The Legal Framework for the Prevention and Control of Water Pollution in Israel

Jerusalem, 1976

Ministry of the Interior

Environmental Protection Service

THE LEGAL FRAMEWORK FOR THE PREVENTION AND CONTROL OF WATER POLLUTION IN ISRAEL

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The ideas expressed in this work are the views of the author and not necessarily those of the Environmental Protection Service.

Jerusalem 1976

FORWARD

In October, 1974 the following dissertation was submitted to the Senat of the Hebrew University to meet the degree requirements for a doctor of la The thesis was approved with changes in November, 1975.

The dissertation was prepared over a period of two years under the gui of Professor Reuvan Yaron and Dr. Aharon Yoran, both of the Faculty of Law. In addition to their help, this thesis could not have been possible without cooperation of those person interviewed, whose names appear in Appendix B. Special thanks go to Mrs. Esther Foa for her help in the preparation of the chapter on ground water, Mr. Yaacov Yanai for his help in the preparation o section on industrial wastes, Mr. Amos Harpaz, Dr. Colette Serruya and Mr. Avraham Shem Tov for their help in the preparation of the chapter on the Kinneret and Professor Hillel Shuval for his overall criticism of the work. Mrs. Ora Baumgarten deserves a special thanks for her typing of the thesis.

ERRATA

Page 18, third line from end, read "food industry" not cooking industry.

Page 33, footnote 72, read "Chief Engineer" and not "Chief Doctor."

Page 103, footnote 137, read "District Sanitary Engineer" not Chief Doctor.

Page 158, last line should conclude with the phrase "stream and wadis."

Page 307, second paragraph, read "Director General's Committee" not "Secretary General's Committee."

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Postulating the Thesis

This doctoral dissertation is a portrayal of Israel's water sources and the legal framework designed and administered to protect them. The thesis accepts as a basic presumption that Israel is a country with scant water resources. From this presumption, two themes are posited which intertwine throughout the dissertation, each reinforcing a single conclusion. The first theme is that an early awareness of limited fresh water sources led to the Knesset's legislating an expansive legal framework for the protection and conservation of inland waters. The second theme, is that despite this awareness and the vast legal mechanism created to protect Israel water sources, the country's western flowing streams are polluted; ground water is rapidly being polluted; and Lake Kinneret is being exploited to the point where it, too, is in danger of pollution. Thus the question posited by this dissertation: With this vast legal framework, why have the water sources been allowed to reach their various stages of pollution?

There are more than likely many answers to this question, social economic, political, scientific and legal. Working within the legal framework, this dissertation posits that a vast legal framework and an all powerful administrative system have not successfully coped with the problem of pollution of Israel's water sources. Therefore, the sheer power of the legal framework has not provided the proper mechanism for prevention and control of water pollution. Since the

question of proper management of water resources is convoluted, however, a solution to the present dilemma would be a revolution in Israel's entire water management program. Short of that, a much tighter legal system must be devised. One that not only empowers the Water Commissioner to act, but requires him to act. One that not only gives the Water Commissioner administrative authority, but also demands of him administrative responsibility. And, finally, one that reduces the number of agencies competing for the Water Commissioner's power to protect and preserve Israel's water resources.

THE ISRAEL WATER CODE: AN OVERVIEW

This dissertation has purposefully been divided into two units. The first unit presents an overall picture of Israel's water code. It includes its historical roots and its present legislative, administrative and judicial framework. Following this overview, the second unit describes in detail the protective legal umbrella afforded each natural source of water. The second unit is composed of three chapters. The first is a discussion of ground water, its uses and the legal framework for its protection. The second chapter describes the western flowing streams of Israel, thei sources of pollution and the legislative, administrative and judicial framework set up for their protection. The final chapter applies the knowledge gained in the first two chapters to a case study on the Law and Lake Kinneret. Thus the reader can pick the forest, the trees, or both in his journey through the following description of Israel's legal framework for the prevention and control of water pollution.

A. The Legal Inheritance

1. Introduction

The modern state of Israel inherited its water laws from sections of the Ottoman Civil Code, or Mejelle[1], and ordinances promulgated by the British High Commissioner of Palestine. Most of this inheritance has been replaced by Israel legislation. All provisions of the Mejelle on water and water rights have been repealed[2]; scattered mandatory pieces of local government and public

health ordinances remain in effect, but generally as amended by more recent Israel enactments. For the purpose of completeness, however, a brief description of that framework in existence when Israel became a state will be set out next.

2. Legislation Inherited from the British Mandate

a. The Mejelle

> Things which have been in existence from time immemorial shall be left as they were.
>
> Article 6
> Ottoman Civil Code

One finds that the Mejelle places water rights in its section on gratuitous property rights and declares that water, like grass and fire is a free good, jointly owned by the public[3]. No one may obtain private possession of ground water[4], lakes, the seas[5], and large rivers[6]. Use of such waters for irrigation and drinking[7] is permitted by all, provided no injury is committed to another user[8]. The Mejelle does not carry this point to its logical conclusion, howeve A river found entirely within the boundaries of one or several landowners, belongs to those landowners[9]. And a well, entirely within the private property of a landowner is his property, and he has the right to restrict its use[10]. Yet the Mejelle provides that this right to restrict use does not bar the creation of an easement to use[11], nor does it extend to the ground water itself. The Mejelle permits anyone to dig a well and withdraw water for his needs, even if such withdrawal lowers the water table in his neighbor's well[12]. Further, unlike the English rule of cojus est solum; ejus est usque ad coelum[13], the Mejelle provides that ownership of the well determines ownership of the surrounding land[14], and not vice-versa.

In the area of pollution control, the Mejelle does not allow an easement to pollute. The construction of a cesspit or sewer near a well or water channel so as to contaminate its waters is strictly forbidden. On failure to remove the injury, the cesspit or sewer are to be closed[15]. There are no provisions for rerouting the sewage in case of closure, however, nor does the section apply at all to contamination of natural bodies of surface water. Of interest are a section on the duty of the state to clean public rivers[16], and a section on the duties of landowners to clean private streams[17]. This later section also defines the order of payment among appropriators for cleaning the stream's waters. The sections apparently refer to the removal of debris from wadis, however, and not to the building of sewage purification plants.

There is scant reported case law on the subject of rights in water during the British mandate. Of the cases found, it is clear that British judges were swayed by principles of English common law and the doctrine of riparian rights as much as by provisions of the Mejelle. Disputes over water rights were to be brought in the Land Courts because the English common law connected rights in water to rights in land[18]. Depletion of a water source, or damage caused by diversion of surface waters, were considered nuisance questions, justiciable in the District Courts[19].

b. Ordinances of the British High Commissioner

The only piece of English legislation affecting water rights was the 1940 Amendment to the Palestine Order in Council of 1922[20]. This significant amendment vested rights in all surface water in the High

Commissioner in Trust for Palestine. By the creation of this Trust, rights created by the Mejelle in private streams were abrogated. At the same time, the 1940 Amendment gave the High Commissioner the auth rity to enact ordinances concerning the beneficial and economic use of all water sources, including underground sources. Empowered with this authority, the High Commissioner created the job of Water Commissioner in 1944 to supervise and regulate the distribution of water in "controlled areas" of Palestine. Forceful objections by members of the Yishuv, however, prevented designation of controlled areas, and, thus, effectively barred execution of the regulation[21].

The 1940 Amendment aside, most British ordinances affecting rights or use in water were primitive supply and pollution control measures in the guise of nuisance control and health legislation. Major ordinances in the area of pollution control included local authority by-laws, the Municipal Corporations (Sewerage, Drainage & Water) Ordinance, 1936[22] and the Public Health Ordinance, 1940[23]. These ordinances and local by-laws treated water pollution as did early English and American legislation[24]. It was a local problem of nuisance control, especially in the protection of drinking water supplies. There was also an added indigenous perspective to mandatory legislation concerning water use -- preventing the spread of malaria[25].

The Public Health Ordinance gave local authorities the power to abate nuisances either on their own initiative, or as a result of a report by a doctor or health inspector[26]. Nuisances included public or private wells and water supplies so polluted, and water

sources, sewers or drains so fouled or so situated as to be dangerous to health. The idea of requiring local authorities to abate nuisances arising from a polluted water course was doomed to failure, however, because local authorities' sewage is a major cause of surface water pollution[27]. Furthermore, the Public Health Ordinance required local authorities to take legal action to abate an existing nuisance; it did not require local authorities to purify sewage wastes to prevent the production of such nuisances.

Building and maintaining sewerage works, including disposal facilities was the duty of each municipality, under the Municipal Corporations (Sewerage, Drainage & Water) Ordinance, but only upon request by the High Commissioner[28]. This provision had no application to towns or rural communities, and reference to sewage disposal works in the Ordinance implied only the location of a sewage outfall. Although the District Governor's approval for placement of a municipal sewage outfall was required by the Municipal Corporations (Sewerage Etc.) Ordinance[29], one finds no accompanying provisi requiring discharge of municipal sewage in such form as to reduce water pollution effects. On the other hand, if the department of health notified a municipality of a polluted water supply, the municipality was required to turn to court for an order closing the polluted supply source[30]. No definition of pollution appears in the ordinance, nor can one discover from its provisions how often inspec tion of the drinking water source was to be performed. Of interest a provision in the Ordinance requiring private parties to close all cesspools immediately upon hook-up of their premises to the municipa sewerage line[31]. Yet there is no requirement that the initial hook-

up be made.

The only British ordinance aimed directly at prevention of pollu tion of a water source is the Criminal Code Ordinance, 1936[32]. This ordinance, still in effect today, forbids the intentional fouling of a spring, stream, well or reservoir on pain of imprisonment of up to three years[33]. A somewhat unique ordinance was promulgated in 1947 t protect the religious associations connected with the Sea of Galilee[34]. The ordinance is still in effect, but it is questionable whether one could infer from its provisions pollution prevention measures. The Fisheries Ordinance, 1937 is also in effect today[35]. It forbids the use of poisonous or explosive matter in the capture or destruction of fish. Yet the ordinance, being criminal in nature, requires an inten to destroy and would be inapplicable in preventing the discharge of sewage, even if such discharge resulted in fish kills.

Evaluation

From the foregoing discussion several points should be clear. T 1940 Amendment to the Palestine Order in Council of 1922, and the reg lations promulgated thereunder, had no actual effect on the customary use of water sources. The Amendment did sever all private rights ove surface water and created a power in the Water Commissioner to restric rights of use in all water sources in controlled areas. Yet this pow lay dormant due to objections raised by members of the Yishuv.

In the area of pollution of water sources, one finds only scatte criminal provisions in British ordinances. Disposal of sewage was a local affair, partially supervised by the central department of healt

and the district governors. Provisions for purification of water at the supply stage are evident in mandatory ordinances, but one finds no provisions for the purification of sewage. In fact, by allowing each local authority to determine the location of its sewage outfall, towns were encouraged to convert streams and wadis into carriers of waste. No ordinance discouraged this practice by requiring either the purification of municipal waste water or standards for private disposal of liquid waste. In short, the combined total of British ordinances did not provide a comprehensive scheme for water use and protection of water sources.

On the other hand, a legal basis for centralized control over water uses existed in Palestine. Furthermore surface waters were held in trust by the government for the people, and, of most importanc the right to use water and protect such use was not an automatic condi tion resulting from proximity to a water source. This, then, was the legal framework for the protection of water sources that the newly formed government of the State of Israel inherited in 1948.

B. History of the Present Legal Framework

1. The Legislative Framework

One of the Israel governments first acts of statehood recognized the state's need for water and protection of water resources. The General Agricultural Ordinance of 1948[36] created an agricultural council, among whose duties was the resolution of questions concerning the protection and development of water resources. The council was further to set policy in the area of increased agricultural production

and the absorption of immigrants in agricultural work, but there is no mention of setting national water policy. The ordinance is significant for several reasons. First, it reinforces the basic presumption of this dissertation, i.e., an awareness on the part of Israel's decision makers of the country's meager water supplies and the need to protect them. Secondly, the failure to include water policy among the policy issues to be determined by the agricultural council probably stemmed not from a lack of consideration of the need for water policy, but rather from an almost instinctual feeling that agricultural policy inherently determines water policy. This feeling has dominated water policy formulations since the creation of the state and its effect on pollution control measures will be all too apparent in later chapters of this thesis.

In the early fifties, water policy reached the planning stages in the Ministry of Agriculture. In 1952, a committee of experts known as the Halperin Committee, began the task of preparing comprehensive water legislation[37]. During this same period, the Minister of Agriculture attempted, by interim pieces of legislation, to consolidate his hold over water uses and sources. In 1955, the Water Drilling Control Law was adopted[38], prohibiting the drilling of wells without a license from the Water Administrator (later the Water Commissioner). This law, still in effect today, empowers the Water Commissioner to refuse a license request if he feels that a new well will cause salination of ground water, depletion of ground water supplies, or interfere with supply of water for household uses[39]. The law empowers a magistrate court judge to close any well dug without license from the Water Commissioner[40]. The only persons excluded from the law's

coverage are those holding a valid oil prospecting license, issued by the Ministry of Development[41].

On the same day the Water Drilling Law was adopted, the Knesset adopted the Water Metering Law[42]. This law forbids the supply of water without measuring it. Although the law recognizes private right in a water source, the Minister of Agriculture is given the power to require one using water from an independent source to measure the water consumed[43]. A later regulation under this law requires a monthly repo on the amount of water consumed or supplied to be submitted to the Water Commissioner[44].

In the year 1957, the Drainage and Flood Control Law was passed[45] Its purpose was to create an administrative framework that could take measures to secure the orderly drainage of water and the prevention of floods. The act created a national drainage board, made up of eight members appointed by the Government, and twelve lay members, eight of whom to represent agricultural interests. The Drainage Board's principal duties are to advise the Minister of Agriculture in drainage matters[46]. The Act also authorizes the Minister of Agriculture to set up district drainage boards, a majority of whose members to be represen tatives of local authorities, and a minority to be representatives of the Government[47]. Creation of each board requires the approval of all the local authorities in the drainage board area, or failing that, a decision by the Government. The boards are to set up drainage companie to prevent soil erosion and promote orderly drainage. To that end, eac board must submit a plan to be approved by the Minister of Agriculture setting out the arteries under its control, the plans for the estab-

lishment of a drainage company, plans for the purchase of lands near a artery and the width of any protective strip to be declared around an artery[48]. Each board has the power to purchase land, to prevent building, sheep grazing and other agricultural endeavors near an artery[49].

The act, however, by its own terms, is not aimed at prevention of surface water pollution[50]. The board's powers do not extend to supervision over sewage flow, including industrial sewage[51]. The boards have no jurisdiction in the area of municipal drainage lines, unless the Minister of Agriculture, after consultation with the Minister of Interior, so determines[52]. Furthermore the boards are limited to supervision over "arteries", thus they do not have supervisory powers over ground water. Of even more significance is the political make-up of the drainage boards. There is no requirement that an expert in drainage matters, an ecologist, or a member of a conservationist group be a board member.

The minor legislation prior to the adoption of the Water Law in 1959 set up a scheme of administrative controls to promote conservatio in water use and establish drainage boards to prevent the loss of rain water as well as preventing flood damage. What was lacking was a national water supply system and administrative control over all sourc of water including sewage sources, as well as legislation aimed specifically at preventing pollution of such sources. This was the purpose of the Water Law of 1959[53]. The law was several years in preparation and served as the subject of heated debate in committee as well as on the floor of the Knesset itself. The act as finally adopted is a com-

prehensive water code, with the exception that it failed to adopt a comprehensive scheme for the prevention of pollution of water sources.

a. The Water Law, 1959

The Water Law of 1959 is essentially an enabling act. Its provisions provide for government control over water sources, as well as the orderly supply of water from those sources. Authority for executing the Water Law is given to the Minister of Agriculture. Power over its operational provisions is given to the Water Commissioner. The Water Commissioner is responsible to the Minister of Agriculture and the National Water Board, appointed by the Government to advise the Minister of Agriculture on water affairs.

The law begins with a clear refutation of private rights in a water source. "The water sources in the State are public property, subject to the control of the State and destined for the requirements of its inhabitants and for the development of the country[54]." If this were not clear enough, the law removes any doubt of its abrogation of riparian rights, by declaring: "A person's rights in land do not provide him with rights in a water source which is on his land, flows past it, or its borders....[55]". The term water source is defined as "...springs, streams, rivers, lakes and other currents and accumulations of water, whether above ground or underground, whether natural, regulated or improved and whether water rises, flows or stands therein at all time or intermittently, and includes drainage water and sewage. In short, all internal sources of water, including the intermittent flow of wadis, as well as sewage sources. The act further grants each

person the right to receive and use water, however such right is contingent upon use that will not reduce the quantity of the water or lead to its salination. Furthermore, rights in water are contingent upon one of the following beneficial uses: household, agricultural, industrial, handicraft, commerce and services and public services. If the use cease, the right to use also ceases.

After the law's introductory section there follows a short section concerning protection of water sources[57]. Water pollution is forbidden on pain of fine or imprisonment. In the event of pollution, the Water Commissioner is empowered to take all measures necessary to rectify the situation. He may order the polluting party to stop his polluting activity and rectify his wrong[58]. On the failure of the polluter to take proper measures, the Water Commissioner may rectify th situation at the polluter's expense. Payment for the Water Commissione efforts is collected as a tax. Aggrieved parties have the right to appeal such payment to the Tribunal for Water Affairs (the Water Court)

Further provisions for the protection of water sources authorize the Water Commissioner to declare protective strips around a water source[59]. Once such strip has been declared by order of the Water Commissioner, no one is permitted to cross such protective strip without permission from the Water Commissioner. In addition, the Minister of Agriculture has the power to set standards for the quantity, qualit and use of water within the framework for beneficial uses, as set out in Section One[60]. The law forbids the supply of water except in accordance with the standards set by the Minister of Agriculture.

no concrete proposals for sewage purification and other "unintentional" sources of water pollution. The Act is also overweighted in its emphasis on water supply, and water exploitation. No provision declares recreational, conservation and scientific uses to be beneficial uses of a water source[66].

In spite of the Water Law's failure to specifically provide for a comprehensive pollution control program, such a program would not be difficult to implement with the power over Israel's water resources given to the Minister of Agriculture and the Water Commissioner. The power to set standards for water quality with regard to use; the power to define protective strips; and the power to rectify a water pollution situation are sufficient to prevent and control most instances of water pollution. Whether such power was actually exercised is a tale to be told by later chapters.

b. Subsidiary Legislation: Filling in the Framework

During the years immediately following the Water Law's adoption, the Minister of Agriculture strengthened his hold over the state's water resources by a series of regulations. Most of the regulations promulgated during this period aimed at preventing inefficient use of water, although individual regulations aimed at pollution prevention were also promulgated. Of significance are 1964 rules concerning industrial use of water[67]. The rules encompass (1) all new industries or additions to existing industries, where water demand exceeds 5,000 cubic meters a year; (2) all existing industries in which the Water Commissioner feels that water wastage exists; or (3) industries whose effluents are polluting a water source as reported to the Water Commissioner by the Ministry of Health. Each plant falling within the

provisions of the rules must submit a detailed plan for effluent discharge before water is to be supplied to the contractor building the plant. In other words, a sewage discharge plan is required at the pre-construction stage. The Water Commissioner reserves the right to change or reject the plan. During operation of the plant, there can be no deviation from the plan without the permission of the Water Commissioner.

The scope of these rules should not be minimized, but it should be noted that a rule to control effluent discharges from industry excludes such discharges from municipalities, agricultural settlements, and domestic activities. On the other hand, proper use of these rules could prevent pollution of water sources by industrial activity.

