THE PHILOSOPHICAL SOCIETY OF THE SUDAN

IN COLLABORATION WITH

THE NATIONAL COUNCIL FOR RESEARCH

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17th. to 21st. APRIL 1976

"WATER QUALITY AND RISKS OF WATER POLLUTION IN THE SUDAN"

PROGRAMME & ABSTRACTS

MIRGHANI HAMZA HALL
FACULTY OF ENGINEERING
UNIVERSITY OF KHARTOUM

P R O G R A M M E

All sessions from 10 a.m. to 12 noon

Saturday, 17th April, 1976

Opening Session - 10 a.m.
Socio-economic aspects of water quality.
Contents: pages 1-7.

Sunday, 18th April, 1976

Agriculture, Water quality and pollution.
Contents: pages 8-16.

Monday, 19th April, 1976

Engineering Session.
Contents: pages 17-24

Tuesday, 20th April, 1976

Health Session.
Contents: pages 25-30.

Wednesday, 21st April, 1976

Conference summary and recommendations.

Note: Philosophical Society's publications will be on sale during the Conference

All are welcome

C O N T E N T S

Agricultural Section — Page

Engineering Section

Health Section — Page

WATER IN THE QURAN

By; Prof. Abdalla El Tayeb
University of Juba.

ABSTRACT

This paper will be mainly concerned with the treatment of the subject of water in the Quran. Water is the source of all life. Both sweet and salt water may become scarce or its nature may change and so become unsuitable for drinking. In the life to come, water supplies some of the most important sources of eternal happiness and divine pleasure, and boiled water and other kinds of unwholesome water supply some of the most terrible means of torture in hell-fire.

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صورة الماء في الذهن الشعبي

د . محمد عبدالحي
كلية الاداب
جامعة الخرطوم

هذه ليست دراسة مفصلة ، وانما هي خطاطة لدراسة وورقة للنقاش. تبدأ بالاشارة الى الجذور الدينية والطقسية للعوامل التي دخلت في تكون صورة الماء في الذهن الشعبي . ثم تنتقل الى الصورة المحلية وارتباطها - بجوانب من النشاط الاجتماعي والثقافي ثم استعمالها لغة رمزية للتعبير عن قيم ومعتقدات تؤمن بها الجماعة.

وتتطرق الورقة اخيرا الى العناصر الايجابية في تلك الصورة ومدى ما يمكن ان تقدمه في تأصيل عملية التغيير الاجتماعي والبيئي في الموروث الشعبي مما يقلل من عوامل التناقض والصراع والمصاحبة لهذا التغيير.

TRADITIONAL METHODS OF WATER PURIFICATION IN THE RIVERAIN SUDAN IN RELATION TO GEOGRAPHIC AND SOCIO-ECONOMIC CONDITIONS

By: Dr. Samia Al Azharia Jahn
Sudan Medical Research Council

ABSTRACT

In the valleys of the Blue Nile and the River Nile, the tremendous increase of suspended solids during the flood season, from less than 100 mg/l to 4-8000 mg/l, calls for water purification. Bank filtration known in the Sudan under the term "gannan" can not be practised during this time because the rising river covers sandy islands as well as sand and gravel formations along the banks. The native methods of choice consist mainly in a type of clay- soil called "Rauwaq" and different types of plant flocculants. There is evidence that the use of plants was better known in the past.

At present the method to clarify turbid water with "Rauwaq" has spread from Gezira villages in the neighbourhood of Rufa'a to the Blue Nile Province and the Northern Province. New sites of high quality "Rauwaq" containing more than 90% bentonite were discovered there only 1-2 years ago. Other types of soil coagulant aids are restricted to defined geologic sites such as the rock stone from Jabel Kassingar.

Indigenous and cultivated plants are used according to their geographical distribution. Several of these plant flocculants play a role in folk medicine in the treatment of gastro-intestinal disturbances.

Women are more concerned about water purification than men. The concern is not related to the social status of the family; but depends on the individual care of the house-wife. Women from poor housholds

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were found to show greater skill in the use of coagulant aids in optimal concentration than women from wealthier homes who delegate part of their duties to servants.

