Ababa (Hultin 1995).

1995 - The World Bank, in conjunction with the UNDP and the Canadian CIDA start working together with an International Advisory Group, senior officials from the riparian states and other donor agencies to give impetus to the NRBAP (Green Cross International, 2000:98). They draw their inspiration from third party success in the Indus Basin in the 1950s.

1997 - All Nile Basin States seem keen to cooperate in order to secure a US\$ 100 million loan. This shows the effect of a third party in hydropolitics (Hultin 1995).

1998 - Ethiopia demands a re-examination of the 1959 Agreement at a meeting of the Nile Basin States that was held in Tanzania. The Ethiopian Foreign Minister announces the intention of constructing various dams and reservoirs within Ethiopia, citing better climatic and engineering-related criteria (lower evaporation

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and deeper valleys with good dam sites). Toshka/New Valley Project in Egypt is launched. It will use 5 bcm from upstream of the Aswan High Dam, and send it via aqueduct to the Western Desert where it will irrigate 200,000 hectares at an estimated cost of 87-145 billion US\$ (Hultin 1995). This should be interpreted as exercising the "prior appropriation" right that was established in the 1959 agreement. It is primarily political in orientation, therefore issues of economic efficiency are secondary. This negates the Ethiopian plans and reinforces the legal principle of "prior appropriation".

1999 - The Nile Basin Initiative (NBI) is launched in Dar es Salaam in February, with all basin states (except Eritrea) being members. The NBI succeeds the former Technical Cooperation Committee for the Promotion of the Development and Environmental Protection of the Nile Basin until an acceptable permanent legal framework is established (Green Cross International, 2000:98).

1999 - The Council of Ministers agree in May to transitional institutional arrangements to strengthen cooperation in the Nile Basin (Green Cross International, 2000:100).

2000 - Five basin states will be water-stressed (2,000 cu m/person) (Tanzania, Burundi, Rwanda, Kenya, Ethiopia). Combined irrigation plans of all the Nile riparians cover 2.9 million hectares, requiring some 25-35 bcm of non-existent water (Hultin 1995).

2000 - Ethiopia is again in the grip of a severe famine.

Results of the Aswan High Dam:

- The High Dam has not provided the benefits it was designed to bring. In fact Egypt's water needs are greater than what the High Dam can satisfy, so the idea of the Equatorial Lakes as a source of supply is again gaining credibility (Waterbury, 1979:151).
- Silt entrapment has caused a reduction in soil fertility.
- Silt entrapment has meant that the Delta is no longer being built, and is thus receding as the ocean currents erode the Delta away.
- Silt entrapment has meant that the river downstream of the dam has become silt-hungry, so major engineering works are needed to protect banks, bridges and barrages from having their foundations eroded from under them.
- Reduced flow of water has meant salt water intrusion into the Delta area.
- Increased irrigation has meant salinization of the land, and the inflow of saline water into underground aquifers.

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- Waterlogging and salinization have meant that drainage systems have been introduced. These are extremely costly, and may negate any previous net gains that irrigation may have resulted in.
- Evaporative losses at the Aswan High Dam have resulted in a reduced water quality downstream, with a higher saline content. Water flowing into the Dam has a salinity of 200 ppm, and when it leaves it is 220 ppm. But because of return flows back into the main Nile, salinity around Cairo is 300 ppm (Waterbury, 1979:142).
- Groundwater in the Delta area now carries a salt load in the order of 3,000 ppm (Waterbury, 1979:142).
- Some of the lakes that are part of the delta aquatic ecosystem have now become hyper-saline.
- There has been a major loss in fish production around the Delta area, with many of the lakes having become nothing more than poisoned hyper-saline eutrophic sewers.
- The levels of bilharzia (schistosomiasis) infection have become increasingly high with a large drain on the economy in terms of medical treatment and lost working hours.
- The planned hydroelectric power was not fully realized. In this regard the power is needed when the irrigation water is not needed and *vice versa*.
- Because the electricity production is below expectation, nuclear power stations are being considered. Because this would mean the importation of fissile material, the USA is opposing it. An alternative is to build a 76 km long canal from the Mediterranean to the Qattara Depression. This depression is 50-60 metres below sea level, so inflowing seawater would be used to generate electricity (five times the Aswan High Dam's installed capacity), creating a massive salt-water lake. The impact that this will have on groundwater and other ecological aspects of the area is unknown (Waterbury, 1979:150).
- Quiet and serious technical debate over the merits and demerits of the Aswan High Dam were never allowed to take place, because the High Dam Covenant branded such studies as suspect and anti-Egyptian (Waterbury, 1979:152).