In 1965, the Knesset passed the Streams and Springs Authority Law[68]. The purpose of this new law was to broaden the powers of existing drainage boards. The Law allows the Ministers of Interior and Agriculture to create a river authority only if the Ministers find no justification for expanding the powers of an existing drainage board by authorizing its transformation into a stream authority. The major addition to the power granted the river authority, not granted a drainage board, is the power to plan the destiny of a particular stream. Once empowered, a stream authority can widen the banks of a stream, destroy health hazards resulting from pollution of the stream, provide recreational and sport areas near streams. Stream authorities are to be composed of representatives of the Government, local authorities within the stream basin, representatives of water consumer and supply organizations, representatives of landowners whose property borders a stream or who use the stream for commercial uses. As of this writing,

not one stream authority has been created by the Ministers of Interior and Agriculture. It should be noted, however, that failure to execute the Law is the result of policy and not oversight[69].

In furthering his consolidation over water sources, the Minister of Agriculture promulgated regulations concerning the sale of purified effluents at a quality to be confirmed by him after consultation with the Minister of Health[70]. The Minister of Agriculture further requested and received power to control methods of recharging ground water supplies[71]. This power was granted by a 1965 amendment to the Water Law and covers intentional recharge of water into an underground aquifer.

As the power of the Minister of Agriculture increased to include prevention and control of water pollution, the power of the Minister of Health to prevent health hazards from polluted water decreased. In the late 1960's, the Minister of Health proposed a draft bill granting him power to prevent and control pollution of water sources. Agriculture balked at splitting control over water resource management[72], and the battle ended in a compromise only when the Minister of Agriculture became the Minister of Health[73]. He compromised with himself; the result being the 1970 amendment to the Public Health Ordinance, 1940[74].

The Amendment authorizes the Minister of Health to set standards for the quality of drinking water. Drinking water is defined as "...water destined for drinking and for cooking, and the cooking industry -- water destined to enter the food stream or come in contact, or that might come in contact with material from which food is

composed[75]". Furthermore the Minister of Health is empowered to set health standards for water sources destined for drinking purposes. Tests for water quality are to performed by the supplier, according to standards and methods set by the Minister of Health in regulations. Water not meeting the standard set by Health will be designated by the Water Commissioner for other purposes, and he, the Water Commissioner, is to replace the lost source.

There is no denying the need for health standards for drinking water. Yet the 1970 Amendment to the Public Health Ordinance should have more clearly defined the duties of the Minister of Health vis-a-vis the Minister of Agriculture in the area of water pollution prevention and control[76]. The Amendment fails to define key words such as health standards and water sources. This can only lead to dual regulation of the same natural resource. The Amendment gives the Minister of Health the power to set standards for water sources destined for drinking purposes, but fails to give the Minister power to protect such sources from pollution. This power, as well as the power to replace a water source not meeting the Minister of Health's standard, remain in the hands of the Water Commissioner. Yet the Amendment fails to designate how the Minister of Health is to notify the Water Commissioner of a polluted source, within what period of time and according to what criteria.

As will be seen throughout the remaining portions of this thesis, the 1970 Amendment was only the beginning of the Minister of Health's assault on the once exclusive power given the Minister of Agriculture and the Water Commissioner in the field of water resource management.

Here, and in each of the succeeding cases where the Minister of Health has chipped away at the Minister of Agriculture's power, fundamental questions of water management policy, efficient use of resources and overlapping of authority have been raised.

After the Ministry of Health's hue and cry over the need for drinking water standards in 1970[77], four more years were to pass before the Ministry successfully produced a set of standards for drinking water. Such standards have only recently taken effect, and, therefore, it is too early to determine to what extent they will improve the quality of drinking water. From the standpoint of draftmanship and scientific accuracy, however, the standards have already come under severe criticism[78].

The lack of power to protect water sources given the Minister of Health under the 1970 Amendment to the Public Health Ordinance will stand out in stark contrast to the comprehensive powers given the Minister of Agriculture and the Water Commissioner under the 1971 Amendment to the Water Law[79]. The 1971 Amendment rejects the definition of pollution under the Water Law and defines it as any change in water or a water source that is biological, ~~physiological, chemical~~, organoloptical, bacteriological or radioactive, or that endangers the public health, or might harm animal or plant life, or make water less fit for the purposes for which it is used or intended to be used. Following this broad definition of water pollution there appears an equally broad definition of a water polluter. A polluter is "...any agricultural or industrial enterprise, any building as so defined under the Planning and Building Law, any installation, including

sewerage installations, any machine or [illegible] placement, operation or maintenance or use thereof which might cause water pollution[80]."

Following these very inclusive definitions comes several prohibitive sections, directing all persons to refrain from polluting a water source[81], and expressly prohibiting the direct discharge of any solid, liquid or gaseous material into or near a water source[82]. In order to effectuate the prohibitive provisions of the Amendment, the Minister of Agriculture is given wide powers in the promulgation of regulations for the prevention of water pollution. He is authorized to promulgate regulations setting out prohibitions, conditions and terms in the following areas[83]. (1) The siting of pollutants as defined in the Amendment. These regulations require confirmation from the Economics Committee of the Knesset. (2) The use of materials and systems of production of polluters, including agricultural methods and fertilization and pesticide use. These regulations require prior consultation with the Minister of Health. (3) The production, importation, distribution and sale of certain materials and products. These regulations are to be brought to the prior attention of the Economics Committee of the Knesset, and are to be issued only after consultation with the Minister of Commerce and Industry. (4) The regulation of water transportation and use of vessels on water sources. These regulations require the agreement of the Minister of Transportation.

Following these provisions there appears a section on sewage discharge plans. The section empowers the Water Commissioner to order any polluter to provide him with plans for their sewage disposal. Once a plan is adopted and approved with or without changes by the Water

Commissioner, there can be no deviation from it[84]. Failure to submit a plan or deviation from a plan can result in a fine, or loss of water supply, except drinking water[85].

The Amendment, by prohibiting in all-inclusive terms the discharge of anything into a water source, enables the Water Commissioner to issue discharge permits in two situations[86]. If the discharge is aimed at improving a water source, it can be permitted. If the circumstances of the case leave no choice but a discharge for a fixed time, a permit will issue. A list of permits is to be open to the public, and a report of such permits is to be filed with the Economics Committee of the Knesset. A further reporting provision requires the Water Commissioner to file a yearly report with the Economics Committee of the Knesset on the water pollution situation in Israel and his activities to prevent such pollution[87].

The 1971 Amendment, then, is an all-inclusive pollution prevention mechanism. The burden of proving non-pollution is placed on any party caught placing anything near or in a water source that might change the nature of that source. It extends the Water Commissioner's power over effluent discharges as well as provides the Minister of Agriculture with the power by regulation to prevent the use and sale of certain materials, to control agricultural and industrial methods of production and to supervise the siting of certain polluters to prevent pollution of a water source.

The failingsof the Amendment are as follows. It fails to come to grips with the real problem of local authorities' sewage disposal.

Although the operation of local authority sewerage facilities are not expressly excluded from the amendment, as was suggested in the Water Commissioner's draft amendment, it is questionable whether the Water Commissioner can effectively enforce these provisions. He has no power to shut off the water supply to a municipality, nor may he build a multi-million dollar sewage treatment plant and charge the municipality with the expenses incurred. And the Amendment does not change the existing situation, whereby effluent charges are set by the local authority.

Another weakness in the Amendment is its failure to require the Water Commissioner or the Minister of Agriculture to act to improve water quality. The Water Commissioner ~~may issue discharge permits, but~~ he is not required to do so. ~~He may order a sewerage plan, or~~ he may not. The Minister of Agriculture may control the use of pesticides and fertilizers, ~~but he is not required~~ to do so. The Knesset's wholesale turnover of the right to legislate to an administrative body is an abrogation of its responsibility to legislate. ** Finally, it should be the aim of government to promote the improvement in quality of water sources so that maximum enjoyment of each source by the population at large and future generations is insured. This would necessarily include protection of water sources for conservation, recreation and scientific uses. Yet the 1971 Amendment fails to include these beneficial uses among the Water Law's list of protected uses.

Summary and Conclusion

Despite the failings mentioned above and weaknesses to be discussed later, it is not the author's intention to present a picture of legislative inadequacy in the face of a pollution threat. On the contrary. From the above, it can be seen that Israel's water code is a comprehensive framework for prevention and control of water pollution. The captain of this vast framework is the Minister of Agriculture and the Water Commissioner is his helmsman. Their general course has been plotted by the Knesset, but each man is free of the constraints of censure should he chart his own course of action. The second unit of this thesis is devoted to a detailed discussion of the course of action chosen by these two men. Without spoiling the plot, however, it can be safely said, that in the area of water pollution prevention and control, both the captain and his helmsman have charted a course of least resistance[88].

2. The Administrative Framework

This section does not attempt a complete description of those bodies charged with water management in Israel. That is properly the subject of a doctoral dissertation. What follows is an introduction to the three bodies charged with planning and directing the proper use of Israel's water resources.

a. The Water Commission

The Water Commission is a government office located in the Ministry of Agriculture[89]. At its head sits the Water Commissioner,

who is appointed by the Government to manage the water affairs of the State. The Water Commission is made up of three technical and four administrative departments. The three technical departments are responsible for the efficient use of water in Israel, hydrology, and drainage. There is no department for water pollution prevention and control. The pollution control section created in 1973 has not been staffed as of this writing[90].

The outer limits of the job of the Water Commissioner, as they relate to water pollution prevention and control, are clearly defined by law. He is empowered to issue rules and regulations for the improvement of water quality. He is to bring to trial violators of the Water Law. He is empowered to issue discharge permits and demand execution of sewerage plans.

On the policy making level the Water Law is less explicit. Generally, the Law declares that the Water Commissioner is to administer the water affairs of the state. More explicitly, he sits as vice-chairman of the Water Board, a policy making body. The Minister of Agriculture appointed him a member of the National Water Planning Committee[91]. More accurately, however, the Water Commission is a regulatory agency, not a policy making body. The Commission has no planning department and is not equipped to engage in long range planning for water management.

The Water Commission has a legal department, staffed with three full time attorneys. Among the responsibilities of this staff is the fashioning of regulations to implement the Water Law. These regulations are then signed by the Minister of Agriculture. In an interview

for this dissertation, the Water Commissioner stated that he has never clashed with the Minister of Agriculture on suggested regulations for water pollution prevention measures[92]. Thus it is assumed throughout this thesis that regulations once proposed by the Water Commissioner would be approved by the Minister of Agriculture.

b. Mekorot

Mekorot is a corporation founded in 1937 by Keren haYsod, the Jewish National Fund, the Palestine Land Development Corporation and Nir Corporation[93]. It was originally set up to plan, operate and administer water companies which would supply water for irrigation and household needs. After the passage of the Water Law of 1959, Mekorot became the official National Water Company by appointment of the Minister of Agriculture with agreement of the Knesset and the Government[94]. The government of Israel and the Jewish Agency own a controlling share of the National Water Company stock. The Minister of Agriculture sits on the company's board of directors.

In addition to supplying water for municipal and agricultural needs, Mekorot has been charged with the construction and operation of the National Water Carrier, designed to bring water from Lake Kinneret to the central and southern portions of Israel. In addition to constructing and operating water supply companies, Mekorot maintains its own laboratories for testing quality of drinking water. Recently the corporation expanded its operations to include research efforts in the Kinneret basin and operation of sewage purification plants, most notably the Gush Dan plant.

c. Tahal

Tahal, Water Planning for Israel, Ltd., is a corporation that was founded in 1952 by the government of Israel, the Jewish Agency and the Jewish National Fund[95]. It was originally created as a planning agency, to plan water works, drainage and sewage operations, all of which were to be executed by Mekorot. In addition, Tahal planned the National Water Carrier, and early in its construction phase, handed operations over to Mekorot. Prior to Tahal's fomation, water planning was splintered among three groups: water planning sections in the Ministry of Agriculture, the Jewish Agency, and Mekorot. After Tahal's creation, the water planning section of the Ministry of Agriculture was abolished and its members transferred to the office of the Water Administrator, which later became the Water Commission. The water planning sections of Mekorot and the Jewish Agency were transferred to Tahal. This meant that water planning and policy were to be made by Tahal and execution was to be performed by Mekorot. Overlapping in these two areas led to an arbitration committee report in 1954, recommending that the corporations be united. Tahal balked at this suggestion. A committee appointed by the Minister of Agriculture in 1967 to study the roles of the Water Commission, Mekorot and Tahal, concluded as follows.[96] Tahal was to continue in its role as long-range planner for water management, operating on its own initiative or at the request of the Minister of Agriculture. Mekorot was to limit its planning activities and order all plans for business ventures from Tahal. The Water Commission was to continue in its role as administrator of the Water Law, relying on Tahal and the National Planning Board for long range planning. Tahal, therefore, kept its department for long range planning to advise the government of Israel on water policy.

Summary

From the cursory description above, it is impossible to get the full flavor of the convulated nature of this triangular arrangement for "centralized" water management and control. The fact that a government appointed committee was set up in 1967 to study ways of reducing the friction among these groups is evidence that open friction exists. What is disturbing about the existing set up from a legal standpoint is the position of Tahal. In an age when overall water planning is a necessary task of government, Tahal, a corporation outside the government, is charged with this task. In more than one way this causes absurdities. (1) First, Tahal is not an elected body and is not subject to public check at the ballot box. This means that the corporation is not as disposed to react to public input in water planning decisions as would a government agency. Thus its water policy can continue "undisturbed" by effective public criticism. (2) Second, Tahal not only suggests proposals for long range planning, it also executes its own planning proposals. Thus the corporation has no external, professional check. (3) Third, Tahal is actually not doing overall national planning. It is at best engaged in regional planning when it responds to requests by the Water Commissioner and Mekorot. Thus it has none of the attributes of a water policy think tank, which would enable it to engage in long range national water planning. Fourth, depriving the Water Commission of a planning arm weakens its ability to properly manage Israel's water resources.

3. The Judicial Framework

Generally speaking, Israel courts follow principles of English common law in their decision making. With the legislative abrogation of the doctrine of riparian rights, however, principles of common law have no application to defining and protecting rights and use in a water source. With the exception of principles of nuisance law, Israel's water sources are not protected by private parties, but rather by the Water Commissioner. For violations of the Water Law, the Water Commissioner petitions a common law court requesting the proper sanctions. On the other hand appeals from decisions of the Water Commissioner and the Minister of Agriculture are to be brought before a special Tribunal for Water Affairs. The head of this tribunal is a judge, appointed by the Minister of Justice. The tribunal sits in Haifa and hears petitions from applicants from the entire country. The National Water Board and its regional counterparts also act as "tribunals" for expressions of public disagreement with water policy and planning decisions[97]. The mere existence of these public participatory bodies serves to ease the pressure on the Tribunal for Water Affairs.

Footnotes

1. The Ottoman Civil Code became part of the laws of Palestine by order of the king of England. Palestine Order in Council 1922, Art. 46, III Drayton's Laws of Palestine p. 2569 at 2580. All citations to the Mejelle are to the English translation by C. Hooper, The Civil Law of Palestine & Trans-Jordan, Vol. I (1933) [Hereinafter cited as Mejelle].

2. Water Law, 5718-1959, S.H. 288 p. 166 §152(1). See Appendix.

3. Mejelle, Art. 1234. This sounds like a flower child's paradise, but it probably gave rise to the problem of externalities discussed later.

4. "Water flowing under ground is not the absolute property of any person." Mejelle, Art. 1235.

5. "Seas and large lakes are free." Mejelle, Art. 1237.

6. Mejelle, Art. 1238. Also see Mudir El Asqaf al Islawiyah El'Am v. Att'y. Gen'l, 10 P.L.R. 187 (1943).

7. Mejelle, Arts. 1264, 1265, 1266.

8. Mejelle, Art. 1265.

9. Mejelle, Art. 1239.

10. Abd El-Latit Hussein v. El-Haj Abd Er-Pahman Mour'i, 1 P.L.R. 386 (1934).

11. Mejelle, Art. 1268.

12. Mejelle, Art. 1268. "Similarly, if a person opens a shop next door to the shop of some other person and the business of the latter declines, the former cannot be obliged to shut his shop." Id.

13. Bradford Corp. v. Pickles, 1895 A.C. 587. [Malicious use of ground water so as to dry up neighbor's well and buy him out permitted.]

14. Mejelle, Arts. 1281, 1286.

15. Mejelle, Arts. 1212, 1224.

16. Mejelle, Art. 1321.

17. Mejelle, Art. 1322.

18. See Mutawalli of Shazletti Waqf v. Municipal Council Acre, 7 P.L.R. 509 (1940). See also Sadiqua bint Abdul Ghani el Jordenah v. 'Aatef Khammash, 4 Ct. L. R. 13 (1938). Connecting rights in water with rights in land is known as the riparian rights doctrine. For the extensive use of this doctrine, see Teclaff, What You Always Wanted to Know About Riparian Rights, But Were Afraid to Ask, 12 Nat. Res. J. 30 (1972).

19. Muhammed Abd El-Aader Aashash v. Rev. Herman Scheller, 1 P.L.R. 721 (1932).

20. Palestine (Amendment) Order in Council, 1940, P.G. II p. 66.

21. Water Law, Hatzaat Hok 36 p. 58, Divrei Hezbear at 74. For an example of a scholarly attack on the High Commissioner's use of his power to restrict uses in water even during war time, see Questions of the Hour -- Water Regulations, 12 HaPraklit 2 (1943) (Hebrew). Members of the Yishuv felt that restrictions on water use was another name for restrictions on immigration . Saul Aloni, Modern Water Legislation and Development, paper presented to the Int'l Conf. on Water for Peace, Washington, D.C., May 23-31, 1967.

22. P.G. 560, Supp I at 1, retitled Cities Ordinance (Water Supply) S.H. 376 p. 96 §56 (5722-1962).

23. P.G. 1065, SuppI at 239.

24. See Hines, Nor Any Drop to Drink: Public Regulation of Water Quality, 52 Iowa L. Rev. 186, 202-204 (1966).

25. Public Health Ordinance 1940, P.G. 1065, Supp I at 239 §52-70. See also Public Health Regulations (War on Malaria) 1941, P.G. II 1121 at 1300.

26. Public Health Ordinance §54.

27. See Text infra p.106-110.

28. Municipal Corporations (Sewerage, Drainage & Water) Ordinance 1936, P.G. I p.1 §3(1).

29. P.G. I p.1 §6(s).

30. Id. at §25.

31. Id. at §6(3).

32. P.G. I at 74.

33. Id. at §198.

34. Sea of Galilee Ordinance 1947, P.G. 1637 Supp. I p. 65.

35. Fisheries Ordinance 1937, P.G. 667, Supp. I, p.151.

36. General Agricultural Council Ordinance 5708-1948, E.R.§A p. 41.

37. 23 Divrei HaKnesset (5717-1958).

38. S.H. 182 p. 84. See Appendix.

39. Id. at §5.

40. Id. at §11a. No one may shut a well on his own initiative without a license from the Water Commissioner. Regulations for the Digging of Wells (Closing of Wells) 5717-1956, K.T. 661 p. 546.

41. Id. at §13.

42. Water Metering Law, 5715-1955, S.H. 182, p. 82.

43. Id. at §4.

44. Regulations for Water Metering (Tranfer of Details & Presentation of Water Supply Summeries) 5715-1955, K.T. 1054 p. 6.

45. Drainage & Flood Control Law, 5718-1957, S.H. 236 p. 4. See Appendix.

46. Id. at §2.

47. Id. at §11.

48. Id. at §18.

49. Id. at §27, 29, 30.

50. Drainage is defined in Section One of the law as any activity to gather or discharge water "but does not include the treatment of sewage water." See Appendix.

51. Sewage is defined in Section One as including waste from any industrial plant or any agricultural structure. See Appendix.

52. Id. at §9.

53. See Appendix.

54. See Appendix, Water Law §1.

55. Id. at §4. This grand statement of policy actually seems superfluous in light of the Israel Government's ratification of the 1940 Amendment to the Palestine Order in Council, which severed all private rights in surface waters. It was needed, however, because the 1940 Amendment did not sever rights in the use of water. Israel courts, as late as 1958, considered rights in the use of water appurtenant to rights in land. See Miphal HaMaim Kfar Saba v. Ephraim Shemesh, 21 P.M. 463 (1958).