In many villages some people are still reluctant to pay for water quality. During the flood season muddy Nile water is used rather than bringing water from more distant ~~sources~~ wells. People may also refrain from water purification if soil or plants need expenses for transport.

PERCEPTION AND CHOICE OF WATER SOURCES, NEEDS AND IMPROVEMENTS IN RURAL KHARTOUM

By: Mohamed E. A. Abu Sin
Dr. Yagoub Abdalla

ABSTRACT

The problem of improving rural water supplies in the Sudan differs from one area to another. In the drier areas improved supplies can mean simply increasing water quantity. In western Sudan especially in Sandy areas, where the problem is a primary water shortage, the borehole policy seems likely to be the most practicable alternative. In other parts of the Sudan, such as Khartoum province, alternative sources of water - other than boreholes "hafirs" and shallow wells - are available and the principal need is to improve their quality for human consumption. Thus the problem is different for different parts of the Sudan.

In Khartoum province water for domestic use may be obtained from the Nile, irrigation canals, hand-dug wells, stand pipes and boreholes. Choice among these alternatives depends on many factors which are incompletely understood. It may be seen as a trade of decision between water price, household efforts and perceived water quality. The choice may also be a function of household demographic, socio-economic characteristics and of community structure.

This study is an attempt to establish the relationships between household choice and perception of water quality, the management of water supplies and the socio-economic statues of the household in selected villages in Khartoum province. An attempt is also made to evaluate the local concern and community involvement in improving their water quality.

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Preliminary results suggest that factors of distance, costs of fetching water and the economic status of the household are the main determinants of the choice of a particular water source. In the areas where there are more than one alternative attention is paid to the taste and quality of water. In some villages where modernized water sources are available, the traditional sources are abandoned. The efforts of the community in improving their water sources through self-help programmes is especially clean in urbanized villages. This seems to be due to the inhabitants of the use hygienic water for domestic purposes.

THE MAGNITUDE OF THE DRINKING WATER PROBLEM IN THE SUDAN

By: Mohd. Osman El Sammani
Ministry of Agriculture Food & Natural Resources

ABSTRACT

According to available information there is an annual deficit of 246 million cubic metres in the drinking water requirements of rural areas.

The first part of the paper reveals the geographical dimension of the problem through a set of 9 maps showing by province the distribution of the existing water sources and areas served by them as envelopes of 5, 10, 20, and more than 20 km. from source. The maps also show those parts of the country depending wholly on shallow wells and natural sources, and served at variable distances from the source.

The second part of the paper attempts to quantify the magnitude of the problem. The said deficit is worked out on estimates of daily and annual consumption for human beings and various categories of livestock, based on figures supplied by WHO and local experts. The paper stresses that the amounts specified are estimates and do not reflect actual consumption of local communities and their herds in various parts of the country. Because of differences in standards of living, availability of water, and the extent of dependancy on natural sources, more close examination of the whole situation is needed to determine the real magnitude of the problem.

The paper concludes by indntifying the short term and long term objectives of water provision, and attempts to list the requirements for meeting the short term objectives.

THE ENVIRONMENT AND ITS POLLUTION

BY: A. T. Abdel Hafeez
Department of Horticulture,
Faculty of Agriculture,
University of Khartoum

ABSTRACT

Pollution of the environment is a result of human activities. It takes place in three media namely, the atmosphere, waters and the land.

According to UN reports the pollutant effects may be direct and indirect both resulting in undesirable conditions which very much endanger mans' living on this planet. It is therefore necessary that efforts have to be made to avoid polluting the environment.

Pollution in agriculture

J.F. Bierhuizen

Department of Horticulture, Agricultural University, Wageningen, The Netherlands.

Summary

Pollution in agriculture leading to a reduced yield may occur either in the soil via irrigation, the application of fertilizers and herbicides or via aerial pollution. The accumulation of substances can be a result of the farmer or that of the environment.