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Typical Exam Type Questions:

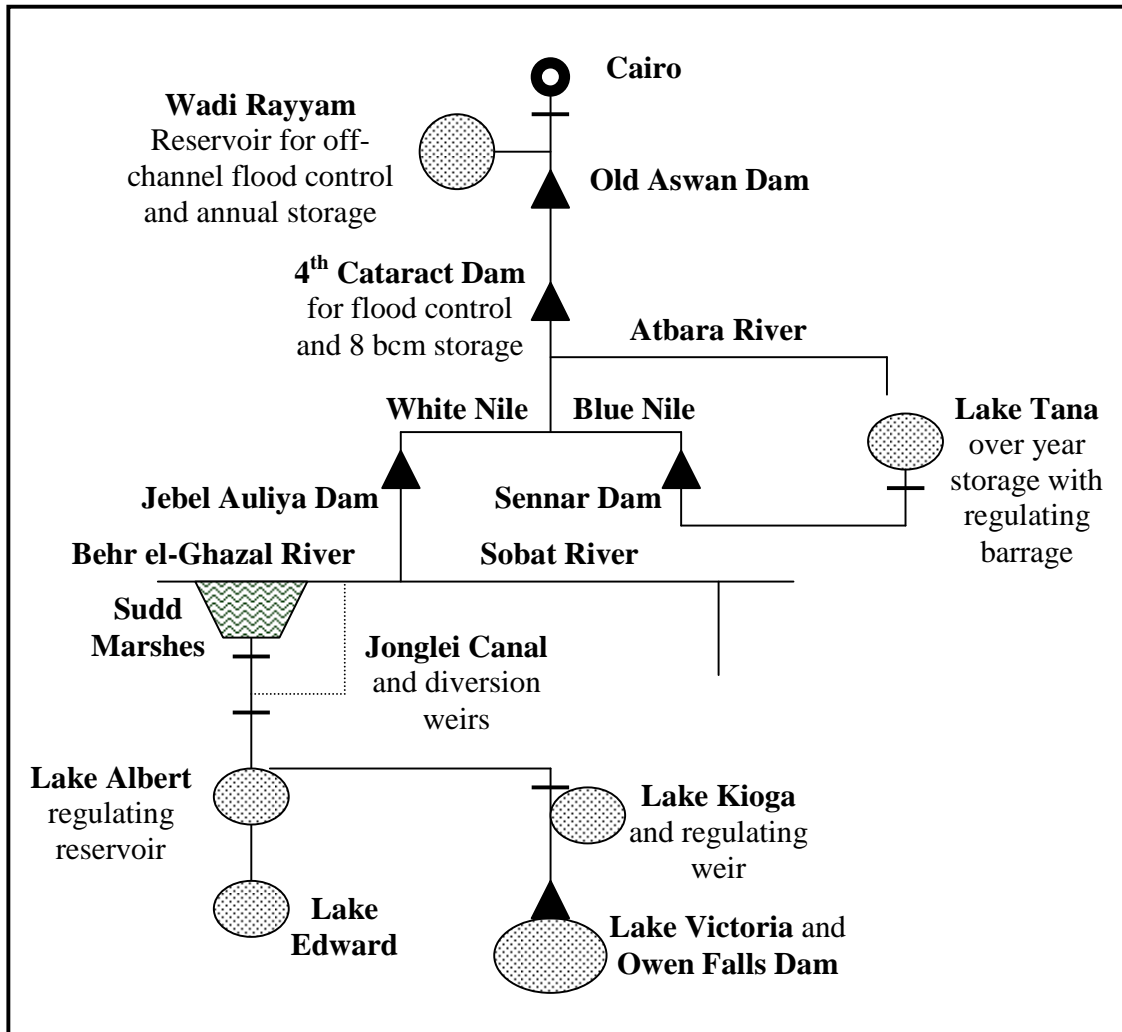
- (1) Southern Africa is reaching the limit of its readily available water supply. Water that is still available is generally far from where it is needed, or found in shared river basins. Four of the most industrialized states in Southern Africa (South Africa, Zimbabwe, Botswana and Namibia) have reached, or are reaching, this limit. This means that a large number of complex inter-basin transfers are required. Having noted the complexities from the Nile River case study, write an essay on what you have learned, but place this within the context of SADC.
- (2) In his classic work *Cadillac Desert: The American West and its Disappearing Water*, Mark Reisner stated that no irrigation-based desert civilization had ever survived with the exception of Egypt. Evaluate this statement in the light of what is now known about the long-term side effects of the Aswan High Dam. Draw a conclusion that is applicable to Southern Africa.
- (3) Compare and contrast the "sanctioned discourse" that existed in Egypt and another country of your own choice over a period of at least fifty years?
- (4) Explain the role that discursive elites played in the decision-making process that led to the construction of the Aswan High Dam? Highlight what the impact of these elites was on the decision-making process at different stages.