56. See Appendix, Water Law §2.

57. See Appendix, Water Law, Ch. 2, Art. 1.

58. Id. at §11.

59. Id. at §14, 15.

60. Id. at §21.

61. Id. at §45-108.

62. Id. at §125.

63. Id. at §140-147.

64. See M. Jacobs, Water in Israel (1971) (Hebrew).

65. Compare with: "The objective of this Act is to restore and maintain the chemical, physical and biological integrity of the nations's waters." Federal Water Pollution Control Act, 33 U.S.C. 1151 §101(a).

66. Compare §6 of the Water Law (See Appendix) with the following section of the California Water Code: "Beneficial uses" of the waters of the state that may be protected against quality degradation include, but are not necessarily limited to, domestic municipal, agricultural and industrial supply; power generation; recreation; esthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves." Porter-Cologne Water Quality Control Act §10350 (1970).

67. Water Rules (The Use of Water in Industrial Plants) 5721-1964, K.T. 1642 p. 284.

68. Streams & Springs Authority Law, 5725-1965, S.H. 457 p. 150.

69. Interview with Ora Tamir, Legal Adviser to the Water Commissioner, in Tel Aviv April 28, 1973.

70. Water Rules (Computation of Purified Effluent Fee) 5725-1965, K.T. 1719 p. 1911.

71. Water Law (Amend. No. 4) 5725-1965, S.H. 459 p. 191.

72. Divrei HaKnesset, First Sess., Vol. 56, p. 669, 674 (1970); Interview with Hillel Shuval, Director of Environmental Health Laboratory, Hebrew University, Jan. 21, 1973. Formally Chief Doctor, Ministry of Health.

73. During discussion in the Knesset on the draft amendment to the Public Health Ordinance, Tova Sanhadrei, M.K. had this to say:

"I ask... is it necessary that we pass a special law, as suggested by the Minister of Health, or would it not be better if we changed the Water Law, under the supervision of the Minister of Agriculture...? Is there not over-lapping of authority here?" Divrei HaKnesset, First Sess., Vol. 56, p. 669, 672 (1970). The Minister of Health and Agriculture was Haim Gvati. R.L.

74. A Law to Amend Public Health Ordinance (No. 4), 5730-1970, S.H. 596, p. 102.

75. Id. at §52A.

76. The California legislature, faced with this problem in 1949, came up with the following solution. California water lawdifferentiates between contamination and pollution, assigning prevention of the former to the Health Department and the latter to the Department of Water Resources. Contamination means impairment of water by waste which creates a hazard to public health through poisoning and the spread of disease. Calif. Water Code §13050 (k). Pollution means an alteration in water quality by waste which unreasonably affects the beneficial use of water or facilities that serve beneficial uses. Calif. Water Code §13050(l). To prevent lacunae, the definition of pollution includes contamination, and the responsibilities of the Department of Water Resources encompass those of the Health Department in preventing water pollution in California. Thus the overlapping remains, but each agency has a clearly defined goal, and the system is said to work. Couzens, State Control of Water Pollution: The California Model, 1 U.C.D. L. Rev. 1,11 (1969). Whether the system works or not, it is at least an attempt on the part of the California legislature to make sense out of chaos. Something the Knesset shied away from doing.

77. For twenty-five years the Minister of Health failed to promulgate regulations for drinking water quality in Israel. From 1956 to 1970 an "Instruction Sheet" adopted by the Israel Standards Institute served as a guide to Health's District Doctors for permissible concentrations of pollutants in drinking water. Gilayon Hadracha, No. 183, Drinking Water (1963).

78. See B. Fatal, The 1974 Drinking Water Standards, Biosphera, No. 10 p.1. (1974)

79. Water Law §20A

80. Id.

81. Id. at §20B(a).

82. Id. at §20B(b).

83. Id. at §20D(a).

84. Id. at §20E.

85. Id. at §20H.

86. Id. at §20K.

87. Id. at §20U.

88. "The most important point in the development of administrative law is the reduction of discretion." P. Freund, quoted in Jaffe, The Illusion of the Ideal Administration, 86 Harv. L. Rev. 1183, 1185 (1973). The thesis of Jaffe's article is that handing regulatory agencies undefined discretion does not, as has been argued, aid the general welfare.

89. The following description is taken from interviews with over ten members of the Water Commission staff, plus the following material. S. Aloni, Water Laws of Israel (2nd ed. 1970).

90. Interview with Dr. Yehuda Goldshmidt, Head of Section on Pollution Control, Water Commission, April 3, 1974. Dr. Goldshmidt's staff consists of Dr. Goldshmidt.

91. Water Law (Notice of Appointment of Planning Committee) Y.P. 764, 5720, p. 1456.

92. Interview with Menahem Kantor, Water Commissioner, April 3, 1974.

93. Information on Mekorot was taken from the following sources. Report on Investigation of Mekorot, Water Co., Ltd., State Comptroller (1964); Report on Activities in Nat'l Water Authority, 1971-72; Water Quality Research in Israel, Nat'l Council for R. and D. (1972); M. Yaakovitz, Water in Israel (1971)(Hebrew). The author was refused an interview with Shmuel Kantor, Secretary-General of Mekorot.

94. Water Law (Notice of Agreement) Y.P. 842, 5721, p. 1206.

95. Information on Tahal was gleaned from interviews with several members of the corporation and the following material. Report on Visit to Water Planning for Israel, Ltd., State Comptroller (1959); Report on Visit to Water Planning for Israel, Ltd., State Comptroller (1965); Water Quality Research in Israel, supra note 93; Yaakovitz, supra note 93.

96. Report on Committee to Study the Institutions Dealing with Water Affairs (1964).

97. See Aloni, supra note 89 at VIII.

THE ISRAEL WATER CODE: CLOSE-UP

A. GROUND WATER

"...but a flow would well up from the ground and water the whole surface of the earth..."

Genesis 2.6

This second unit of this thesis opens with a discussion of a source of water known to scientists as ground water and to jurists as percolating, subterranean and underground water[1]. This source has been deliberately selected first because prevention of its pollution in Israel has been seriously neglected and because it supplies more than sixty per cent of all water used in the country.[2] It will be necessary to briefly describe what is ground water, its use and sources of pollution, before embarking on a discussion of preventative measures.

Ground water is generally the name given to that water found below the earth's surface[3]. For ground water to be usefully exploited there must be sufficient amounts of precipitation or surface water flowing through rocks beneath the surface of the earth to saturate an area before lateral movement of the water reduces saturation. The rocks through which ground water flows must be permeable enough to allow both saturation and access to the water by man. Yet these rocks must not dissolve and cause heavy concentrations of minerals to build up in the water. This situation exists in Israel along the coast and the hilly sections of the country.

Ground water is confined below the earth's surface either by atmospheric pressure or by confinement in nonpermeable rock. In an unconfined aquifer, atmospheric pressure determines the water level, or table -- above the table the water flows downward; below the table the flow is horizontal towards an opening. The flow is extremely slow, between fifty to two hundred meters a year in the coastal aquifer, and up to a couple of kilometers a year in the hill aquifer[4]. Flow is determined by the pressure of refill water, the composition of the aquifer, and the slope or gradient of the aquifer. It is the slow movement of water through layers of rock, sand and gravel that make ground water a desired source for all domestic, industrial and agricultural uses. Ground water temperature is uniform; it usually requires no treatment; it remains essentially unchanged even in times of drought; and it is cheaper than impounding reservoirs for the storage of water[5]. At the same time, its unseen location underneath the surface of the earth makes ground water susceptible to thoughtless pollution from not easily identifiable sources. Further, its slow movement and recharge rate make its pollution an irreversible process[6]. It should be further re-iterated that there is a close connection between diminishing the supply of ground water and its pollution.

1. Ground Water in Israel -- A Description

Israel is an arid country in that she lacks abundant rainfall and large rivers. Her ground water supply[7], intimately connected with rainfall and the flow of surface water, is exploitable, but not

inexhaustible. Ground water in Israel flows in two major aquifers: one, a sandstone aquifer, located along the coast, and the other, a limestone aquifer, made up of three basins in the hilly sections of the country. The coastal aquifer stretches from Binyamina in the north to Gaza in the south. It is some 120 kilometers long, twenty kilometers wide at its widest point, and reaches a depth of 180 meters[8]. The limestone aquifer comprises the Judah and Shomron, Galil and Carmel basins. The estimated natural refill of the aquifers by rain is 330 million cubic meters (MCM) a year in the hill aquifer and 240 MCM for the coastal aquifer.

Ground water is extracted from over 2,400 wells in Israel, 580 manned by Mekorot, the National Water Company, 500 by local authorities and the rest by private parties. The wells serve as the major supply of water for domestic, industrial and agricultural uses in Israel. The aquifers also are used as reservoirs in the national network for water supply, known as the National Water Carrier[9]. In addition, plans for sewage reclamation for the Gush Dan, or Tel-Aviv metropolitan area include storage of treated sewage in a section of the coastal aquifer[10].

2. Ground Water Users & Polluters

Water pollution is not a subjective phenomenom, but it is variable. For ground water, as for other water sources, it is closely connected to the water's use. Pollution of a drinking water source has a different meaning than pollution of an industrial source, and vice-versa. Ground water in Israel is used as a source for

drinking water, crop irrigation and industrial uses, but Israel's "one-pipe" supply system does not differentiate between water for domestic, agricultural and industrial uses. This single supply system has often been attacked as wasteful and illogically planned[11], but the system remains, and it requires the supply of water to all users at a drinking water quality standard. Therefore, although the following discussion analyzes pollution causes in relation to water use, one must keep in mind that this division is for the sake of clarity. Due to the single pipe supply system, in Israel, ground water which is to be piped in the central system must be supplied at drinking water quality to industry and agriculture.

a. Agriculture

(1) Salinity

Every schoolboy knows the story of Hannibal, who in the siege of Rome poured salt (sodium chloride) on the Roman fields to kill the crops and starve the Romans out. Although Hannibal did not succeed in conquering the Romans, natural salination coupled with improper irrigation methods may have caused the sterilization of the soil in ancient kingdoms situated in the Euphrates Valley[12].

The buildup of minerals, or salts, in ground water used for irrigation of crops has several effects, depending on the type and concentration of mineral and ratio of mineral to mineral found in the water[13]. Of the numerous minerals found in water, three have a decidedly negative effect on plant growth if allowed to reach certain concentrations or ratios. Sodium in high concentrations binds the soil and makes tilling difficult, if not impossible[14].

Boron in low concentrations burns plant leaves[15], and high concentrations of chlorides causes soil sterilization. The effect of chlorides in the soil in low concentrations is to limit the variety of plant growth[16].

All soils contain minerals or salts, and all bodies of surface and underground water contain concentrations of salts adsorbed from the rocks and soils through and over which the water passes[17]. Rainwater, on the other hand, contains only negligible quantities of minerals[18]. Therefore in humid areas, one finds low concentrations of salt in soils due to the continual washing, or leaching out of salt by rain. On the other hand, arid soils generally contain high concentrations of minerals because insufficient rainfall fails to leach out the salts found in the soils, and the high evaporation rate tends to diminish the leaching effects of the rain and concentrate salts in the soil[19].

It has been standard agrarian procedure in Israel to prevent the builup of salt in soils by over-irrigation during certain periods of the year[20]. Excess irrigation acts as rain in humid climates by leaching out salts and preventing high concentrations from forming in the soil. This agro-technique will work as long as the water used for irrigation is itself low in salt content. *

In order to understand how salts can build up in ground water so as to pollute it for agricultural purposes, a more detailed understanding of hydrology of ground water is essential. Ground water flows, at a snail's pace, through soil crevices or in con-

fined aquifers at various depths under the surface of the earth. The flow is generally in the direction of an opening, or the ocean, due to pressure from its refill source -- rain or surface water, and due to principles of gravity (gradient pressure) and soil permeability. The coastal aquifer of Israel flows toward the ocean pursued by refill from water percolating from the surface at various points above the aquifer, as well as by the incline of the aquifer, which slopes toward the ocean[22]. The Galil and Carmel aquifers also empty into the ocean, while the northern portion of the Judah and Shomron aquifers empties into Nahal Taninim and the southern portion into the Yarkon Springs[25].

The flow of ground water toward the ocean is but one phase of the circular flow of the earth's water, but it is as important to the farmer as rain. This flow carries the salts, leached out of the soil by rain or excess irrigation to the ocean and prevents the buildup of salts in the aquifer. If this flow is reversed, salt concentrations build up in the ground water from two different sources, but with the same ultimate effect -- pollution of the source for diversified agricultural use.

The first source and the easiest to control and monitor is intrusion of salt water from the ocean. It has been mentioned that water in the coastal aquifer flows toward the ocean due to refill and gradient pressure. When that pressure is released, the ocean flows into the aquifer[24]. Since ocean water is heavier than ground water, there is little diffusion of the two bodies and the ocean intrudes as a finger or wedge along the bottom of the aquifer. This salt

water intrusion has a dual effect on the concentrations of salinity in ground water. First the salt water wedge diffuses slowly with ground water and causes a slow buildup of salts. Secondly, as the wedge moves inland, more and more fresh water is displaced by ocean water so that there are immediate high concentrations of salts to the depth of the wedge of ocean water[25].

In Israel this has occurred in the coastal aquifer along the entire coast at different depths. In the Tel-Aviv area, the deepest intrusion reached $2\frac{1}{2}$ kilometers in 1960, but retreated to 1,500 meters in 1970 due to recharge of the aquifer by fresh water[26]. In most other areas along the coast, the wedge is advancing fifty to one hundred meters a year. The largest advance is near Hadera, where the interface intruded from 1,130 meters in 1960 to 2,000 meters in 1974.[27] It has resulted in the closing of numerous pumping wells and the loss of that water to local consumption[28].

The cause of salt water intrusion is over pumping of wells far enough inland to reverse the gradient pressure and allow sea water intrusion. In Israel, overpumping of wells in the coastal aquifer reached a peak in 1962. In that year, 280 MCM of ground water were pumped over the natural refill rate of the aquifer[29]. In 1964, water was brought from the Kinneret to recharge ground water basins and supply consumptive uses. This helped reduce pumping of ground water and raised ground water tables. Excess pumping has continued, however, and remains above both the natural and artificial refill rate. In 1972, 435 MCM of water was withdrawn from the coastal aquifer, while recharge added 108 MCM and natural refill reached 240 MCM[30].

Overpumping, by reversing the flow of the fresh water in the aquifer, also produces another source of salt concentrations in ground water. It prevents the salts, leached from the soil, from emptying into the ocean. Therefore, these salts are captured in the aquifer and concentrations of them slowly build up in ground water. When the ground water is used for irrigation, further salts from the soil are added to those already in the ground water and the process becomes a closed circle. In Israel, overpumping of ground water to irrigate crops has caused a stady buildup of salts in the coastal aquifer.

(2) Nitrates

Of major concern to human health are recent scientific reports monitoring the rise in concentrations of nitrates in Israel ground water[31]. High concentrations of nitrates in drinking water have caused the death of infants in the United States from a disease called methemoglobinemia[32]. Methemoglobinemia in Israel has also been traced to high concentrations of nitrates in drinking water[33]. Recent scientific reports in the United States also show the toxic effect of nitrates in drinking water to livestock[34]. Although scientists differ on the necessary concentrations of nitrates in drinking water to cause methemoglobinemia, in Israel concentrations in drinking water between 45 and 90 milligrams per liter are considered unhealthy. Supply of drinking water with concentrations over 90 milligrams per liter is forbidden by the Ministry of Health.

In the Rishon-Rehovot area in 1972, forty-six per cent of 271 wells produced drinking water with concentrations over 45 milligrams per liter and thirteen per cent over 100 milligrams per liter[35]. Prior to the adoption of an official drinking water standard in 1974,[36] wells in the Rishon-Rehovot area with concentrations exceeding 100 milligrams per liter nitrates were forbidden to supply drinking water. Ninety-seven such wells were closed between the years 1969 and 1972[37]. The rise in nitrates in the coastal aquifer since 1955 has been estimated to be two milligrams per liter per year[38].

Agricultural contributions to nitrate concentrations in Israel are significant, mainly from extensive use of fertilizers high in nitrogen, enclosed feedlots for livestock and reuse of sewage for irrigation[39]. A contributing cause to increasing nitrate concentrations in the coastal aquifer is the use and reuse of the same ground water as a result of pumping operations in excess of the aquifer's natural and artificial refill rate[40].

(3) Pesticides

The harmful effects of pesticide residues in water on man, animals and plants will be discussed more fully in the section on surface waters. For purposes of this section, the following information is relevent. First of all, pesticide residues can be found in the coastal aquifer in Israel[41]. Secondly, certain pesticides, for example lindane, move more rapidly through light soils than other pesticides, for example DDT[42]. This means that quantities of DDT in ground water should be close to zero. Thirdly,

the little data published in Israel show that conventional agricultural use of pesticides is not the major source of pesticide residues found in ground water[43]. Attempts by agricultural users to dispose of quantities of pesticides or wash down pesticide spraying equipment, however, may be a significant source of pesticide residues found in certain wells in Israel[44].

Summary

To sum up this discussion it is necessary to note that agriculture requires water for irrigation at a quality free of high concentrations of minerals and free of low concentrations of certain minerals e.g. boron. Agriculture consumes large quantities of ground water for irrigation, which consumption has lead to overpumping of wells. This excess withdrawal causes mineral buildup as a result of ocean intrusion. Salts are also trapped when leached from agricultural lands due to overpumping from limited basins. At the same time that agricultural users create a condition of mineral buildup in ground water, they are the major sufferers of that buildup. Furthermore agricultural fertilizers and feedlots are sources for the buildup of nitrates in ground water, polluting its use as a source of drinking water. It is still unclear whether agricultural use of pesticides pollutes ground water to any substantial degree.

b. Industry

Water for industrial use must meet a different standard of quality than water for agricultural use. A major concern of industry is water's corrosive effects on the pipes through which it passes. A second element is the temperature of water, often used as a coolent in industrial plants. The temperature of ground water in Israel meets this industry need. Thirdly, taste and smell are important to the food processing, beer and soft drink industries. Generally a rise in concentrations of minerals in water leads to a change in its taste and smell. Total dissolved salts are not monitored in Israel, therefore, there is no accurate data on their concentrations in ground water.

Industrial pollution of ground water in Israel may result from discharge of industrial wastes into wadis and streams and unintentional recharge of aquifers from settling ponds for industrial wastes. Industrial wastes may be a far more dangerous pollutant of ground water than either agricultural or domestic wastes because of new industry processes and chemicals. Certain industrial wastes contain chemicals that are not easily broken up by normal biological processes. These wastes, called exotic because their full pollutant effect is unknown, are found in wastes produced by Israel manufacturing firms in the chemical and pharmaceutical industries[45]. These same wastes plus radioactive wastes are found in effluents discharge from hospitals, and if not properly treated, may find their way into ground water[46].

Of equal significance is the oil industry practice of recharging one of the hill aquifers with brine that flows up with oil as a waste by-product[47]. Although this brine is being pumped into an already salty aquifer, the potential effect of brine recharge will be to further reduce the chances for use of this aquifer. Another practice of the oil industry may lead to far heavier pollution of the coastal aquifer and that is the laying of pipes[48] and storage tanks[49] directly above this source of ground water. Although there have been no accidents or spills into ground water in Israel, the likelihood of it happening is not unforseeable, and the results could be disastrous. The placing of dangerous or hard to dispose of wastes in underground waste wells is not regularly practiced in Israel. Thus this country has been spared the pollution "time bomb" effect of this practice, widespread among industry in the United States[50].

c. Household

The quality of ground water to be supplied for domestic uses is fixed by its highest use, i.e. drinking water. Drinking water need not be of the same quality as water supplied for irrigation. Water high in chlorides (over 150 mg./l) reduces variety of plant growth, but for drinking purposes, water supplied with a high chloride content (as high as 600 mg./l) has been deemed acceptable by the World Health Organization[51]. As opposed to agricultural pollutants, the major pollutants that affect drinking water are bacteriological and chemical, and unlike water used in irrigation, drinking water may be heavily chlorinated before use. Pollution of drinking water

can occur at the source or at the supply stage. This discussion focuses on pollution of the major source for drinking water in Israel -- ground water.