The most important source of pollution in the soil is that via irrigation, because a plant absorbs enormous quantities of water which is evaporated in comparison with the simultaneous uptake of kations, anions and other substances. The transpiration coefficient of a plant, that is the amount of water transpired per gm dry matter produced can be in the order of 1000. Dry matter may contain 10% kations and anions. This means that for the production of 1 gm dry weight, 1000 gms of water is transpired with an uptake of 0.1 gm of salts. Surface or subsurface water used for irrigation with a concentration higher than 0.1 gm/ltr necessary leads to an accumulation of salts in the top layer. (concentration of the Rhine 0.7 g/ltr, the Merdedah Tunesia 2.5 g/ltr, the Nile 0.1 g/ltr). The plants react on the concentration of the soil solution rather than on total salts present in the soil. The sensitivity towards salinity is different. Usually 4 groups of tolerance are distinguished. The sensitivity, however, depends also on the growth rate. The choice whether a certain water quality can be used for irrigation depends not only on the sensitivity of the crop but also on the probability of increase in soil salinity during a growth period, which depends e.g. on the soil, the rootdepth, the amount of irrigation (vide fig. 1). Some experiences with leaching, sprinkling and irrigation, irrigation time will be discussed.

An excess of fertilizers and herbicides in the long run may effect plant growth and through drainage pollute surface water. At present balances are made between the amount of fertilizer applied and kations and anions regained in the crop. Phosphate usually does not lead to a large pollution of the surface water due to the fact that the transport in the soil is extremely low. The nitrogen load on surface water is higher which is at least partly due to nitrification. With herbicides, heavy metals, models are developed to calculate transport in relation to absorption, evaporation, half time values of certain substances.

Aerial pollution (fluoride, SO2, ozone, ethylene) is a great problem at present in industrialized countries. The threshold concentrations at which damage occurs depend on the time of exposure and are in general extremely low. The opening of stomates during the occurence of pollution is important. Bulbs are extremely sensitive towards pollution and often used as indicator for aerial pollution. Fog and dust especially in glasshouses might reduce yield via the reduction in light intensity.

WATER QUALITY AND AQUATIC WEED CONTROL

By: Dr. Kamil Beshir El Tigani
Water Hyacinth Control Section
Plant Protection Administration

ABSTRACT

The presence of aquatic weeds in a number of waterways and irrigation canals leads to serious water losses, navigation, irrigation, fishing problems and health hazards and prompts necessary control measures. The use of chemical herbicides against such infestations is not without ill-effects on the quality of the treated water and the organisms living in it. Moreover, the decaying plant material reduces the water quality and changes the aquatic environment to an extent that might be harmful to organisms inhabiting aquatic ecosystems.

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A CRITICAL APPRAISAL OF THE WATER POLLUTION PROBLEM IN THE GEZIRA CANALS WITH PARTICULAR REFERENCE TO AQUACULTURE

By: T. T. George
Fisheries & Hydrobiological Research Section
Khartoum.

ABSTRACT

The canalisation network of the Gezira Cotton Scheme adds a considerable water area to the vast resources of inland waters in Sudan. This water area provides an excellent scope for aquacultural development of cultivable species of fish which can also be utilized in the biological control of aquatic weeds and disease vectors already heavily infesting the irrigation canals. The use of pesticides and molluscicides poses serious water pollution hazards. The crucial problem is how best to develop aquaculture. In this paper, therefore, a critical appraisal of this problem is reviewed and the need for well-coordinated ligislative, adminstrative and technical measures to protect this water resource is stressed.

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CROP RESISTANCE AND POLLUTION

By: Gaafer Mohd. El Hassan
Department of Horticulure
Faculty of Agriculture
University of Khartum

ABSTRACT

The existence and development of crops that are resistant or tolerant to pests and disease will contribute to the reduction or elimination of the use of pesticides, a major source of pollution in agriculture. Salt tolerant cultivars not only make it possible to utilize polluted areas but will also minimize the build-up of such pollutants.

Resistant cultivars should therefore occupy a pivotal position in the long-term integrated and coordinated approach to pollution control.

EFFECT OF POLLUTANTS ON BIRDS:

WITH SPECIAL REFERENCE TO PESTICIDES

By: Dr. Magzoub Omer Bashir
Department of Crop Protection
Faculty of Agriculture
University of Khartoum

ABSTRACT

Since the time of the Ancient Egyptians, birds have always fascinated man in a number of ways. In modern times some species are taken as national Symbols. These are highly respected and protected.