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- (5) What hydropolitical parallels exist between the Nile and Okavango River Basins? Highlight both similarities and differences.
- (6) What lessons can be learned from the Nile Basin case study? Place particular emphasis on the impact of the "sanctioned discourse" on the decision-making process. Apply the answer to Southern Africa.
- (7) Water that is found in international (shared) river basins is complex in the sense that its use by any basin state can politicize the issue. In the Nile Basin for example, two agreements have been reached, but neither have ever included all of the riparian states. In the case of South Africa, 66% of the country lies in international river basins. What lessons can be learned from the Nile Basin that can/should be applied to South Africa?
- (8) In order to use water from a shared river basin, some form of agreement needs to be in place. This can take the form of regime creation. South Africa has a number of agreements with other riparian states, but these are almost always bilateral in nature. What are the political implications of creating basin-wide regimes for South Africa? Use the lessons that have been learned from other case studies to support your answer.
- (9) Engineering and hydrology are based on Newtonian physics. Central to this is the use of clearly defined numbers. In hydropolitics, numbers are almost always contested by the various riparian states, often being the very source of conflict. Discuss this statement using examples from various case studies that you have been exposed to.
- (10) What role can political scientists play in the water sector? Motivate your answer by quoting examples from various case studies that you are familiar with.
- (11) "No regime ever built a monument to itself with tile drains, but it is at that level that Egyptian planners must focus their attention" (Waterbury, 1979:153). Discuss this statement and highlight its political relevance.
- (12) John Foster Dulles announced that, "We believe that anybody who builds the High Dam will earn the hatred of the Egyptian people, because the [financial] burden will be so crushing". Nasser responded by stating that "this is not simply the withdrawal of an offer; it is an attack on the regime and an invitation to the people of Egypt to bring it down" (Waterbury, 1979:107). Discuss this statement and highlight the hydropolitical relevance of it.
- (13) Boutros Ghali, in his capacity as the Egyptian Foreign Minister, said in a speech that "the national security of Egypt which is based on the waters of the Nile, is in the hands of other countries. ... The next war in the region will be over the waters of the Nile" (Hultin 1995). Evaluate the whole "water wars" debate in light of this statement, analyzing its relevance to Southern Africa.

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- (14) The Nile Valley became the focus of the Cold War. Discuss this statement.
- (15) Countries in semi-arid regions with a strong need for rapid economic development sometimes have a strongly articulated "hydraulic mission". Discuss this statement using case studies that you are familiar with.



Schematic Layout of the Century Storage Scheme

(After Waterbury, 1979:97)

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Map of the Nile River Basin (Green Cross International, 2000:99).

Map of the Nile River Basin (Wolf, 1998).

Map of the Nile River Basin showing Water Management Structures (Agnew & Anderson, 1992:232).