Agricultural contributions of nitrates to ground water have been discussed. Domestic sources include septic tanks or cesspools, cemeteries, solid waste landfills and sewage. Although totally neglected in Israel by scientific reporting, septic tanks seem to be major contributors to rising nitrate concentrations in the coastal aquifer. The reason for this is the compact nature of the organic material found in cesspools and their location below the earth's surface, preventing nitrification from taking place[52]. Despite the known phenomenom of septic tank contributions of nitrates to ground water, little information is available on the quantities contributed. One reason for this is the time-capsule nature of septic tank contributions of nitrates to ground water. Because of the slow movement of pollutants in ground water and the unknown location of numerous abandoned septic tanks, little is known of relative contributions of nitrates to ground water from septic tanks [53]. To the same effect are contributions of nitrates from cemeteries. This source of ground water pollution has been discussed in scientific circles in Israel, but ignored in scientific reports on the subject of nitrate pollution of ground water[54]. Although cemeteries are a known source of nitrate concentrations in ground water, no estimate of their contribution is available.

Unlike cemeteries and septic tanks, data exist for sewage and solid waste contributions of nitrates to ground water. Sewage sources in Israel contain an estimated 6,600 tons of nitrogen a year. Of this, an estimated 4,000 tons per year is considered a potential source of nitrate pollution of ground water in the coastal aquifer[55]. Since most sewage in Israel flows in wadis and streams located above or connected to a major underground aquifer, the actual contribution of nitrates to ground water from sewage sources is probably higher than that estimated.

It is estimated that 600 tons of nitrates from solid waste disposal centers along the Israel coast contribute to the load of nitrates already found in the coastal aquifer[56]. Furthermore, it is unclear whether the dumping of solid waste in wadis and pits, without proper sanitation methods does not contribute to concentrations of minerals, bacteriological and virological pollution of ground water.

Bacteriological and virological pollution of ground water used for drinking is presently the subject of intensive study in Israel and the world. In advanced and developing countries, there have been reported outbreaks of intestinal diseases from water-born viruses not destroyed by chlorination of drinking water[57]. The fear is great among scientists that chlorination cannot destroy all viruses. Therefore, it is essential that drinking water sources be as free as possible of bacteriological and virological contamination[58]. For this reason, ground water is considered an excellent source of water for drinking and cooking needs. Contamination of this source,

has been increasing, however. The excessive use of streams and wadis for disposal of sewage invites contamination of ground water sources in those areas where surface water acts as a natural source of ground water refill.

A second source of "unintentional" recharge of ground water by contaminated sources is the use of settling ponds in sewage purification plants. Moreover, future plans for the Gush Dan sewage reclamation project include the spraying of waste water, purified by conventional methods, over sand dunes in the Rishon le Zion area. The water thus sprayed will percolate into the ground water and is to remain underground for one to three years before being pumped out and used as a source of water for agricultural, domestic and industrial needs[59]. Such percolation will provide a further source of aquifer recharge, but it is not without inherent pollution problems. It is unknown whether percolated purified effluent is free of all organic bacteriological, chemical and mineral agents that might harm man.

A 1973 study of pesticide concentrations in water[60] found high concentrations of lindane in Gush Dan raw sewage. Far more serious, however, is the fact that higher concentrations of lindane were found in the sewage after purification[61].

A further potential source of bacteriological pollution of ground water are intentional recharge operations conducted by Mekorot, mainly in the coastal aquifer. In order to halt salt

water intrusion, Mekorot began recharging the coastal and hill aquifers in 1964 by pumping fresh water into them[62]. The fresh water used for such purposes is taken from Lake Kinneret via the National Water Carrier to various recharging stations. The inherent problem with this recharging method, however, is that the waters from the Kinneret are also high in mineral content and thus increase the concentrations of salts in the ground water. Another problem is that the recharge operations themselves may be a source of bacteriological pollution of drinking water. Studies have shown that bacteria grow on the filters of those pumps used in the sandstone aquifer for recharging operation[63]. When the pumps are reversed and used to supply water, the bacteria are flushed out with the first rush of water. Care must then be taken to prevent this water from contaminating the aquifer or reaching the National Water Carrier.

The other domestic needs for ground water require its supply to be low in mineral content to prevent water hardness and corrosiveness. Certain minerals, e.g. magnesium, harden water[64] and require housewives to use water softeners to prevent the buildup of limestone in cooking utensils. Hardness of water also forces the use of heavier doses of detergents to get wash clean. Other minerals, e.g. chlorides, cause corrosion of pipes, radiators and water heaters[65].

To sum up, household uses of ground water require a quality fixed by drinking water needs. Since chlorination may not purify drinking water in all cases, ground water in Israel should be kept as free as possible of bacteriological and virological contaminants.

The most threatening source of ground water pollution that affects drinking water is nitrates. Another potentially dangerous source of ground water pollution, to be more fully discussed in the chapter on surface water, is exotic pollutants, found mainly in industrial waste. Exotic pollutants and pesticides may be harmful to man in minuscule concentrations in drinking water. Little data are available on this subject in Israel.

3. The Legal Framework for the Prevention of Ground Water Pollution

a. Introduction

The previous sections briefly described ground water and its major sources of pollution in Israel. The following sections analyze the corrective measures available and those actually being applied to prevent complete pollution of the coastal aquifer of Israel and limit pollution of the hill aquifers. In order to properly analyze the corrective and preventative measures available in Israel, the analysis breaks down into a discussion of legislation for the protection of ground water and administrative and judicial action in the enforcement of this statutory framework. In order to gain perspective on the adequacy of the entire framework, an introductory section on the legal framework for the protection of ground water in California precedes a discussion of water pollution controls in Israel.

b. California Law: A Comparison

California law of water pollution control has been chosen in juxtaposition to Israel law for several reasons. First there are similarities between the codes of the two states. The similarities result from the following: (1) concepts from California water law were incorporated in the Israel Water Law of 1959[66]; (2) 80% of all water in Israel[67] and 90% of all water in California is consumed by agriculture.[68] In addition, the California water code has long

been considered the most comprehensive in the United States, and its rules on water use and misuse the toughest among the fifty states.[69] Therefore in order to fully grasp the comprehensiveness of Israel legislation[70], the California law of water pollution should serve as an excellent prototype.

California water law, because of an interesting history, is today a highly complex code. California courts recognize both the doctrine of riparian right and the doctrine of appropriation in settling disputes over rights to surface and ground water[71]. A landowner, whose land overlies a ground water basin has the right to the reasonable, beneficial use of water underlying his property[72]. A riparian may take only his reasonable share of ground water, if there is not enough for all overlying users. This legal framework, thus, allows a limited, public ownership of ground water in California, i.e., ownership by all overlying landowners[73]. Appropriation of ground water by non-overlying users is allowed for only that amount in excess of the reasonable amount needed by overlying landowners[74]. In cases involving excess pumping of an aquifer, however, the courts have established a different rule.

There have been three epic cases on the question of aquifer over-draft and all three required years of deliberation (between 13 and 15 years), decision by referee and the resolution of rights of hundreds of parties[75]. The first major conflict over the adjudication of ground water rights occurred in City of Pasadena v. Alhambra[76]. In that case the California Supreme Court held that in a continual over-draft of ground water for five years, the rights of all users become equal, whether based on principles of riparianism or appropriation. The court, in adjudicating the rights of withdrawal among the parties, held that water production should be limited to a safe yield by a proportionate reduction in the amount each party took during the five years period prior to suit. As a result of this case

the controversy over withdrawal rights in the basin in question were mainly resolved, but several important questions remained. First, what about those parties not joined in the suit? Secondly, the decision probably spurred other ground water extractors to begin pumping water as fast as possible, so that if a court decreed a proportionate reduction in pumping, they would still have a substantial amount of ground water at their disposal[77].

In order to get a handle on the ground water reserves of the state, the California legislature, in 1955, required all those parties extracting 25 acre feet or more of water a year to file a notice of extraction with the Department of Water Resources[78]. This requirement has been incorporated in California's newest attempt to protect the state's waters from pollution -- the Porter-Cologne Water Quality Control Act[79]. The Porter-Cologne Act simplified the administrative structure and responsibility for water pollution control in California[80]. A State Water Resource Control Board, composed of five full time members, knowledgeable in the field of water quality, is the state agency required to make policy for water quality control[81]. The State Board is advised by the Water Quality Advisory Committee which provides information and advice on regional and technical matters[82]. The State is then divided into nine regions, each with its own regional water quality control board, corresponding to the surface watersheds and approximate ground water basins of the State[83]. Each regional board is charged with prevention and abatement of water pollution and the encouragement of regional action in planning for water quality control. Jurisdiction of the boards extends to all the waters within the borders of the State, surface,

underground and saline.

In resolving ground water disputes and preventing the pollution of ground water, the State Water Resources Control Board has the following powers. First of all, the Department of Water Resources receives all requests for ground water extraction. If the Department files with the State Water Resources Control Board recommendations for the protection of the quality of ground water, the State Board is empowered to file an action in court to restrict pumping after the Board has held a public hearing[84]. The State Board also has the power to establish minimum standards for the construction and dismantling of wells to prevent pollution of ground water[85]. Other than these two enforcement measures, the State Water Resources Board has the power to investigate the quality of ground water and its sources of pollution.

Evaluation

It is clear from the above that California law properly directs administrative efforts for the protection of ground water. Yet, despite its claimed toughness, California law is not a model code for prevention of ground water pollution. No administrative agency has the authority to abate pumping[86]. The courts, in the final analysis are the forum that must adjudicate rights of appropriation of ground water. The results, as noted in the Alhambra case, are mechanical -- a proportional reduction in water pumped. This is not the most efficient means of establishing water policy for a ground water basin, nor will it result in the most efficient allocation of

ground water. Secondly, in order to prevent salt water intrusion, a major source of pollution in California, a regional ground water pumping policy must be planned and carried out. Yet courts are not planning bodies. They do not act on their own initiative. An aggrieved party, or the State Water Resources Control Board, must bring the question of overpumping to the court's attention by initiating suit. Yet how does it help a well owner on the coast, threatened by salt water intrusion due to excess pumping inland, to know that the only body that can resolve the problem is a court, whose decision may be ten years in the making? Furthermore, court decisions in California have had the effect of inviting other ground water basin users to overpump to reserve their rights. Also a judicial decision, once handed down, crystallizes what should properly be a dynamic situation. Finally court decisions do not and cannot consider overall state water policy for the prevention of ground water pollution.

not clear

c. Israel's Water Code

(1) The Legislative Framework

(a) Licensing Wells

California law, admittedly the most comprehensive water code in the United States, fails to provide a model legal framework for the prevention of ground water pollution. Israel ground water law,[87] on the other hand, appears, on paper, to be a water planner's dream. In juxtaposition to California law, where an appropriator files a report on ground water extraction, in Israel any party intending to drill for water must first be licensed by the Water Commissioner. A well dug without such license can be sealed and the party fined or imprisoned by order of a magistrates court judge on request of the Water Commissioner. Further, since there are no inherent rights to ground water extraction in Israel, once a license request has been applied for, approval is not automatic.

Two of the grounds available to the Water Commissioner for refusal to grant the license are that overpumping will lower the ground water table or increase salt concentrations. Prior to granting the license, either as requested or with conditions, the Water Commissioner must publish the license request in writing in order to grant objectors the opportunity to be heard. Since there is no language in the law as to appropriate grounds for objection, an objection based on a claim of potential ground water pollution would

seem legitimate. A decision by the Water Commissioner is appealable by either the party requesting or the party objecting to the license before the Tribunal for Water Affairs. Once a license is granted, the Water Commissioner has the power to review it each year and attach conditions to limit allowable pumping or to gather information on the amount and quality of water pumped.

With this power, then, the Water Commissioner not only has the ability to obtain information about aquifer levels and concentrations of pollutants, but he also has the power to develop ground water policy and execute it. All requests for ground water extraction pass through his hands. He has the power to approve or disapprove such requests, and there is no right of appropriation or riparianism in Israel to interfere with his dictation of water policy.

From the preceding discussion it appears that the problem of excess pumping in Israel and its pollution effects are not the result of a powerless Water Commissioner. The Water Commissioner essentially has the power to determine who will pump, where the pumping operations will be and the allowable withdrawal amount[88]. In addition to these extensive powers, the Minister of Agriculture has the power to set water rates for consumers in order to regulate the supply and demand of water in Israel[89]. Furthermore the Minister of Agriculture has the final say on all administrative decisions of Mekorot, the country's largest water supplier[90]. Therefore, if there is excess pumping in Israel, it is not for lack of an adequate legal framework to deal with the problem.

The same might also be said for the extensive powers given the Water Commissioner in the area of intentional aquifer recharge. A 1965 amendment to the Water Law specifically limits planned recharging operations to refilling the aquifer or other activities designated by the Minister of Agriculture[91]. The Minister has gone beyond refilling operations to decree that recharging operations may be employed for the disposal of industrial and toxic wastes. No operation may proceed without assurances that all steps have been taken to prevent a health hazard, and such assurances receive the approval of the Water Commissioner. Furthermore, the entire procedure of licensing a recharge operation parallels that of licensing a well. No license may be granted without permission of the Water Commissioner after he is satisfied that ground water pollution will not result from the recharge and that steps will be taken to monitor the operations.

All requests for recharge are open to the public for sixty days to allow objections to be heard. No license will be granted until the objections of all water consumers and suppliers situated in the neighborhood of the planned recharge have been heard by a special sub-committee of the Water Board. All parties aggrieved by a decision of the Water Commissioner to grant or refuse to grant the license have recourse to the Water Court. The license once granted must set out the quality of the water to be recharged, and the recharger must check at intervals the effect of the recharge operations on the quality of the ground water subject to the recharge. If these periodic checks show that the surrounding water is unfit for the use to which

it was formally put, the Water Commisioner may limit or stop all recharging operations. Those parties affected by a lowering of water quality due to recharging operations are entitled to damages from the state treasury. Aside from objectors to pumping operations and affected parties, a further check on the Water Commissioner is a requirement in the Water Law that he supply the Knesset Finance Committee with an annual report on the recharging activities approved by him for five years from passage of the recharging amendment.

Despite the above, all the powers given the Water Commissioner in the area of aquifer recharge relate to planned or intentional recharging operations. Indirect recharge of an aquifer by percolation or seepage is not covered by the Water Law. Therefore the owner or operator of any source of liquid waste that seeps into an aquifer, thereby recharging it, need not apply for a license from the Water Commission. This includes the owner or operator of any basin or tank used for the storage of effluents, chemical wastes or other industrial liquid wastes. The 1971 Amendment to the Water Law does not change this situation, unless the Water Commissioner lists seepage basins as "polluters" and sets conditions for their location or construction[92]. To date he has taken no action in this direction. On the whole, it would be preferable to require operators of seepage basins, indirectly recharging an aquifer, to apply for a license from the Water Commissioner, rather than wait for the Commissioner to attack such operators by indirect means available to him.

(b) The Pollution Amendment of 1971

The 1971 Amendment to the Water Law increased the powers given to the Minister of Agriculture and the Water Commissioner for the protection of ground water. The amendment goes beyond mere corrective measures to give the Minister of Agriculture planning powers that could affect the entire economy of the state, in the name of water pollution prevention. The extraordinary powers granted stress the priority given by the Knesset to water pollution control measures, and they are further evidence that failure to actively pursue this parliamentary mandate results not from lack of authority.

In the section on ground water pollutants, feedlots were noted as a source of pollution. Concentration in one place of hundreds of head of livestock results in percolation of nitrates into ground water from the organic animal wastes. To the same effect, it is an accepted fact that fertilization of citrus crops in the loamy soil above the coastal aquifer has lead to higher concentrations of nitrates in that aquifer[93]. Under the 1971 Amendment to the Water Law, the Minister of Agriculture has the power to regulate the use of agricultural methods of production, including livestock operations and fertilizer use, to prevent ground water pollution[94]. To date, the Minister of Agriculture has promulgated no regulations for the prevention of ground water pollution from agricultural methods of production.

To the contrary, the Minister has ordered the Water Commissioner to allow excess irrigation, even above allowable amounts, in cases where the Water Commissioner's research discovers that plant roots are suffering from high concentrations of chlorides[95]. Such excess irrigation, to leach out chlorides, can only increase chloride and nitrate concentrations in ground water. In addition, this is the only regulation under the Water Law which requires the Water Commissioner to check the effect of water quality on a declared beneficial use. No such regulations exist for effects of water on industrial or household uses. Thus, the Minister of Agriculture has used his regulatory authority under the Water Law to descriminate in favor of agricultural interests against industrial and domestic users of ground water.

Another source of aquifer pollution is pockets of solid waste from which pollutants percolate into ground water. This source is not covered by the Water Law's regulatory provisions. The 1971 Amendment to the Water Law defines a "polluter" to include an industrial or agricultural enterprise, a building or plant which pollutes a water source[96]. Since local authority sanitary landfill sites fit neither of these descriptions, the Water Commissioner has no power to site sanitary landfills to prevent pollution of ground water. Israel law gives local authorities, under the supervision of the Ministries of Health and Interior, the responsibility of disposing of solid waste[97]. Thus any program instituted by the Water Commissioner for the prevention of ground water pollution from sanitary landfill sites requires coordination with these bodies. To the same

effect would be any program instituted by the Minister of Agriculture for siting of cemeteries.

A full discussion of sewage as a source of water pollution serves as a separate chapter of this dissertation[98]. Let it suffice to say here that the Minister of Agriculture, with approval of the Finance Committee of the Knesset has the power to regulate the siting of sewerage works, the placement of which causes or might cause pollution of ground water[99]. To date the Minister has not exercised this regulatory power.

Despite the power granted the Water Commissioner and the Minister of Agriculture for the prevention of pollution of ground water, it would be misleading to portray their role as the single administrative voice created by legislation to deal with the problem. In the very narrow range of drinking water and sanitary conditions for sources of water used for drinking purposes, the Minister of Health has been given a major statutory role by a 1970 Amendment to the Public Health Ordinance[100].

(c) Drinking Water Standards

The Ministry of Health historically played a role in the protection of drinking water sources due to the power given the Ministry by the Public Health Ordinance of 1940[101]. The aim of this early legislation was to improve sanitary conditions in cities and towns. In essence, the ordinance aimed at removing nuisances, if created, and closing wells, if polluted[102]. It did not lay a

foundation for elimination or prevention of pollution of ground water, except at the well site.

Under the 1970 Amendment, however, the Minister of Health has the power, by regulation, to set sanitary conditions for "sources of water" used for drinking[103]. What this means is not exactly clear because the term "water sources" is not defined by the Amendment. It would seem logical to interpret the Amendment as applying to the actual source from which the water is pumped, i.e., the well, and not a water source as defined under the Water Law. The logic behind this argument rests on two points. First, on the Ministry's traditional inspection of wells and other sources of drinking water supply. Second, the Minister of Health has little of the power granted the Minister of Agriculture and the Water Commissioner to prevent pollution of ground water from percolation of pollutants. In spite of this logic, the Minister of Health issued regulations for drinking water[104] and defined water sources as they are defined in the Water Law. With all due respect to the Minister of Health, he has no power to legislate in regulations what he has no power to regulate by law.

In preventing contamination of wells used as a source of drinking water, the 1970 Amendment grants the Minister of Health the power to set standards for well construction. To date, the Minister has not taken any steps in this direction. Actually, since the licensing of wells is performed by members of the Water Commission, it would be preferable for both agencies to work together to devise standards

for well construction to prevent pollution of drinking water and ground water.