In his endeavour to monopolize the earth's resources, unknowingly man has endangered many species of birds and other creatures. Chemicals, especially pesticides ware one of the main threats to birds.

The mobility of birds, however, is one of their natural means of protection against damaging exposure to chemicals. However, this is counteracted by cyclic or rhythmic habits, food specificity and habits of reproduction.

Cases of acute toxicity and loss of birds after pesticide applications are reported from all over the world. Loss because of acute toxicity might occur through pesticide magnification along the food chain. Birds of prey especially those at the ultimate top of a long food chain are particularly endangered.

Subacute and chronic toxicity is manifested in loss due to reproductive failure rather than adult birds mortality. Evidence correlating the population decline of some birds species and the use of pesticides in their ecosystem was reported in the

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case of the Grebes, Pelicans and Falcons. Experimental evidence was established by research on the Malard and the Sparrow Hawk.

The population decline of some species was theorised as resulting from thin egg shell and breakage of these eggs. DDT, its metabolites and Dieldrin of the chlorinated hydrocarbon group of pesticides were experimentally found to cause egg shell thinness. Pesticides affect hydrolysis of the enzymes and hormones necessary for the mobilization and deposition of calcium for egg shell formation.

In the Sudan hazardous pesticide use practices are found in the Gezera and other big schemes. The use of chemicals to control competitor birds like the weaver is deleterious to non-target species. With the wide use of pesticides in the country one doubts that no bird species is in danger. The lack of appreciation of the importance of birds and lack of specialised ornitholygists hamp hamper serious studies on the situation of birds species under the wide use of pesticides.

PESTICIDES AND THE GEZIRA ENVIRONMENT

BY
G.A, El Zorgani; N.M. Nasr El din*and
A.A. Abdel Rahman
Agricultural Research Corporation, Wad Medani

Abstract

Historically the use of organic pesticides in the Gezira was first introduced in 1946/47 when a limited amount of the then new discovered insecticide DDT was used to control the cotton jassid. Since the sixties there has been a continuous increase in the quantity and diversity of pesticides used annually in the Gezira.

It is now estimated that not less than 2.5×10^3 tons of active insecticidal material is being deposited annually on the Gezira. This figure should be more alarming when it is realized that nearly two thirds of it represents DDT.

Despite this increasing usage of pesticides in the Gezira, there was no serious consideration to trace its effects in early days. For this reason investigations are now being made to study the pesticides interference with the environmental fabric, and also to look into the environal effects on behaviour and nature of pesticides.

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*Sudan Gezira Board, Barakat.

REVIEW OF WATER TREATMENT IN THE SUDAN

By: Kamal Mahmoud
Public Electricity & Water Corporation
Khartoum

ABSTRACT

The paper deals with the current water treatment practice as applied by PEWC to the community water. Urbanisation which is now a noted phenomenon taking place in various parts of the country, requires a full review of the existing water system with respect to:

(A) High quantities of chemicals consumed in the treatment processes.

(B) High cost of water purification works.

HOW PLANTS CAN AID TO IMPROVE WATER QUALITY.

TRADITIONAL METHODS IN AFRICAN COUNTRIES AND MODERN APPROACH IN THE WEST

By: Dr. Samia Al Azharia Jahn
Sudan Medical Research Council

ABSTRACT

In the Sudan, Egypt, Northern Nigeria and probably several other African countries the muddy water from rivers and rainponds is clarified with different types of plant material. Similar methods are also applied for the purification of drinking water from decomposing organic matter. A small amount of crushed bark, stem, leaves or seeds is usually added to the water stored in tins, barrels, jars of burnt clay, great gourd-halves or small bassins dug in the ground for pasturing animals. If optimal concentrations are used a good effect on the ~~optical~~ turbidity ~~removal optical density~~ is seen after 2 hours. In addition several plant flocculents improve the odour and taste of the water. Whether the bacteriological quality can also be affected by these methods is under investigation. Some of the plants discovered by people in Bornu villages (Northern Nigeria) as useful coagulant aids are identical with those known in the Sudan.