Summary and Evaluation

The legislative framework for the prevention of ground water pollution provides the Minister of Agriculture and the Water Commissioner with extensive power to control and abate sources of ground water pollution. It has been argued that agricultural users will be the first to be hurt by pollution of ground water, therefore, naming the Minister of Agriculture as the authority reponsible for protection of ground water sources will inure to the benefit of all users. Past action by the Minister belies this claim.

Since the passage of the Water Law, the Minister of Agriculture has been willing to sacrifice the quality of ground water to obtain immediate gains for his agricultural constituency. Moreover, for the past ten years he has permitted continual agricultural overdrafts of the coastal aquifer above both the natural and artificial recharge rate of that aquifer. Finally, that the Minister of Agriculture, by regulation, has encouraged rather than abated agricultural sources of ground water pollution, should force the Knesset to reconsider the question of proper ministerial control over the Water Law.

Of less importance, but not to be overlooked, is the Knesset's failure to properly define water sources under the Public Health Ordinance to avoid unnecessary conflicts between the Minister of

Health and the Water Commissioner. It is recommended that this omission be corrected in the following manner. The Knesset should amend the Public Health Ordinance to define water sources as the actual source from which drinking water is pumped. This definition would enable the Minister of Health to set standards to prevent pollution of those water sources over which he has control -- the well or pumping station. The Ministry of Health could then regulate the quality of water in the pipe, while the Water Commissioner could dedicate his energies to protecting water in the natural environment.

(2) The Administrative Framework

From the preceding it should be clear that the Office of the Water Commissioner is the central administrative organ for the protection of ground water in Israel. In spite of this clear legislative mandate, there is no one section within the Water Commissioner's Office whose raison d'etre is conservation of ground water and prevention of ground water pollution. Pollution prevention measures, when taken, result from decisions made by various departments within the Water Commission, not as a result of a national plan for ground water protection, but on a case by case basis. Further, significant decisions are made for ground water extraction, use and recharge as a direct result of studies performed or data supplied by those groups interested in carrying out the extraction or recharge operations. The following chapter attempts to analyze execution of the legislative mandate previously presented by choosing sources of ground water pollution and discussing present administrative measures employed for their elimination.

(a) Salinity

In order to prevent over pumping of an aquifer, some legal systems e.g. California's, require an extraction report, and, if necessary, a judicial decision limiting the amount of ground water that may be pumped from each well in a specific basin. In Israel, control of groundwater pumping is by a licensing process, the most restrictive of all administrative measures. A party requesting a

license to drill a well, change his output or switch his method of pumping makes application to the Water Commission's section on Licensing and Water Allotments. A committee of five, a member of the Allotments and Licensing Section, a member of the Hydrological Service, a member of the Geological Institute and two members of Tahal, review the request and make a recommendation to the Water Commissioner, who decides whether to grant the license or not. Once the license to dig has been issued and digging operations completed, a further request for allocation of water is made to the wells committee. The committee again reviews the request and makes a recommendation to the Water Commissioner. A license to withdraw water always includes a condition as to the amount of water that can be withdrawn and a requirement that a test for chlorides be made once a year. Sometimes conditions for the construction of the well are included in the license so as to prevent ground water pollution. At other times a requirement that a check for other minerals or pollutants is included in the license. There are no general published standards for well construction, however, nor standards for monitoring and testing of pollutants. Furthermore, the wells committee acts only on licensing requests. The committee does not deliberate and make recommendations to the Water Commissioner for the abatement of ground water pollutants.

This is the general scheme for licensing of wells in Israel[105]. It has potential for protection of ground water because each withdrawal request must receive approval from the Water Commissioner under conditions the wells committee dictates. In practice,

however, the scheme is unsound. Without justification it grants too much power to Tahal and too much leverage to Mekorot to enable the wells committee to deliberate as an objective body.

Why should two representatives of Tahal sit on the committee? Tahal has the duty of presenting long range policy choices to Israel's water policy makers. What sense does it make to grant an organization with think-tank capabilities the burden of deciding on daily licensing requests? Second, Tahal is not a government body, it is a corporation interested in profit making, which receives substantial contractual bids from Mekorot. Therefore, Mekorot is indirectly represented on the committee, which hears Mekorot's request for licensing the opening of new wells. In addition, until 1974[106], tests for the quality of ground water were performed for the Water Commission by Mekorot. Therefore the wells committee based its decision on data supplied by an interested party. Thus Mekorot, the licensee, initiated water policy, while the licensor Water Commission responded to licensing requests.

The problem of over pumping is not due simply to the issuance of new licenses but existing extraction of ground water as well. The Water Commissioner's power to limit extraction of ground water results from the requirement that each license holder must renew his license each year[107]. The Water Commissioner has the power to limit the allotment at each renewal stage. Yet this decision is difficult because precedent for water use has already set in. It is possible and frequent that the Water Commissioner refuses to

raise a water allotment, but it is rarer that he cuts back on such an allotment[108].

A party exceeding his alloted share is subject to one of several penalties. The Water Commissioner has the power to close and independent well and supply the party with a substitute source from a district supply company[109]. The Water Commissioner may institute criminal proceedings against one who violates the conditions of his license[110]. Yet criminal action takes time, and cutting back on supply is too drastic a remedy. Therefore monetary incentives and disincentives are used[111]. Yet monetary incentives have not prevented excess pumping in the coastal aquifer. (1) First, because the scale of payments for agricultural users is low[112], it has little effect on their behavior. (2) Second, there are 1,400 independent wells in that aquifer, 90% of the total number of independent wells in Israel, and if each well owner exceeds his rationed amount by a few thousand cubic meters of water, the effect could be catastrophic. (3) Third, requiring a kibbutz or moshav to pay more for water, forces them to pass this expense on to the ultimate consumer. This burdens the economy as a whole and does not reduce agricultural consumption of water.

Just as economic incentives have not succeeded in reducing excess pumping by independent well suppliers, so persuasion has not worked with Mekorot in reducing its pumping. Convincing Mekorot to reduce its supply meets with opposition because, in the final analysis, Mekorot is a corporation interested in revenue[113] and not necessarily in prevention of ground water salinity or salt

keeping with Mekorot's statutory mandate, which is water supply and not prevention of water pollution. Third, assuming that Mekorot can be persuaded to limit its supply of water and cut back its pumping, this will have no effect on the major area of salt water intrusion in the sandstone aquifer from Herzliya to Hadera. Along this strip there are few Mekorot wells[114].

Mekorot often uses the existence of independent wells to justify its own excess pumping. An example of this is the case of Binyamina[115], a town in the northern part of Israel. In May of 1968 a member of the Hydrological Service wrote the Water Commissioner advising him to limit pumping in the Binyamina area. During the next four years, the Hydrological Service continued to press for a reduction in pumping. Finally in 1972, a decision was reached in the Water Commission to limit pumping and a request sent to Mekorot. Mekorot answered by asking when they should start reducing the pumping. The exasperated answer, written in January, 1973 by the Head of the Licensing Section in the Water Commission, was to the effect that Mekorot would be the first to know because the company was building the pipeline from the substitute water source to Binyamina. Mekorot's answer to this letter was to request that the independent wells in Binyamina be cut back as they were not under Mekorot's control. In the meantime, concentrations of salinity tripled in the Binyamina wells and they are now unusable for irrigation[116].

Mekorot, however, is not a political body. Therefore, although it cannot be excused for its narrow economic considerations, ultimate responsibility for her actions should rest with the political body charged with the protection of Israel's water resources -- the Water Commission. It should be pointed out that despite dire warnings from his staff, the Water Commissioner did not order Mekorot to reduce pumping in Binyamina either during the annual licensing procedure or by means of emergency powers given to him. One explanation for the Water Commissioner's inaction is that pollution of ground water, unlike pollution of the Kinneret, cannot be seen and therefore has little political sex appeal. A more plausible explanation can be found in the legal framework for water pollution prevention and control. A Water Commissioner whose power of operation is generated by the Minister of Agriculture, circumscribed by agricultural interests on the Water Board and directed mainly toward a distinctively agricultural constituency will be hard pressed to limit water for agricultural purposes.

To alleviate pressure on the Water Commissioner, the Knesset should require him to develop a program for reduction in ground water withdrawals. Without such a requirement, the Water Commissioner will take the course of least resistance and bow to agricultural pressure. Thus, in spite of comprehensive legislation for the protection of Israel's ground water, excess pumping with its attendant pollution problems continues apace[117].

(b) Nitrates

Preventing pollution of ground water by nitrates does not require a licensing scheme as is useful in preventing excess pumping operations. Nitrate pollution results from heavy fertilization, animal feedlots, cemeteries, cesspools and sewage. From an administrative standpoint, each of these pollution sources must be treated differently to prevent excess contributions of nitrates to ground water.

[1] Fertilizers

The Water Commissioner has yet to be armed with the power to limit pollution of ground water by limiting the amount of fertilizer used in Israel or limiting its use on certain soils. The statutory authority for granting such power rests with the Minister of Agriculture who will safely guard it to protect his agricultural constituency. There are data linking fertilizer use with ground water pollution, especially in loamy soils[119]. Yet the Minister of Agriculture at present does not intend to excercise his statutory power and issue standards limiting the use of fertilizers or directing agricultural practices in general to limit concentrations of nitrates in ground water[120].

Although nitrates in drinking water are of special concern to the Minister of Health, the Ministry does not have the power to direct methods of agricultural production to limit their pollution

of ground water. The Minister of Health was recently granted the power to regulate the commercial use of sewage[121]. Such water is high in nitrogen and its proper control could limit nitrates in ground water. Yet, since Health is limited in its control over other sources of nitrogen, the Ministry is without the authority to direct the use of sewage to be a supplement for fertilizer, or to forbid its use on loamy soils.

[2] Septic Tanks and Cesspools

Septic tanks have been recognized as a source of nitrate pollution of ground water in scientific reporting in Israel, but not in direct administrative action. The Water Commission has never properly studied the problem[122] and the Minister of Agriculture has not listed septic tanks as "polluters" and required their construction in a specified manner or their elimination. The Ministry of Health has been concerned with septic tanks overloading and causing a nuisance and health hazard[123]. Often this concern has led to deeper septic tanks which increase the contributions of nitrates to ground water. In any case the Ministry has never set up guidelines or standards for septic tank construction, nor has there been an effort made to locate existing cesspools and septic tanks and require their hook-up to city sewerage lines.

One reason for this lack of attention is the hope that the National Sewerage Plan, to be discussed later, will reduce the number of septic tanks. Another reason is the diffusion of authority over water supply, sewerage and water pollution among the

Ministries of Health, Interior and Agriculture, as well as among local authorities. A third reason is that existing laws permit, but do not require, owners of septic tanks to hock-up to city sewerage lines[124]. If he so desires, the expense of the hook-up is on the spetic tank owner. Some city by-laws, for example Jerusalem's[125], require the payment of a higher fee for emptying the septic tanks of those parties able to hook up to city sewerage lines. Thus the law creates an economic disincentive to septic tank owners. This situation does not exist in rural communities and small towns, however.

[3] Sewage

The National Sewerage Plan will reduce the number of septic tanks and halt their contribution of nitrates to ground water, but it will increase nitrate percolation from sewerage lines, wadis and streams. Since sewage sources are the subject of a later chapter, the following comments relate simply to sewage contributions of nitrates to ground water.

There is little supervision over water supply and sewerage pipes because local authorities are generally responsible for their maintenance[126]. Therefore percolation from both sources into ground water occurs, and contamination of the supply source by the sewage source also takes place[127]. Secondly, there can be no final solution to sewage contributions of nitrates to ground water until a solution to treatment and reuse of sewage wastes is carried out. The legal framework, by requiring the cooperation of local

authorities and the Ministries of Interior, Health and Agriculture in the execution of a "national" sewerage plan, only makes such a solution more difficult.

[4] Cemeteries

The Water Commissioner and the Minister of Agriculture have taken no steps to eliminate ground water pollution from cemeteries. This is properly the subject for interministerial decision under the auspices of the Planning and Building Law[128]. What is needed is integration of the proposed national plan for cemetery sites[129], initiated by the National Planning Council, with representatives of the Ministries of Agriculture, Health, Interior and Religions.

[5] Solid Waste

In 1972, the National Planning Council agreed to formulate a national plan for solid waste disposal[130]. The committee formulating the plan is composed of members of the Water Commission, the Ministry of Health, the Ministry of Interior, the Environmental Protection Service, the Israel Lands Authority and the Israel Defense Forces. The Committee originally set out to find a site suitable for burying Tel-Aviv's garbage; such site to have no connection with an underground aquifer[131]. The full plan for solid waste disposal will not be prepared, completed and approved by the Government for several years.

(c) Nitrates -- The Ministry of Health

The Water Commissioner has done little to prevent the flow of nitrates into ground water. What has the Ministry of Health done to protect those, drinking water, from high concentrations of nitrates? First of all, the Ministry has attempted to match its regulations with the rise in nitrates in ground water. In its drinking water regulations of 1974 the Ministry raised the maximum permissible standard for nitrate concentrations in drinking water from 45 to 90 milligrams per liter (mg/l). With over 300 wells along the coast in the 45 to 90 mg/l range[132], raising the standard prevented automatic closure of these wells. To be fair, this rise in permissible level also resulted from scientific studies showing that nitrate concentrations up to 90 mg/l do not cause immediate health effects. No one knows the long term effects of such concentrations. The regulations also allow a district doctor to shut down a well supplying drinking water with nitrate concentrations over 45 mg/l, but he must shut down such well only at concentrations of 90 mg/l.

The Ministry of Health is also totally unequipped to supervise its own standards. For years, the Ministry has relied on Mekorot and local authorities to test their own water. This practice will continue. Yet the Ministry has little power to control Mekorot[133]. Further, the files of the Central District of the Ministry of Health show that several communities and agricultural settlements do not test their drinking water supplies regularly, according to Health's instructions[134]. As for the checks the Ministry is required to per-

form, the Central District reports that it will violate the regulations the Ministry promulgated in 1974, and make less checks than is required by law[135]. According to the report, the Central District Health Office is unable to meet the standard for checks as set out in the 1974 regulations.

By allowing each District Doctor the power to shut down a well supplying drinking water, the regulations strengthen district control over a national resource. Thus the regulations continue the process of decentralization in the Ministry of Health. This process has already created a system where each District Doctor protects a "fiefdom" of Israel in his particular style and according to his own particular judgment[136]. This results in a lack of coordination among the various districts and a district approach to national problems. For water pollution control, it means that the Ministry of Health cannot properly function nationally in coordination with the Water Commission. In those instances where the Minister of Health turns to the Water Commissioner for an alternate source of water, it will do so with regional considerations in mind. The Water Commission, however, must consider national interests when it supplies the alternate source.

(d) Oil

Until recently, neither the Water Commission nor the Ministry of Health approached the problem of pollution of ground water by oil spillage or leakage with any degree of seriousness. Even today, the Central District Officer of the Ministry of Health scoffs at even

the possibility of such an occurrence[137]. Members of the Water Commission, however, have recently taken an interest in the problem due to construction of a pipeline from Ashdod to Jerusalem and plans to expand oil storage facilities in Jerusalem[138].

In 1972, while the oil pipe was being laid, a report was prepared by the Petroleum Institute at the request of the Water Commission on the potential danger to ground water from oil leakage from the pipe[139]. The report laid heavy stress on the real danger of aquifer pollution in Ein Karem because of the height of the ground water table and its proximity to the pipe. It was therefore recommended that the walls of the pipe be made impermeable and that flow meters and automatic shut off valves be installed. Criticism of this report and further suggestions were offered by the Water Commission[140]. In July, 1972, a trip by members of the Water Commission's staff revealed that not one recommendation suggested by the Water Commission was adopted by the firm laying the pipe. The reasons given for disregarding the suggestions were that they arrived too late; they were too expensive; and they did not insure prevention of ground water pollution in Ein Karem[141].

In conjunction with their efforts to prevent ground water pollution from the Ashdod-Jerusalem pipeline, members of the Hydrological Service began concentrating their efforts on oil storage tanks in the Jerusalem area[142]. A check of the storage tanks revealed that the tanks are not protected against leakage or accidental spills. An experimental study performed in late 1973 showed that there are wells within three kilometers of the storage tanks and that oil percolating from a leak in any direction could pollute a well[143]. Furthermore, since the water from the wells is used for drinking, even the tiniest amount of oil pollution would suffice to pollute the supply.

As a result of the danger raised by construction of the pipeline and studies performed on the storage tanks, the Water Commission and the Petroleum Institute have agreed to write standards for pipe, pipe laying and oil tanks to prevent oil spillage and pollution of ground water. Although standards for pipe and storage tanks were promulgated in 1934[144], they do not relate directly to prevention of pollution of ground water, nor do they require approval of pipes and storage tank facilities by the Water Commissioner.

(e) Recharge

Intentional recharge operations are carried out by Mekorot under license and conditions from the Water Commissioner. Mekorot checks the results of its recharge operations and forwards such information to the Water Commission. Because of the licensing arrangement, there is good input from the Water Commission's staff on the question of location of the recharging operations. Non-intentional recharge of ground water, however, is not covered by the Water Law. Thus there is no monitoring of non-intentional recharge operations, e.g. from aeration ponds used in sewage treatment centers. Mekorot, the operator of the Gush Dan Reclamation Plant has agreed to monitor recharge of ground water from its aeration ponds[145]. This is the only instance of monitoring of a non-intentional recharge operation known to the author.

Evaluation

It should be apparent from the foregoing that a number of ground water pollutants have been recognized, but little or nothing is being done to eliminate them. The reasons for such inaction can be explained as follows.

A certain unwillingness to attack agricultural polluters was built into the system when the Water Commissioner's Office was placed under the control of the Minister of Agriculture. Administrative unawareness of the potential pollution threat to ground water from oil, pesticides and exotic chemicals results from the non-existence of a unit within the Water Commission whose raison d'etre is conservation of ground water sources from both a supply and a pollution prevention standpoint.

A further reason could be poor scientific reporting and evaluation of pollution problems. The Hydrological Service has monitored chlorides and nitrates for several years. Mekorot checks for other pollutants, but only at the well site. Tahal frequently does regional surveys and checks for ground water pollutants. Yet there is no state-wide, on-going monitoring of concentrations of ground water pollutants correlated to potential sources of such pollutants. Without such monitoring, it will be difficult for the Water Commissioner to pinpoint and control sources of ground water pollution. And in those cases of ground water pollution caused by pinpointable sources, such as septic tanks, cemeteries, solid waste landfills and sewage, the Water Commissioner must compete with other governmental

agencies and local authorities to reduce the pollutant effect of these sources on ground water quality. It is apparently this fear of clashing with other governmental units which prevents the Water Commissioner from exercising the range of pollution control devices made available to him under the Water Law.

(3) The Judicial Framework

It was earlier mentioned that California courts were forced to allocate ground water in three basins to prevent overpumping in each basin. Judicial interference resulted from the State Water Resources Control Board's limited administrative powers in the event of excess pumping. Private petitions to the judiciary also resulted from the doctrines of riparianism and appropriation, which give well owners a protected interest in the water they withdraw, therefore they have a personal interest in its conservation. In Israel, neither of these conditions prevail and, therefore, one would expect little judicial activity in the settling of disputes between private parties or between a private water user and the government. Indeed this is the case. There has been only one Supreme Court decision related to the right to receive water at a certain quality in the history of Israel[146]. On the other hand, since the Water Law prescribes criminal sanctions for pollution of water sources one would expect to find frequent judicial activity in this area. Yet prior to and since the passage of the Water Law in 1959, and its pollution amendment of 1971, one finds no reported cases on the

with the legal section of the Water Commission. The reasons for such a clean record are many; one of them is surely the difficulty of connecting a potential source of ground water pollution with actual pollution of the source. It remains to be seen from later chapters, however, whether this is a phenomenom related solely to pollution of ground water sources.