Bulusu and Pathak (1974) reported that seeds from some Indian plants can be used as natural coagulant aids in combination with alum or sodium carbonate.

In several European countries, U.S.A. and Japan higher aquatic plants mainly belonging to the species Scirpus, Phragmites and Juncus are used at present in the treatment of domestic and industrial waste water. The pioneering investigations in this field

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were conducted by Seidel and her co-workers in the Max-Planck--Institute in Krefeld, Western Germany. The elimination of inorganic and organic sludges as well as pathogenic germs from waste water by artificial marshes was studied best with the bulrush, Scirpus lacustris. The good results in improvement of water quality can be partly explained by typical morphological features of the stem. Biochemists were able to follow the metabolism of organic compounds such as phenolic. These substances affect also the development of the stomata and induce the outgrowth of hydropotes from the surface of the epidermis. Bactericide root secretions or symbiosis between the rhizosphere and other micro-organisms seem to be responsible for the effect on bacteria.

Rush ponds are at the same time easy to operate and have low installation and operation costs.

SOLAR DISTILLATION OF WATER, WATER QUALITY AND POSSIBLE USES

By; Dr. Yahia H. Hamid
Faculty of Engineering & Architecture
University of Khartoum

ABSTRACT

The simple solar still is a single-effect distiller that operates at sub-boiling temperatures. It utilizes the greenhouse effect in its operation; an effect which depends essentially on the selective property of glass being transmissive to visible light and opaque to the infra-red.

The quality of distillate is chemically compareable with the product from other single effect thermal distillers. Preliminary biological tests conducted at the Central Medical laboratories in Khartoum on samples from a laboratory unit at the samples adhere to the BP standard on water fit for medical use. However further tests under controlled conditions would be necessary.

Production cost of the water is about 1.5 nn per Imperial Gallon. At this cost the product is a much cheaper than that from any known method for the production of distilled water. The product could be used in the Chemical and pharmaceutics industries, in research laboratories and medical centres and possibly for human consumption.

WASTE RECYCLING USING SELECTED INDIGENOUS PLANTS

By: Kathe Seidel
Max-Plank Institute,
Krefeld-Hulserberg,
Germany

ABSTRACT

We have developed methods in the Max-Plank-Institute at Krefeld to make use of higher plants for waste recycling. This was based on the observation that certain aquatic plants metabolize inorganic and organic sludges, eliminate poisons and kill microbes.

The plants are grown on a system of stepwise descending sand beds or basins arranged like a cascade. If waste water is allowed to enter the system it will penetrate through the sand layer. Its stepwise purification takes place in the roots which are also able to destroy pathogenic bacteria. Even virus and worm eggs are inactivated, but we can not as yet explain by what specific mechanism. Thanks to the sand layer there is no risk for stagnating waste water and growth of harmful algae. Solar energy and gravitation satisfy the energy demands of the system this cheap sources of energy make the poblem inexpensive. In addition the abundant growth of plant stems yields material which can be used as animal food, fertilizer, raw material for the production of cellulose and for hand made mats and baskets.

These waste recycling units are already in use in several countries and have given very encouraging results.

SEWAGE COLLECTION, TREATMENT AND DISPOSAL AS A PREVENTIVE MEASURE AGAINST POLLUTION

By: Ibrahim Mohd. El Hassan and Manoun

ABSTRACT

In order to avoid the pollution of water resources, whether surface water or under ground water measures should be taken not to allow polutants to reach the water sources. Since waste water whether industrial or domestic has ever been one of the major problems causing water pollution in developed countries it becomes very essential for the developing countries to learn the lesson and avoid the disposal of sewage in the water courses.

Based on this fact this paper will deal with the experience in the Sudan with sewage collection, treatment and disposal which is only limited to Khartoum and Khartoum North. The paper will reveal the experiences and problems facing the personell who has been engaged in these two schemes,and will reflect the light on the future of sewage collection, treatment and disposal in this country.