Although there have been no criminal actions brought for the prevention of ground water pollution, there have been numerous cases before the Water Court, and, on appeal before the regular courts, from the Water Commissioner's refusal to allot water or increase an allotment. In more than 95% of the cases brought, the Water Commissioner's ruling was upheld[147], further evidence of his power to limit excess pumping in Israel. In their decisions over the years, the courts have created several rules of law for the allocation and use of ground water. First a license to use water is to be associated not only with the use of the water but also its place of use. If a party uses water for growing purposes, sells his land and moves to another growing area, he must file a new request for a license to use, and it will not be granted automatically[148]. Secondly the party buying from a land owner does not automatically acquire the landowner's water rights; he too must make application for an allotment[149]. Thirdly, the Water Commissioner has no power to refuse the allotment request simply because the purchaser of land intends to use the water for a different use than the previous owner. The Water Commissioner must show that his refusal is based on a fear that ground water sources will be depleted or salinated[150]. Fourth, the courts do not look with favor on a plea for increased allotment from a party that

Fifth, the Water Law does not recognize the right of any person to receive water from a specific source at a specific quality. This was the issue before the Supreme Court in the case of Pardes Hana v. the Minister of Agriculture[152], to be discussed below.

Under the Water Law, the Minister of Agriculture has the power to declare areas of the country to be rationing areas for water purposes[153]. This gives him the power to promulgate regulations for pumping and supply methods including the amount of water to be used, the quality of such water and distribution of the supply. The Water Law specifically declares that the purpose of rationing areas is to limit the amount of water used to the minimum necessary, without injuring the rights of parties in the use of water. But these rights, according to the Water Law, are not in the receipt of water from a specific source and at a pre-conditioned quality; rather the Water Commissioner has the power to order supply of water from a different source to a user on the condition that the water is of a quality that he can use. The user is given the right to appeal from the decision of the Water Commissioner to the Water Court, and it is this question that has given rise to the only Supreme Court case that deals directly with water quality.

The plaintiffs, Pardes Hana, supplied water, mainly to agricultural users, with chlorides in concentrations of between fifty and eighty milligrams to one liter of water prior to the operation of the National Water Carrier. In 1964, the Water Commissioner declared the central part of Israel to be a rationing area[154] and ordered the plaintiffs to supply water from the National Carrier.

Water in the carrier comes mainly from the Kinneret, and the concentrations of chlorides received by the plaintiffs after the hook-up reached 170 milligrams per liter of water. The plaintiffs argued before the court that this change in quality may have a substantial effect on the plants raised by their customers. Without research on the potential effects of the change, they argued, the Minister of Agriculture overreached his powers in ordering the new distribution arrangement. Plaintiffs further argued that they are entitled to receive water from the sources presently supplying them with water.

In his opinion for the court, Justice Berenzon notes that the Water Law, by a declaration of constitutional magnitude, transferred all rights in water from private to public hands, without compensating the prior private owners[155]. Although the Water Law, continued Berenzon, recognizes the right of Israel residents to receive water, the right does not include the right to receive water at a certain quality nor from a specified source. What the law does demand, reasoned Justice Berenzon, is that in supplying a party with a substitute source of water, the Water Commissioner must supply him with water of a quality that meets his needs.[156] After these introductory findings of law, the remainder of the judge's opinion revolves around the fairness of the only water quality criteria ever promulgated by the Water Commissioner -- criteria for maximum permissible concentrations of chlorides in water supplied to the central and southern parts of Israel[157]. On the issue of appropriateness of the Minister of Agriculture's rules for maximum allowable concentrations of chlorides, the court held that the Minister did not

exceed his powers in promulgating such rules. On the other hand, the Minister of Agriculture's requirement that water quality for avocados be fixed by the Water Commissioner without further guidelines seemed arbitrary. Yet since a standard of 120 milligrams per liter had already been set by the Water Commissioner, and since a substitute source must be of a quality to meet the needs of the party receiving it, the case was remanded to the Water Court for a determination of whether the standard set met the needs of the plaintiffs.

Pardes Hana is judicial recognition of the unlimited power given to the Minister of Agriculture and Water Commissioner in the conservation of Israel's water resources. Justice Berenzon notes that the law does not declare as its aim the transfer of private rights in water to the State, rather the transfer took place the moment the water bill became law. The only right left private parties since the passage of the Law is the right to receive water, but this right does not carry with it the right to demand water from a certain source, nor at a specified quality. In short, the Minister of Agriculture and Water Commissioner not only have the power to engage in long range planning for the conservation of Israel's water resources, but they may do so without fear of challenges to their power and law suits by private citizens claiming an interest in a water source.

Pardes Hana is the only reported case on the question of water quality. More than that, it is the only case that deals with a standard of quality issued by the Minister of Agriculture. Neither

before nor since the promulgation of this standard of quality has the Minister issued criteria or rules for water quality. The fact that the single standard to appear relates to the quality of water supplied to agriculture and not for domestic or industrial use comes as no surprise. There could be reasons, however, other than concern for agricultural interests, for the lack of standard setting.

First, for years, ground water served as a source of water for all needs, and it was of a desirable quality. Second, if the Water Commissioner has adopted as policy the path of least resistance, setting standards for water quality would hinder this policy. This argument gains luster when seen in the light of the Pardes Hana opinion. Pardes Hana holds that the Water Law does not allow a claim by a user for water at a certain quality. Once a standard of water quality is promulgated, however, such a claim does arise. Plaintiff Pardes Hana attacked both the standard and the quality of the water it was to receive. In short, the standard of quality gave plaintiff Pardes Hana standing to contest the quality of her water source. Without the promulgation of a standard, the Water Commissioner could supply water from any source at any quality without fear of judicial interference, if the source met the user's needs.

Operating without a standard gives the Water Commissioner tremendous flexibility in planning use of Israel's water resources because he need not fear claims from private parties over the degradation of water quality, provided the water is usable. For a long range program of water conservation this flexibility is desirable,

but it may have had a second effect, one opposite to that of water conservation. The Water Law, by abrogating all private rights in water sources also destroyed any private recourse to the courts to prevent degradation of Israel's water resources. At the same time, the Law, by not requiring the Minister of Agriculture to promulgate water quality standards, further insured his immunity against private suit and judicial scrutiny of his water pollution prevention measures. Carrying this argument to its logical conclusion, it might well be maintained that the lack of a water quality standard and the concomittant rights to uphold that standard have prevented private action for the prevention of water pollution, and the conservation of Israel's waters. In short, the lack of a standard for water quality has made government's job easier, but reduced the interest of private citizens in water quality, and possibly aided in the ever worsening quality of Israel's waters.

Summary and Conclusion

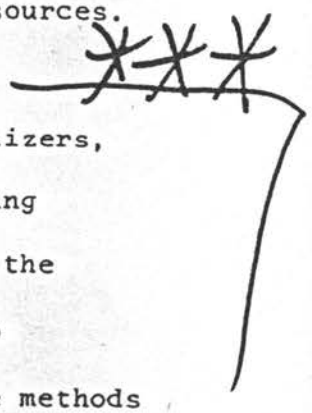
The major sources of ground water pollution are the products of modern living. Huge pumps have the capability of sucking out large quantities of ground water and sucking in large quantities of ocean water. Intensive agricultural methods add tons of nitrogen to soils and significant amounts of nitrates to ground water. Modern man's sewage, which in Israel flows freely in wadis and streams, is full of organic waste, pesticides and other exotic wastes, whose total effect on ground water sources is unknown.

In order to meet the challenge modern living poses to Israel's ground water resources, the Knesset passed an extraordinarily modern act in 1971. This law to amend the Water Law aimed at handing the Water Commissioner and the Minister of Agriculture more than adequate power to protect Israel's ground water from all sources of pollution. To amplify this point, the following example has been brought.

Assume that the Water Commission performed proper research and discovered that Israel's sand dunes provide the major source of refill for the coastal aquifer. The Water Commissioner's research reveals that water percolating through sand dunes acts as a natural barrier to ocean water intrusion. The Water Commissioner also discovers that building on the sand dunes should be prohibited because it will prevent the percolation of rain into the coastal aquifer and thus lead to salination and pollution of the aquifer. With this knowledge, the Water Commissioner turns to the Minister of Agriculture with a suggested

regulation under the Water Law -- a regulation forbidding the building of any structure and the laying of any asphalt or concrete on the sand dunes of Israel. Does the Water Law empower the Minister of Agriculture to issue such a regulation? Yes. But would it be plausible for the Minister of Agriculture to promulgate such regulation? No, because in the name of water pollution prevention, the Minister of Agriculture cannot plan the face of the State of Israel.

The question thus becomes philosophical. Did the Knesset act properly in giving the Minister of Agriculture such extensive power? Was this 1971 Amendment legislative overkill to a point where the Minister has so much power he does not know where to begin to use it? This is not the place to dissect the esoteric contours of parliamentary thinking. But certain points are essential for proper analysis of the Minister of Agriculture and the Water Commissioner's handling of their respective powers with regard to preservation of ground water sources.

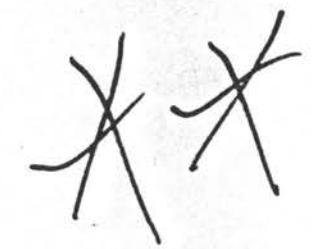


It is true that modern living provided the curse of fertilizers, pesticides and an alchemy of modern chemicals. But modern living has provided the Water Commissioner with the tools to discover the whereabouts of Israel's ground water pollutants, the ability to record pollutant effects and the ability to provide alternative methods of production and disposal to reduce sources of ground water pollution. The Knesset in 1971 intended to provide a flexible legal framework so that modern instruments for discovering pollution would not fail for lack of a legal framework on which to carry them out.

The problem is that simply providing the legal framework is not enough. The Knesset forgot to see how the legal framework could be effectively implemented. Could the Minister of Agriculture in fact pass a regulation changing agricultural methods of production? Could the Water Commissioner in fact change man's methods of waste disposal to prevent ground water pollution? Could the Water Commissioner in fact face up to Mekorot and tell the National Water Company to cut back on its pumping? Does the Water Commissioner have the capability of providing the Minister of Agriculture with the data he needs to promulgate regulations attacking sources of ground water pollution? Or must he turn to Tahal, Mekorot or some other interested party for that information? If, indeed, such information is available to these honorable corporations.

The Knesset only did half its job when it passed a law providing unlimited power to two men, without thinking of the effective exercise of that power. With this said, however, and the proper excuses made for the Israel administrative system, the Water Commissioner still cannot be excused for his total lack of initiative in protecting Israel's ground water from the onslaught of modern man. There has been not one regulation passed for the protection of ground water sources. Not one septic tank has been closed, pipeline moved, agricultural method changed in the name of ground water preservation. Not one statement of policy limiting overpumping for agricultural use has ever been carried out. Building continues apace on the sand dunes of Israel, as if this filter for ground water did not exist.

Had the Water Commissioner attempted to execute the Knesset's plan and floundered on the shoals of agricultural interests or was stymied by the bureaucracy of the Ministry of Health, or simply sunk by the power of Mekorot and Tahal, then he could be excused for having tried and failed. But there has been no such clash of political interests. All is as quiet as the trickle of ground water through rocks. And the pollution continues; the ocean creeps in, and all in spite of the most comprehensive code for the protection of ground water capable of being passed in a democratic country.



Footnotes

1. Ground water at common law was percolating water or subterranean water flowing in an undefined channel. See 5 Powell on the Law of Real Property para. 729 (1956); Coulson & Forbes on the Law of Waters 221 (6th ed. 1952). Courts often treated ground water as a mysterious intruder into the soil. Burton, Pollution of Ground Water, 1 U.C.D. L. Rev. 141 (1969).

2. M. Rebhun, D. Ronen, E. Foa, Proposed Monitoring System for Ground Water Quality 1 Water Commission - Ministry of Agriculture (1972) (Hebrew). Ground water supplies 20% of the water supply of the United States. Ballentine, Reznick & Hall, Subsurface Pollution Problems in the United States 1, EPA Report (1970). Ground Water in England and Wales makes up one quarter of the public water supply. Bruch & Taylor, The Management of Groundwater Resource Systems, 1 J. Env'l Rights 36 (1972).

3. There are numerous books and articles on ground water and ground water pollution, written in a style easily understood by laymen. The description in the above text is taken from the following sources. Groundwater Pollution: An Interim Report, EPA (1973); The Hydrological Situation in the Southern Coastal Area in the Years 1965-66, Tahal (1966) (Hebrew); Burton, supra note 1; Gindler & Holburt, Water Salinity Problems: Approaches to Legal & Engineering Solution, 9 Nat. Res. J. 329 (1969).

4. A. Marcardo, Master Plan for Kinneret, Eutrophication of Lake Kinneret, Tahal at 31 (1973) (Hebrew).

5. E.W. Steel, Water Supply & Sewerage 64 (4th ed. 1969).

6. Water Quality in Israel, Report of the Committee on Water Quality, the Israel National Committee on Biosphere and Environment, at 25 (Saliternik ed. 1973) (Hebrew) [Hereinafter cited as Water Quality in Israel.]

7. The following description of Israel's ground water resources is taken from the following sources. Water in Israel - Part A, Ministry of Agriculture - Water Commission, at 32-66 (Boneh ed. 1973); Water Quality in Israel, at 71-106.

8. Y. Boneh, Historical Development of Withdrawal of Ground Water, in Water in Israel Part A, Collected Articles, at 44, Water Commission (Boneh ed. 1973) (Hebrew); S. Aurbach & A. Sellinger, Review of Artificial Groundwater Recharge in the Coastal Plain of Israel, paper presented to IASTI Symposium on Artificial Recharge & Management of Aquifers, Boneh 19-26, 1967, Haifa. Other ground water experts use figures of 180 kilometers long and thirty kilometers wide at its widest point. See Water Quality in Israel at 71.

9. This thesis deals only indirectly with the National Water Carrier. For more specific information, see M. Virshuvsky, Water Resources Administration of Israel, A National Survey 18-22 (1969).

10. For a history of the planning concepts employed for the Gush Dan Sewage Reclamation Plant, see Report, Conclusion of the Council of the Plan for the Disposal and Reuse of the Dan Area Sewage, Tahal (1966) (Hebrew).

11. Interview with Dr. Gdalyahu Shelef, Advisor to Ministry of Health's Department of Environmental Health, November 5, 1973. Professor Hillel Shuval of the Hebrew University's Environmental Health Laboratory, addressing the Technion, suggested money be appropriated to separate the drinking water supply system from other water needs. "Life" Telegram No. 13 p. 2 (1973).

12. This theory is postulated in D. Carr, Death of the Sweet Waters, 25 (1966).

13. In speaking of concentrations of minerals in water, reference will be made throughout this paper to the weight of the mineral in a certain volume of water. For example, total mineral concentrations, or total dissolved salts (tds), will be expressed in terms of one thousandth part of a gram of tds to 1 liter (1000 grams) of water. The other types of measuring devices used for mineral concentrations in water are expressed in terms of electrical conductivity because salts carry electrical current, or as chemical equivalents because in dissolution, salts break into anions and ions. For further explanation of the measuring of minerals in water, see Gindler & Holburt, supra note 3, at 332.

14. The ratio of sodium to calcium and magnesium in irrigation water is an important factor in soil manageability. Interview with S.P. Cohen, Hydrological Service -- Water Commission, May 24, 1973. Soils high in sodium when wet "run", when dry form clods. Hayward, The Salinity Factor in the Reuse of Waste Waters in The Future of Arid Lands 287 (White ed. 1956).

15. Over three milligrams of boron per liter of water (mg/l) affects most crops. Hayward, supra note 14, at 283.

16. Use of water with chloride concentrations to 1000 mg/l does not present a problem for most field crops. J. Shalhevet, The Use of Saline Water for Irrigation in Israel in Utilization of Brackish Water, Nat'l Council for Research & Development, at 197 (Levite ed. 1972). But the crops are specifically sensitive to chlorides and sodium. Id at 198. Avocados apparently are affected by concentrations of chlorides over 120 mg/l. Pardes Hana v. Minister of Agriculture, HCJ 221/64, P.D. 18 IV at 533.

17. Gindler & Holburt supra note 3, at 330.

18. But in Israel, one scientist has maintained that rainwater along the coast contributes a substantial quantity of salts to ground water. See D. Yaalon, On the Origin & Accumulation of Salts in Groundwater & in Soils in Israel 22, Geology Dept. Hebrew University (1961).

19. Skokerboe & Law, Research Needs for Irrigation Return Flow Quality Control, EPA Report, at 10 (1971).

20. This is standard agricultural practice in regions with arid climates. D. Fuhriman & J.Barton, Ground Water Pollution in Arizona, California, Nevada & Utah, EPA Report, at 89 (1971) [Hereinafter cited as Ground Water Pollution in Arizona.]

21. See, in general, Groundwater Pollution Control: An Interim Report, EPA (1973); Burton, supra note 3, at 152.

22. Water Quality in Israel, supra note 6, at 71.

23. Id. at 72.

24. For a more detailed discussion of salt water intrusion, see Gindler & Holburt, supra note 3, at 344.

25. Sometimes excess concentrations of salt water can occur in as short a time as one growing season. Moore & Snyder, Some Legal & Economic Implications of Sea Water Intrusion -- A Case Study of Ground Water Management, 9 Nat. Res. J. 401, 404 (1969).

26. Bahmat & Chetbain, Seawater Encroachment in the Coastal Plain of Israel During the Period 1958-1971, Water Commission -- Hydrological Service, at 44 (1974). Statistics differ on the depths inland. Compare D. Gilad, Y. Bahmat, Water in Israel, at 37 (0.5 to 1.5 kilometers inland), with Report, Supply of Water to Gush Dan, at 3, Tahal (1959) (depths to 3.5 kilometers inland).

27. Bahmat, supra note 26, at 44.

28. Id. at 2.

29. The natural refill rate of the coastal aquifer is estimated at between 200 and 250 MCM a year. Y. Boneh, The Historical Development of Ground Water Supply, in Water in Israel - Part A, at 44. In the year 1962 480 MCM were pumped from the coastal aquifer. Id. at 47.

30. Bahmat, supra note 26, at 1.

31. See, e.g. Health Aspects of Water in the Central District -- 1972, at 37, Ministry of Health (1973). [Hereinafter cited as Health Aspects.] In 1968, 34% of the wells in the central section of Israel contained concentrations of nitrates less than five mg/l. In 1972, only 20% of those wells contained concentrations less than five mg/l. Id. at 38.

32. Harpaz, Pollution of Ground Water by Nitrates, in Water in Israel at 240.

33. H. Shuval, Nitrate Problems in Drinking Water in Israel, in The Movement of Nitrates & Other Dissolved Substances in the Ground and Their Percolation into Ground Water, at 3, Israel Nat'l Com't for Biosphere & Environment (Hillel ed. 1973) (Hebrew). [Hereinafter cited as Movement of Nitrates.] None of the methemoglobenemia cases have been acute. D. Hillel,in Movement of Nitrates, at 70.

34. Ground Water Pollution in Arizona, supra note 20, at 96. "shortly after cattle and sheep drank high nitrate water, 3100 ewes and 300 cows experienced abortion...." Id. at 96.

35. Health Aspects, supra note 31, at 37. This figure of 13% is misleading. It remains stable due to the fact that each year wells with concentrations over 90 mg/l nitrates are closed as sources of drinking water. Id. at 38. Therefore they are not tested for nitrate concentrations the following year.

36. Public Health Regulations (Health Standards for Drinking Water), 5734-1974, KT 3117 p. 556.

37. Health Aspects, supra note 31, at 38.

38. H. Saliternik & I. Cahanovitz, Sources of Ground Water Pollution from Concentrations of Nitrates, "Biosphera" no. 9. p.1 (1972).

39. For causes of ground water pollution by nitrates in Israel, see Y. Harpaz, Nitrate Pollution of Ground Water in Israel, Tahal (1972) (Hebrew); A. Marcardo, Pollution & Salination of Ground Water in the Rishon le Zion-Rehovot Areas, Tahal (1973) (Hebrew); D. Ronen, Pollution of Ground Water by Nitrates in Rishon le Zion-Rehovot, Tahal (1972) (Hebrew); H. Saliternik, A Study of the Sources of Nitrate Pollution of Ground Water in Movement of Nitrates, supranote 33, at 6.