It will also look into the existing practice in rurual and urban Sudan of the disposal of human wastes and point out the main advantages and disadvantages of the methods used.

AN ATTEMPT TO CONTROL THE WATER POLLUTION IN SUDAN

By: Dr. Beshir Mohd. El Hassan
Faculty of Engineering & Arch.
University of Khartoum

ABSTRACT

The paper describes briefly the organizational problems related to drinking water and point out that more than six bodies are responsibe for water supply with minimum or no co-ordination between them. The paper also describes the status of sewage treatment and disposal in this country. It criticises the system of water treatment and management, and calls for the establishment of a central body to cater for, or at least to coordinate the activities in this field inorder to achieve the followings:

1. To work out national standards for drinking water
2. To work out national standards for waste disposal and prevension of water resources against pollution.
3. To encourage the economical use of water particularly in industry through recycling and similar processes, inorder to overcome the water shortage and to prevent pollution.
4. To investigate and adapt simple and cheap technology for water and waste water treatment (such as oxidation bonds)
5. To work out an overall pollution control system.

AN APPROACH TO WATER MANAGEMENT IN THE SUDAN

By: Dr. Abdin M. A. Saleh
Faculty of Engineering & Arch.
University of Khartoum

ABSTRACT

Water in the Sudan can either be obtained directly from the falling rain or at a later stage in the hydrological cycle, from surface and ground water.

Up to a very recent time the general tendency was that, surface water especially the Nile and its tributeries have been the major source for the country's water of which agriculture is the major consumer. This relationship has been satisfactory at the time when the supplied surface water is much higher than the demand for it. With the recent very large increase in the irrigated areas, the Sudan's use of the Nile water is nearly approaching its upper limiting value. In addition to that, other very important consumers such as, domestic, industry hydro-electric power generation, and navigation have increased demanding a greater share. Other new sources of water such as loss on swamps, storage in lakes, desalination of water, recycling and improvement of water uses, can also be considered in any management plan.

A balance between such a wide variety in supply and demand can only be achieved through a new approach to the management of the water resources in the Sudan. This new approach, which is currently called system approach, must pay a considerable attention to the hydrological, ecological, economical and political characteristics. Following this approach a Water Resources System can be drawn adopting the techniques developed in the field of System Engineering.

DRINKING WATER QUALITY

By: Joseph Zaki Boutros
The Chemical Laboratory
Ministry of Health

ABSTRACT

The paper discusses the drinking water quality in the Sudan and details are given to cover the following:

1. The sources of drinking water, namely: rivers, deep boreholes, open wells and natural and artificial reservoirs. Comments are given on their level of quality.

2. The physical and chemical analyses were carried out by the Chemical Laboratories on water samples. Other investigations and control measures are reported.

3. Local Standards for drinking water were formulated by the Chemical Laboratories after giving considerations to WHO International standards, National Standards of other countries, available information and toxicity data, conditions prevailing in the country, and the research carried out locally.

The paper concludes by recommending more attention to water quality problems; and strict measures to improve the bacteriological and biological conditions of drinking water.

PESTICIDES, WATER POLLUTION AND HEALTH HAZARDS IN THE SUDAN

By: Zuhair Ibrahim Fakhry
Occupational Health Division
Ministry of Health

ABSTRACT

With development and agricultural expansion, pesticides are being increasingly used in the Sudan with consequent pollution of the environment and health hazards to man and animal. In this communication the different types of pesticides used in the Sudan are surveyed. The methods employed, the manner of environmental pollution, the routes of entry into the body and the clinical features and toxic effects are discribed. It is emphasized that pesticides are essential for the economy of the country, but the health risks are stressed and preventive measures are suggested.

BACTERIAL FLORA OF ZEER WATER

By: Prof. H. H. Erwa
Dept. of Medical Microbiology & Parasitology,
Faculty of Medicine

ABSTRACT

Samples of "zeer" water from houses of twenty-five children of the age of two years or less seen at Mygoma Health Centre in Khartoum were examined. Nineteen of the children were suffering from diarrhoea and six were healthy controls. The "zeer" water samples were cultured. Rectal swabs of seven of the nineteen sick children yielded strains of enteropathogenic E. coli. Nine of the "zeer" water samples of these patients were highly contaminated; and in four cases the organisms of the rectal swabs and the "zeer" water were identical. From the six controls no enteropathogenic organisms were isolated by rectal swabs. In the "zeer" water samples four were grossly contaminated.

HEALTH RISKS FROM HAFIR WATER IN KHARTOUM PROVINCE

By; Mohamed Ahmed Adam Fadul
Assistant Chief Sanitary Engineer
Ministry of Health

ABSTRACT

The pollution of "hafir" water is of two types: a) Natural Pollution of the hafir water due to the type of the soil, washing and accumulation of wastes inside the hafir by run-off from the catchment area. b) Insanitary methods of extracting the water from hafirs.

The first sanitary survey to all water sources in the rural area of Khartoum Province showed that hafir water is always contaminated.

There are obvious health risks due to the use of polluted or contaminated water supplies from hafirs to the rural population of Khartoum Province. There are as yet no records showing the diseases related to the use of water from hafirs. Therefore the evaluation of health risks from hafir water is estimated only from the general health records in the rural health units.

It is suggested that the cost of treating the water from hafirs will be, in the long-run, more than the cost of building, running and maintaining the health care system.

PREVENTION OF WATER POLLUTION FROM INDUSTERIAL WASTES

By; Mohamed Ahmed Adam Fadul
Mohamed El Hassan Salih
Yousif Osman
Occupational Health Division
Ministry of Health

ABSTRACT

The prevention of discharge of industerial wastes into water bodies is of particular importance in the Sudan. In recent years industerial dutelopment has attracted and imported modern techinologies of industerilization from the highly developed countries which are now suffering from the problems of environmental pollution created by intensive industries. Many different kinds of wastes are produced which may be harmful to human health as well as to animals, plants and aquatic life.

For the prevention of water pollution from industerial wastes the following measures are suggested:

1. Establishing some means of treating the industerial wastes to an acceptable degree before discharge into water bodies.
2. Studying the possibility of changing the process of production to change the quality and the volume of the wastes so as to minimize the cost of treatment of the wastes and the health hazards of their discharge into water sources.
3. Taking the advice of qualified consultants in the field of industerial wastes as well as colaboration with the government and industerial agencies to make use of industerial wastes.
4. Enacting laws and regulations for the control of the discharge of untreated industerial wastes into water sources.

SCHISTOSOMIASIS IN IRRIGATION SCHEMES AND WATER BODIES IN THE SUDAN

By; Mutamad Ahmed Amin
Department of Social & Preventive Med.
Faculty of Medicine

ABSTRACT

Schistosomiasis is one of the most important public health problems of the Sudan. Since 1925, the prevalence of the disease had increased as a result of the establishment of dams, pump schemes and now agricultural development projects.

In the Gezira Irrigated Scheme the prevalence of the intestinal form of the disease has risen sharply to 60-75% and in the age-group 8-14 years almost every individual is infected.

The White Nile areas are badly affected with both types of schistosomiasis, S. mansoni and S. haematobium. Duein, Aba Island and Kosti are examples of the badly affected regions.

Very little is known about schistosomiasis in the West. S. haematobium is belived to be the only species. In El Rahad the prevalence is about 12%.

Except for a recent epidemic of s. mansoni in Bor district nothing is known about the Bilharzia situation in the South.

The establishment of Irrigation Schemes like, Girba, Geneid, Suki and Pump Schemes in the Northern provinces had led to great modification in the environment which favoured the spread and multiplication of snails and produced a dramatic increase in the prevalence of schistosomiasis.

PHILOSOPHICAL SOCIETY OF THE SUDAN
P.O. Box 526, KHARTOUM.

Banker's Order

The Manager, Date:

Dear Sir,

Please pay to the account of the Philosophical Society of the Sudan at Bank of State for Foreign Trade, Gamaa Avenue, Khartoum the sum of £S2.500 (Two Sudanese pounds and five hundred millims only) to-day and thereafter annually on the 1st of January until further notice, and debit my account accordingly.

Yours sincerely,

Name in Capitals

Signature :