40. "On the face of it, it would appear that nitrate concentrations increased as ground water pumping increase."Marcardo, supra note 39, at 25.

41. N. Lahav, I. Cahanovitz, Soil & Water Pollution Caused by Agricultural Pesticides, at 97, Tahal (1973) (Hebrew).

42. Id.

43. Id. at 99, 110.

44. Id. at 112, 113.

45. Water Quality in Israel, supra note 6 at 140.

46. S. Kishoni, Liquid Industrial Waste as a Source of Water Pollution, in Man in an Antagonistic Environment, Israel Nat'l Com't

on Biosphere & Environment at 163, (1971) (Hebrew) [Hereinafter cited as Man in an Antagonistic Environment]; Water Quality in Israel, supra note 6, at 92.

47. M. Jacobs, Ground Water Pollution, in Man in An Antagonistic Environment, at 193, 194.

48. Id.

49. Sixty instances of ground water pollution were reported in the United States in a single year due to leaks in oil tanks at gas stations. Groundwater Pollution Control: An Interim Report 3-6, EPA (1973).

50. See Ballentine, Reznick, Hall, Subsurface Pollution Problems in the United States 5, 6, EPA (1970). There were 246 subsurface injection wells in the United States in 1972. Water Quality Strategy Paper, Environmental Protection Agency at 20, (2nd ed. 1974).

51. This is the maximum permissible level; the highest desirable level is 200 mg/l. Int'l Standards for Drinking Water, World Health Organization, at 39 (3rd ed. 1971).

52. M. Rebhun, D. Ronen, E. Foa, Proposed Monitoring System for Ground Water Quality, Ministry of Agriculture - Water Commission, at 5. (1972) (English summary).

53. Interview with Daniel Ronen, Water Commission, Dep't of Water for Industry, May 18, 1973.

54. See Man in an Antagonistic Environment, supra note 46, at 174.

55. Water Quality in Israel, supra note 6, at 79.

56. Water Quality in Israel, supra note 6, at 79.

57. In Riverside, California, chlorination of drinking water failed to prevent the outbreak of a typhoid epidemic that affected 18,000 people. M. Bernarde, Our Precarious Habitat 144 (1970). In New Delhi, India, some 30,000 people affected by waterborn hepatitis, despite chlorination of water. Shuval & Katzenelson, The Detection of Enteric Viruses in the Water Environment 348 in Water Pollution Microbiology (Mitchell ed. 1972). See also Healy & Grossman, Water-Borne Typhoid Epidemic at Keene, New Hempshire in Biology of Water Pollution, U.S. Dept. of Interior, (1967).

58. Interview with Badri Fatal, Environmental Health Laboratory, Hebrew University, January 21, 1973. In April 1974, the Environmental Protection Agency reported that 74 cities in the United States experienced shortages of chlorine. Environmental News, April, 1974.

59. The plan is to store the water underground for a minimum of

400 days. Report: Summary of Discussion of the Planning Commission for Disposal & Reuse of Gush Dan Effluents 31, Tahal (1966) (Hebrew).

60. Lahav & Cahanovitz, Soil & Water Pollution Caused by Agricultural Pesticides, Tahal (1973) (Hebrew).

61. Id. at 86.

62. Actually recharging operations began in 1955, but only in 1963-64 did recharge begin on a large scale. Harpaz, The Artificial Enrichment of Ground Water in Israel, at 52, 53, in Water in Israel.

63. Water Quality in Israel, supra note 6, at 20-21.

64. International Standards for Drinking Water, at 38 (3d ed. 1971).

65. Id. at 39.

66. Hatza'at Hok 326 p. 5, at 74.

67. Water in Israel at 102.

68. Recommended Changes in Water Quality Control, Final Report of the Study Panel to the California State Water Resources Board, at 40 (1969) [Hereinafter cited as Recommended Changes.]

69. Craig, California Water Law in Perspective LXXXIII, in California Water Code (West 1971); Robie, Water Pollution: An Affirmative Response by the California Legislature, 1 Env't L. Rev. 426 (1970).

70. Israel water law is generally considered an appropriate statutory framework for a model water conservation system. See Harrison & Sandston, The Groundwater-Surface Water Conflict & Recent Colorado Water Legislation, 45 Colo. L. Rev. 1, 12 (1971). [Israel is the best example of a water system, highly managed on the basis of state ownership.] For a comparison of the comprehensiveness of Israel ground water legislation with European countries, see Groundwater Legislation in Europe, FAO Legislative Series no. 5 (1964).

71. Bain, Caves & Margolis, Northern California's Water Industry, at 62 (1966).

72. Peabody v. Vallejo, 2 Cal. 2d. 351, 40 P2d 486 (1935).

73. W. Hutchins, the California Law of Water Rights 450 (1956).

74. Burton, Pollution of Ground Water, supra note 1, at 157.

75. See discussion in Reis, A Review & Revitalization: Concepts of Ground Water Production & Management -- The California Experience, 7 Nat. Res. J. 53, 60 (1967).

76. 207 P.2d 17, 33 Cal.2d 908, cert. den. 339 U.S. 937 (1949).

77. See Burton, supra note 1, at 163.

78. Craig, supra note 69, at LXXIII.

79. California Water Code §13000 (West Supp. 1973).

80. For a concise summary of the California Water Code's section on water quality, see G. Myroie, California Environmental Law Guide 59 (1971).

81. Calif. Water Code §175 (West Supp. 1973).

82. Calif. Water Code §13120 (West Supp. 1973).

83. Calif. Water Code §13200 (West Supp. 1973).

84. Calif. Water Code §2100 (West Supp. 1973).

85. Calif. Water Code §13800 (West Supp. 1973)

86. Burton, supra note 1, at 163.

87. Specific reference is made here and in the following discussion to the Water Drilling Control Law 5715-1955 cited in the Appendix.

88. "Essentially" because he cannot stop the flow of water to those parties licensed before the Water Law was passed. These parties retain their alloted amount. See Appendix, Water Law §26. This section is of little significance today, however, because the rights apply to the alloted amount in 1959.

89. See Appendix, Water Law §111.

90. See Appendix, Water Law §47a.

91. See Appendix, Water Law §44A.

92. See Appendix, Water Law §20D(a).

93. See note 119 infra. "Leaching of nitrates is in general much more pronounced in coarse, sandy soils than in fine, clay-like soils." Impact of Fertilizers & Agricultural Waste Products on the Quality of Waters, at 5, O.E.C.D. (1973).

94. See Appendix, Water Law §20D(a)(1).

95. Water Regulations (Use of Water in Rationing Areas), 5729-1969, K.T. 2347, p. 883 §8, 9.

96. See Appendix, Water Law §20A.

97. See Solid Waste Pollution in Israel, Israel National Com't on Biosphere & Environment, at 88-90 (1973).

98. See discussion, text, infra p. 74

99. See Appendix, Water Law §20A.

100. See Appendix, 1970 Amendment to the Public Health Ordinance.

101. P.G. 1065, Supp. I, at 239.

102. See specifically §53 of the Public Health Ordinance, 1940.

103. See Appendix, 1970 Amendment to the Public Health Ordinance §52(b).

104. Public Health Ordinance (Drinking Water Regulations), 5734-1974, K.T. 3117 p. 556.

105. The procedure for licensing of wells in Israel was explained to the author by a member of the Wells Committee . Interview with Shalom Goldberger, Hydrological Service, Water Commission, September 21, 1973.

106. In 1974, the Hydrological Service began monitoring nine pollutants in ground water. Interview with Ted Herman, Hydrological Service - Water Commission, June 5, 1974.

107. This condition appears in the standard license for wells. Interview with Shalom Goldberger, Hydrological Service -- Water Commission, Sept. 20, 1973. See also Information Pamphlet to Suppliers & Consumers of Water, at 4, Ministry of Agriculture -- Water Commission (1973) (Hebrew).

108. For the past two years, the Water Commissioner has been threatening agricultural users with a 10% cutback. This year the agriculturalists were saved by the rain. See, "The Minister of Agriculture is Delaying Cutting Back on Water Allotments," Haaretz, Mar. 20, 1973, p.12, col. 4. "All these years we talked about distributing water. We never thought of cutting back." Talk by A. Broom, Sec'y-Gen'l, Ministry of Agriculture, to Workshop on the Kinneret, Hebrew University, June 3, 1974.

109. See Appendix, Water Law §20.

110. See Appendix, Water Law §156.

111. The Minister of Agriculture has the authority to set water tariffs. A special tariff or administrative tax has also been set by the Minister of Agriculture. Information Pamphlet, supra note 117 at 10.

112. See, e.g., Water Regulations (Grants), 5733-1973, KT 2909, p. 773; Water Regulations (Special Payment), 5733-1973, KT 2909, p. 779.

113. Not above contracting to supply water at a price linked to the dollar, or refusing to license the city of Ramat Gan as a district supply company because the city refused to buy Mekorot stock. See City of Ramat Gan v. Att'y Gen'l, C.P. 68/61, P.D. 15 I, p. 161,165.

114. Interview with E. Foa, Hydrological Service -- Water Commision, Sept. 19, 1973.

115. The facts presented in the text are taken from File no. 412 "Shomi Binyamina," Hydrological Service -- Water Commission.

116. S. Gerber, "Checking the Possibility of Stopping the National Water Carrier in the Dry Months," Haaretz, Jan. 24, 1973, p. 7, col. 4.

117. Household use of ground water in 1972 was 270 MCM. Industrial use was 70 MCM. Total permitted use (i.e. refill rate) is 1,450 MCM. Thus agricultural use should have been limited to 1,110 MCM. In 1972, an exceedingly dry year, agricultural withdrawals reached 1,180 MCM. E. Kalley, Water System in Israel & Problems for the Early Seventies, in Water in Israel, at 87.

118. The data are overwhelming. In Israel, see Movement of Nitrates, at 14; Harpaz, supra note 39 at 13-15; Ronen, supra note 39 at G-12. In the United States, see Ground Water Pollution in Arizona at 104, 119.

119. This conclusion was reached in several independent studies performed in Israel. See Pollution of Ground Water in Israel: Collection & Preparation of Data, Tahal (1972) (Hebrew); Reinhorn & Avnimelech, Release of Nitrates in Tilled Soils that Accompanies the Breaking Down Process of Organic Matter & the Influence of High Levels of Oxygen on the Dentrification Process, Fertilizer & Lands Laboratory, Technion, at 82 (1973) (Hebrew); Wachs, Avnimelech & Sandbank, Effect of Irrigation with Stabilization Pond Effluents on the Concentration of Nitrates in Underground Water, Environmental Engineering Laboratories, at 7 (1971).

120. Interview with Ora Tamir, Legal Advisor to the Water Commissioner, April 28, 1973.

121. Law to Amend Public Health Ordinance (No. 5) 5733-1973, SH 710, p. 23 §65A.

122. Interview with E. Foa, Hydrological Service - Water Commission September 18, 1973.

123. Interview with Rafael Teplitz, Health Inspector, Jan. 9, 1974.

124. Local Authorities (Sewerage) Law 5732-1962, S.H. 376 p. 96 §47; Cities Ordinance (Water Supply) 1936, P.G. 560, Supp. I p. 1; as amended S.H. 376, 5722, p. 102.

125. K.T. 3075, p. 119 (1973).

126. See discussion infra p.142-145.

127. The most famous example of this was pollution of a water source in Ein Karem by sewage from the city of Jerusalem. Interview with Shlomo Alphi, District Sanitation Engineer, Jerusalem District, March 6, 1973.

128. Planning & Building Law, 5735-1965, S.H. 467, p. 307 §55.

129. Announcement of the National Cemetery Plan. Y.P. 2027, p. 1903 (1974).

130. Decision of the Nat'l Planning Commission, no. 72-78 in its Session no. 75 of July 4, 1972.

131. Interview with Peter Preuss, Environmental Protection Service, June 2, 1974.

132. H. Shuval, Problems of Nitrates in Drinking Water in Israel, in the Com't to Study Soil Pollution and Water Quality, Nat'l Com't for Biosphere & Environment, at 3 (Hillel ed. 1973) (Hebrew).

133. The Northern District Office of the Ministry of Health has been unsuccessful in getting Mekorot to accept a license under the Licensing of Businesses Law. Interview with Daniel Brand, Health Officer, Ministry of Health, Nazereth, Nov. 20, 1974.

134. File no. 21/11, Ministry of Health, Central District.

135. Bacteriological and Chemical Checks for Settlements in the Central District in Accordance with the Drinking Water Regulations, Ministry of Health, Central District (1974).

136. It was the author's experience, in compiling information for this paper, to find not even a central depository of information for the District Offices of the Ministry of Health. In this situation, the author was forced to visit different district offices and interview the District Health Inspector in charge. What governmental agencies, that deal with the Ministry of Health, do, probably varies with the agency.

137. Interview with M. Fleisher, Chief Medical Officer, Ministry of Health, Central District, May 2, 1973.

138. See File no. 413, Refinery Pipe-Ashdod-Jerusalem, Hydrological Service.

139. Koifman, Ashdod-Jerusalem Products -- Underground Water Protection, Petroleum Institute (1972).

140. Interview with S. Cohen, Hydrological Service - Water Commission, May 24, 1973.

141. See File 413 note 138 supra.

142. Interview with Shalom Goldberger, Hydrological Service, September 21, 1973.

143. File no. 430, Hydrological Service.

144. Licensing of Businesses Law (Regulations)(Oil) 1934, P.G. II p. 454 §7,8 and Part III §1,9; Part IV §1.

145. Professor H. Shuval of the Hebrew University's Environmental Health Laboratory maintains that Mekorot neither has the equipment nor the scientific capability of making virological checks. Interview with Prof. Hillel Shuval, Hebrew University, Jan 21, 1973.

146. Pardes Hana v. Min. of Agriculture, HCJ 221/64, P.D. 18 IV p. 533.

147. See cases on file at the Office of Legal Advisor, Water Commission.

148. Ruth Ben-Ami Hatayas v. Water Commissioner, C.A. 293/65, P.D. 19 III p. 73.

149. Haim Baraz v. Water Commissioner, C.A. 246/65 P.D. 19 IV p. 519.

150. Id. at 522.

151. Ha"Ein" v. Water Commissioner, C.A, 253 /68 P.D. 22 II p. 968.

152. HCJ 221/64 PD 18 IV p. 533. For a discussion on the case, see Landau, A Problem Under the Water Law, 2 Israel L. Rev. 352 (1966).

153. See Appendix Water Law, Part D.

154. Water Regulations (Use of Water in Rationing Areas) 5729-1969, KT 2347, p. 883.

155. Pardes Hana v. Minister of Agriculture, P.D. 18 IV p. 533, 539-40.

156. Id. at 546.

157. See KT 2347, 5729, p. 883 §5,6.

158. A report prepared at the request of the Water Commissioner, and submitted to him in 1973, recommended cutting back the use of pesticides by 50% and the reduction of nitrates in sewage by 80%. See Mercardo, supra note 38, at H.

B. Surface Water

1. Introduction

"...For the Lord your God is bringing you into a good land, a land with streams and springs and lakes issuing from plain and hill..."

Deuteronomy 8.7

Surface water is that water found above the surface of the earth visible to the eye, formed by rainwater moving in natural channels or by groundwater breaking through to the surface at a natural spring. The area in which rainwater is collected and flows downward toward a natural channel is called a catchbasin or watershed, and that water flowing in the channel is labelled either a river, stream or lake, depending on its size, volume and type of water flow. Historically rivers, streams and lakes have served man in his religious, social and industrial endeavors. Surface water has been used as a source of communication and as a carrier of man's wastes, as a source of food and a source of pleasure, as a source of religious ceremony and a means of societal punishment[1]. In order to meet all these needs, surface water quality must be kept at a level to support each need. In meeting any one of these needs, the quality of the water will depend on the need.

2. Surface Water in Israel

a. A Description

The surface waters of Israel have been and continue to be used for some of the purposes set out above. Yet, as in other developed countries of the world, Israel's surface water is too often exploited for the single purpose of assimilating and carrying unwanted residuals from domestic, agricultural and industrial endeavors. This is no

doubt an important function of surface water[2], but it is only one of the several beneficial uses to be considered in defining a national water policy.

This paper does not attempt to evaluate in economic scientific or social terms the importance of a river's assimilative capacity for unwanted residuals. The Water Law declares that water is to be used for a multiplicity of uses[3], and such declaration assumes that from an economic, scientific and social viewpoint, the impairment of surface water quality is undesirable. Water is too scarce a resource to relegate it carrying discarded substances, and Israel's need for water for a myriad of uses does not justify a surface water management policy based on a single use. In protecting this country's network of streams and lakes for a multiplicity of uses, the legal process must play an integral part. But first a look at Israel's western flowing streams[4] before analyzing the protection the legal system affords surface water in Israel.

b. Western Flowing Streams[5]

There are five major streams in the Galilee which flow west and empty into the Mediterranean Sea. Nahal (Hebrew for stream) Betset is a perennial stream draining a catchment basin measured at 123 square kilometers with an annual average flow of more than one million cubic meters (MCM). The Betset receives its major flow of water from springs located along the stream; it also receives treated domestic and agricultural sewage from six kibbutzim. To the south of Nahal

Betset, in a drainage basin of 131 km^2 is Nahal Keziv. Nahal Keziv is a perennial stream receiving flow from natural springs as well as raw and treated sewage effluents from two small communities. Its flow in 1970 was measured at 3.27 MCM. Below Nahal Keziv lies Nahal Ga'aton, which had an annual flow of 11.52 MCM in 1970, mainly from springs located in a catchment basin of 49 km^2. It also received both treated and raw agricultural, domestic and industrial sewage wastes from three kibbutzim. The fourth of the five major western Galilee streams in Nahal Bet ha'Emeq, an intermittent stream located in a catchment basin of 73 km^2. In 1970, Nahal Bet ha'Emeq had an annual flow of 2.64 MCM mainly during the winter from precipitation, but it also receives treated sewage wastes from Moshav Regba and untreated industrial effluent from a food processing firm. Nahal Na'aman, to the south of Nahal Bet ha'Emeq drains a catchment basin of 3.7 km^2. Its flow is perennial and fed by springs with a 1970 flow of 20 MCM. Its largest tributary is Nahal Hilazon which had a flow of 5 MCM in 1970. The Na'aman receives treated household and agricultural effluent from four kibbutzim and the community of Carmiel, and untreated industrial sewage from a food processing plant.

Nahal Qishon is located in the north of Israel, in a catchment basin that covers an area of 1,075 km^2. The stream has an annual average flow of aoproximately 27 MCM, with water flowing all year round in the western part of the stream and emptying into Haifa Bay. The Qishon is supplied by three major tributaries, Nahal HaShofet, Nahal Yiftah'el and Nahal Tsippori, whose sources are fresh water springs. Reservoirs

have been built for the storage of water at Kfar Baruch, at the eastern end of the Qishon, and at the northern end of the Yiftah'el, at Bet Netofa. The source of the Qishon itself is in intermittent streams, which carry flood waters in the winter, containing heavy concentrations of silt into the Kfar Baruch Reservoir[6]. At the Reservoir, the silt settles, but treated and untreated sewage effluents from Nazereth and Afula reach this man made lake[7] after their journey through dry river beds or wadis[8]. From the Kfar Baruch Reservoir to the entrance of Nahal Tsippori, some fifteen kilometers, one finds flora, fauna and some sport fishing in the Qishon[9]. For the last fourteen kilometers of the stream, however, discharges of industrial and domestic waste into the Qishon and her tributaries make up the bulk of water flow. In terms of quantity, approximately 14 MCM a year of effluent from the Haifa treatment plant in 1971 was discharged directly into the Qishon[10]. The petrochemical industries, close to the mouth of the stream, add some four MCM a year[11]. Another five hundred industrial establishments in the Greater Haifa area dump their unwanted effluent either directly or indirectly into the Qishon and her tributaries, the Yovlin and Gadura[12]. As a result of this burden, during the last few kilometers of flow in Haifa Bay, the Qishon functions solely as a carrier of unwanted residuals.

(10)

Nahal Daliya is an intermittent stream located to the south of Nahal Qishon in a catchment basin measured at 95 km^2. The Daliya had an annual flow in 1970 of 7 MCM with a recorded natural flow only four months of the year. The Daliya receives treated domestic sewage

from several kibbutzim and receives an untreated dose of wine and detergent residuals from two industrial firms located on its banks. In 1972, pollution of the stream prevented Mekorot and Tahal from using such water to recharge a nearby aquifer[13].

To the south of Nahal Daliya is Nahal Taninim, located in a catchment basin measured at 196 km^2 with an annual average flow of 28 MCM[14]. Due to an artificial channel built by Mekorot for the storage of flood waters from the tributaries of Nahal Taninim, the stream actually drains an area of only 90 km^2.[15] Nahal Taninim has a perennial flow supplied by Nahal Ada as well as natural salty springs located within its channel. Nahal Taninim receives treated and untreated sewage from kibbutzim and local authorities, mainly Binyamina, and Nahal Ada receives untreated sewage from Or Akiba. In the last few kilometers of Nahal Taninim, one finds specimens of flora and fauna unique to salt water streams, and this section of the stream has been declared a nature reserve[16].

To the south of Nahal Taninim, in a catchment basin covering 604 km^2 one finds Nahal Hadera. The Hadera is an intermittent stream with highly irregular flow in three to four months of the year and a flow in 1970 of 10 MCM. Nahal Hadera receives raw sewage from Pardes Hana, the city of Hadera, the Alliance Tire works and the Hadera Pulp and Paper mill[17]. Below Nahal Hadera lies Nahal Alexander, which receives its water from a catchment basin of 555 km^2. The Alexander is an intermittent stream with an annual average flow of 10 MCM. The major tributary of the Alexander is Nahal Avihail, a stream with year

round flow. The Avihail serves mainly as a carrier of sewage effluents, some 3 MCM a year, from the city of Netanya. Its stream flow is interrupted near Kfar Vitkin and used in settling ponds for Netanya's waste water[18]. The outflow from these ponds acts as the headwaters of the continued Avihail, which then flows into the Alexander. Another tributary of the Alexander, Nahal Ometz carries domestic sewage from the kibbutzim located on its banks and treated industrial sewage[19]. The flow from numerous springs that at one time emptied into Nahal Alexander has been captured at their source or reduced due to ground water overpumping[20], thereby limiting the stream's natural flow to its present level.

Nahal Yarqon, to the south of Nahal Alexander is a strong stream in a catchment basin of 1,804 km^2 with a year round flow of water for a distance of 27 kilometers. Its headwaters, at Rosh ha'Ein, have been captured and serve as the main source of water to the Gush Dan area. A small regulated flow is allowed into the Yarqon at the Rosh ha'Ein springs, and this flow is suitable for fishing and swimming until the entrance of Nahal Qana[21], some 18 kilometers downstream. With the entrance of the Qana, however, the Yarqon picks up industrial and domestic sewage from the towns of Kfar Saba and Hod haSharon[22]. The Shiloh tributary, which enters below the Qana, brings with it sewage

from small settlements along its banks. The Ayalon, which enters the Yarqon in Tel-Aviv, brings with it the sewage of some seven communities, approximately 6 MCM a year[23]. In Tel-Aviv, the Yarqon has been designated a park by the city of Tel-Aviv and pleasure boats travel between Ramat Gan and the mouth of the River. Some coarse fish are also found in this part of the river, but in general one finds little flora or fauna after the entrance of Nahal Qana, until the Yarqon empties into the Mediterranean. Pollution of the Yarqon reached such proportions in April, 1974 that it caused a national furor[24].

Nahal Soreq stretches 90 kilometers from Ramallah in the east to the Mediterranean Sea, within a catchment basin of 705 km^2. Nahal Soreq is an intermittent stream with a natural flow averaging 8 MCM yearly during five or six months a year. Its main flow is untreated sewage from the cities of Bethlehem and Jerusalem, estimated at 7 MCM annually[25], and treated sewage from Bet Shemesh, Yavneh and Rehovot. To the south of Nahal Soreq is another intermittent stream, Nahal Lakhish, located in a catchment basin of 1005 km^2 with an annual flow averaging 7 MCM. It receives both treated and untreated sewage from numerous kibbutzim and moshavim, the communities of Kiryat Gat and Kiryat Malachi[26]. Nahal Shiqma, to the south of Nahal Lakhish, is located in a catchment basin of 751 km^2. It is an intermittent stream with flow in three or four months of the year, and an average annual flow estimated at 8 MCM. Nahal Shiqma is the recipient of treated sewage from a number of moshavim and kibbutzim and untreated sewage from Sderot.

Nahal Besor is located in the northern negev in a catchment basin measured at 3,418 km^2. The Besor is an intermittent stream with flow recorded at intervals in three or four months a year and with an annual average flow measured at 20 MCM during a few days a year. From its numerous tributaries it receives treated and untreated sewage from twenty kibbutzim. One of its largest tributaries, Nahal Beer Sheva, carries untreated industrial and domestic waste from the city of Beer Sheva, estimated at 2 MCM annually[27].

From the dry statistics presented above, one gets an idea of the fragile nature of Israel's western flowing streams. Most of Israel's streams have no natural flow most of the year, and, therefore, they support no fish or any other form of life. Even those streams with perennial flow have their flow regulated by man, either as a result of overpumping, or, as in the Yarqon and the Qishon, by dams and reservoirs. These then are the western flowing streams of Israel, intermittent, mainly non-life supporting carriers of man's unwanted residuals, with noticeable quantities of water only as they empty into the Mediterranean Sea.

3. Surface Water Uses & Misuses

a. In General

(1) Surface Water Pollutants

The above introduction into the world of Israel's surface water presented a general picture of the major western flowing streams in Israel. It did not describe stream quality nor define stream pollutants, but it has been assumed throughout this thesis that any substance reaching a

stream which makes it less fit for its intended or legally declared use impairs water quality and is therefore a pollutant. Under Israel law, any substance deposited by man in or near a stream, whether liquid, solid or gas, is forbidden[28] without a permit from the Water Commissioner, even if the substance was so deposited as to better stream quality[29]. The Water Law also defines water pollution as any chemical, physical, organoloptical, biological, bacteriological, radioactive or any other change in water quality, which makes the water dangerous to public health, harmful to animal and plant life or less suitable for its intended purpose[30]. In order to understand the need for such a comprehensive section for the protection of stream quality, the following information on water pollutants is pertinent.

(a) Chemical

Water pollutants are categorized as chemical, biological, physical or physiological[31]. Chemical pollutants[32] are composed of organic and inorganic compounds. Organic compounds are proteins, carbohydrates, fats, acids and nutrients. Once injected into a stream, organic compounds are decomposed by bacteria into their inorganic constituents, nitrogen, phosphorus and carbon. Their inorganic constituents are nutrients for micro-organisms that propogate in streams, which are the basic food for higher forms of stream life. In decomposing organic material, the bacteria use up oxygen at a rate determined by the amount of organic material injected; the more material, the harder the bacteria work and the more oxygen that is depleted. Oxygen is normally found in streams as a result of photosynthesis and the air-water interface. Since decomposition of organic matter is a natural function of

stream biota, the injection of organic matter into a stream should have no pollutant effect, i.e. it should not impair stream quality. This is true unless the quantity of organic matter reaching the stream is such as to disrupt the balance of life therein by a too rapid depletion of oxygen.

Oxygen for most streams is an indicator of stream life. Fish need it to survive[33] and reproduce and plants need it for respiration. Organic compounds can be decomposed without it, however, by anaerobic bacteria. These bacteria produce oxygen from the organic compounds they decompose and change these compounds into carbon dioxide, hydrogen sulfide and methane. The result of this anaerobic decomposition process is the propogation of unpleasant odors and further depletion of stream biota.

Because oxygen has traditionally served as an indicator of water quality, the process whereby organic compounds deplete stream oxygen is measured and expressed as Biochemical Oxygen Demand, or BOD[34]. BOD is a measure of the number of milligrams of oxygen needed to decompose a given organic compound in a liter of water kept at 20° centigrade for five days[35]. BOD_5 is a good laboratory tool, but it is not an exact indicator of oxygen levels in a flowing stream.

In a stream, the entrance of a mass of organic material causes an immediate drop in the level of dissolved oxygen. This drop or sag in oxygen levels gradually rises downstream as oxygen reenters the stream and as the microorganisms use less oxygen to break down less

material. In contrast to laboratory tests for BOD, stream conditions determine to a large extent the oxygen sag curve. The curve is affected by water temperature -- warmer the water the less dissolved oxygen; speed of stream flow -- faster the flow, further downstream the sag; stream's cross-sectional area -- deeper and wider the stream, larger the diffusion; type of pollutant discharged -- nitrogen begins oxidation after 15 days[36], while carbon begins at once[37]; sludge deposits -- river bottom sludge deposits are also consumed by micro-organisms and add to the oxygen burden[38].

Aside from the inherent inexactness of the BOD_5 test on a natural flowing stream BOD has other limitation. I is a rough indicator of the strength of one category of water pollutants on the dissolved oxygen of a stream. The test has no applicability to bacteria, viruses, toxic substances and heavy metals. It relates only to the effect of an organic compound on dissolved oxygen in a stream, not to the effect of that compound on technological processes employed in sewage treatment plants. It measures only a static condition of dissolved oxygen in streams, whereas stream oxygen increases during the day as a result of photosynthesis and decreases at night. As an indicator of dissolved oxygen, BOD's relevance is mainly to streams with no natural water flow, and it tells nothing about the quality of the water for recreational, domestic, agricultural or industrial use. Because of all these limitations, BOD is recognized today as only one of many indicators of stream quality[39].

In his search for a substance that would not easily decompose in the natural environment, man has created an array of synthetic organic chemicals[40]. These substances have complex molecular chains that are not effectively decomposed by stream biota. Included in the list of these synthetic organic chemicals are plastic and rubber products, surface agents, colorants, flavors, perfumes and pesticides[41]. Most of these products are "persistent" and not easily decomposed in the natural environment; some are not water soluble, but are fat soluble and therefore can be absorbed by human tissue[42]. The effect of each of these chemicals on stream life varies with the chemical introduced and the receiving water. Polychlorinated biphenyls (PCB's) is a plasticizer which is not water soluble but is fat soluble[43]. In streams they are known to be fatal to shell fish and their predators[44]. Surface active agents used in detergents do not break down easily in streams, nor in conventional sewage treatment plants[45]. These surfactants are responsible for detergent foam found in streams. Pesticides, notably DDT is similar to PCB's in that they do not break down in the aquatic environment[46]. DDT is fat soluble and concentrates in animal tissue. Other pesticides, such as endrin are highly toxic to fish in negligible concentrations[47].

Inorganic compounds such as metals, salts and silt are also not broken down by stream bacteria[48]. Most are diluted by stream water or settle in stream sediments[49]. Some, for example metallic mercury, can be changed by bacteria to methylmercury, a toxic compound that can enter the food cycle through stream biota[50]. Such mercury in small concentrations in water can be concentrated in fish. Those eating

fish contaminated with high concentrations of mercury are likely to suffer neurological damage or death[51]. Arsenic, another metal associated with the manufacture of herbicides and pesticides, is toxic to mammals even in small doses if taken over time because it has the capacity to accumulate in tissues[52]. Boron, a by product of the manufacture of detergents[53], should be absent from drinking water supplies. It is toxic to stream organisms at concentrations as low as one milligram per liter of water (1 mg/l) and it is unsatisfactory for irrigation at concentrations above 4 mg/l[54].

(b) Biological and Physiological

The other categories of pollutants that affect stream life are biological, physiological and physical. Biological pollutants are bacteria, protozoa and viruses[55]. Infectious bacteria are difficult to measure, therefore an indicator organism found in the human intestine, E coli, is measured by laboratory tests to determine the presence of bacteria in a water source[56]. For measuring viruses in water several tests exist, but this is a new science and the tests are expensive, time consuming and difficult to execute[57]. Physiological pollution of a water body is the term used to describe objectionable odors and tastes. Although threshold levels of both odor and taste are somewhat subjective, there are scientific tests for determining objectionable levels of each[58].

(c) Physical

Physical pollution of a stream is a description of its foaming, color, heat and turbidity. Turbidity is caused by suspended clays,

silt, dispersed organic matter and microorganisms[59]. It sets important limits to animal and plant life in streams because it blocks the sun's rays and prevents photosynthesis[60]. Color of streams is an indicator of turbidity, the health of the stream and pollutant concentrations in the stream. It may limit stream use for industrial and domestic uses. A test for color is expressed in color units, with 75 color units to a scale[61]. Ten color units is generally considered a desirable level for drinking water; fifteen is an aesthetically desirable level for agricultural uses[62]. Above 50 units, photosynthesis may not occur[63]. Heat affects stream life by decreasing the capacity of a stream to hold oxygen needed by fish for normal growth or reproduction[64]. The cooler the stream, the higher its oxygen saturation point[65].

(2) Treatment of Water Pollutants

The above introduction to water pollutants presupposed that the pollutant was injected into or received directly by a surface water body. In Israel, this is normally not the case. Most of this country's unwanted residuals, disposed of in the form of effluent, are treated prior to their entry into a flowing stream or dry river bed[66]. In the majority of cases, the treatment provided is similar to the treatment described earlier for natural BOD removal. It is essentially aimed at allowing waterborne microorganisms to decompose organic matter, while at the same time, it allows most silts and settleable materials to settle, thereby reducing turbidity. This process, known as primary treatment[67], generally implies in Israel the use of ponds in which waste effluents are poured and held for a long enough period

for a percentage of BOD removal and settling to take place[68]. After this treatment, the treated effluent is sometimes chlorinated to kill bacteria and poured into the nearest stream or wadi, or used for irrigation or industrial processes. Primary treatment can reduce BOD loads by 40 per cent, but present studies in Israel point to the fact that overloading of most primary treatment centers as well as inadequate maintenance results in little BOD reduction, if at all[69].

In Haifa,[70] Hadassah Hospital and lower Tiberias, a process known as secondary treatment is employed to further reduce BOD levels[71]. This treatment, either by aeration, lagooning or activated sludge[72], can reduce over 90 percent of the BOD found in normal domestic sewage. In Haifa, however, the plant was planned to treat 10 MCM of sewage waste a year, but in 1971 was required to handle 16 MCM[73].

The most ambitious plan for sewage treatment is the Tahal planned, Mekorot operated, reclamation center for sewage from the greater Gush Dan municipal area[74]. Plans for Gush Dan's liquid waste, begun as early as 1959, envision a treatment center which will recycle municipal sewage at a quality to meet all uses, including drinking water. In 1995 the plant will provide primary and secondary treatment, plus treatment for the removal of phosphorus for 162 MCM of domestic and industrial sewage. The treated effluent will be sprayed over sand dunes south of Tel-Aviv. It will trickle into ground water, there to remain for a minimum period of 100 days as a method of final purification.

It should be noted that the treatment plants described above reduce the organic load found generally in domestic sewage. Even secondary treatment plants, however, hardly reduce inorganic compounds, such as phosphorus[75] and nitrogen. They have little effect on stable metals such as mercury[76], arsenic and cadmium; nor do they affect persistent organic chemicals such as surfactants and plasticizers; nor do they significantly reduce viruses[77]. Even the extensive treament planned for Gush Dan sewage will not reduce chlorides significantly[78], nor affect heavy metals[79], nor remove all organic material[80]. In fact, because of the high grade of treatment planned for the Gush Dan project, certain problems are created rather than removed. For instance, planned recharge of sand dunes requires spraying of a purified effluent with a minimum of solids to prevent jamming of the sprayers[81]. Secondly, the fact that the water is to be removed from storage and used as a source of water for all uses, means that its quality must be superb to prevent the build-up of harmful substances in man[82]. Third, the higher the removal of pollutants during treatment, the greater the quantity of solid and gaseous waste created[83].

b. Surface Water Uses and Misuses in Israel

(1) Agriculture

(a) Uses

Of the 150 MCM annual flow of western flowing streams in Israel, 45 MCM is exploited[84]. Of that latter figure over 35 MCM is exploited by agriculture for irrigation or fish ponds. In looking at specific

streams, one finds that in Nahal Daliya, of the 6 MCM annual flow, 1 MCM is exploited for fish ponds and 0.5 for irrigation[85]. Of the close to 10 MCM flow in Nahal Hadera, $3\frac{1}{2}$ MCM is exploited for irrigation purposes[86]. In Nahal Alexander, with a flow of over 8 MCM, $2\frac{1}{2}$ MCM is exploited for fish ponds and irrigation[87]. It should also be pointed out that some of this flow is sewage. Agriculture is the largest user of sewage in Israel. In 1971, 21% of all municiapl sewage and 38% of all agricultural sewage was exploited by agriculture[88].

There are problems in the reuse of domestic sewage by agriculture, however. First, domestic sewage is often high in chlorides and cannot be used on all crops[89]. Second, when used for irrigation or fish ponds, the chlorides found in the sewage can reach an underground aquifer and increase its salinity[90]. Third, even after treatment and chlorination, sewage contains significant concentrations of pathogenic bacteria and viruses[91]. Studies performed in Israel have found salmonella, a common pathogenic bacteria, in soils on agricultural land seventy days after irrigation with sewage[92]. This may be one reason for Israel's abnormally high mortality rate from gastroenteritis, bacillery dysentry and hepatitis[93]. Crops irrigated with untreated sewage from Jerusalem were the main cause of the cholera epidemic of 1970, with its tremendous costs in suffering and economic losses[94]. In Jerusalem, Ascariasis, or nematode infection, rose from six cases in 1966, prior to irrigation with Jerusalem sewage, to 90 cases in 1968 and 120 in 1970 after irrigation[95]. A second health problem associated with the use of spray irrigation of sewage is health effects on workers, although on this point, scientific viewpoints differ.[96]

A technical problem in irrigation with sewage water is the problem of Israel's single pipe system for supply of water to agriculture, industry and local authorities. This has prevented full exploitation of sewage for irrigation because a separate system must be constructed for conveying sewage to fields and fish ponds. A further technical problem that has not been resolved to date is the storage and disposal of sewage during the winter when it is not needed for irrigation. An aesthetic problem has also been raised in the use of sewage for irrigation and fish ponds, with some agricultural settlements balking at the use of sewage for their fish ponds for fear of public reluctance to buy their fish[97].

Despite the above costs incurred in the use of sewage for irrigation, there are offsetting benefits. First, domestic, agricultural and some industrial sewage are excellent sources of water for agriculture because of their high nutrient load[98]. Second, irrigation with sewage replenishes ground water. Once applied to the soil, plants act to remove nutrients and the soil acts as a final filter to purify water prior to its entry into an aquifer[99]. Third, reuse of sewage has positive cultural implications. It is recognition by man of use and reuse of a natural resource and a denial of "disposal". Fourth, application of sewage to crops under controlled conditions, solves the aesthetic, ecological and health problem of raw sewage flowing in streams and wadis.

(b) Misuses

Agricultural sources of water pollution contribute both liquid and solid waste to Israel streams. Solid waste occurs when members of agricultural settlements empty cartons of spoiled fruits and vegetables into a stream[100]. Liquid wastes reach streams from direct and indirect agricultural sources, i.e. point and non-point sources of pollution. Point sources[101] are those sources which can be monitored because their flow is from a single source directly into a stream. An example of an agricultural point source would be the direct discharge into a surface water body of fish pond water or domestic and animal waste from a sewage outfall. Non-point sources are those sources difficult to pinpoint which carry pollutants into streams from different locations and in a variety of ways. The most noted forms of agricultural non-point sources of pollution are those from pesticide use, fertilizer run-off and run-off from animal feedlots. Run-off from feedlots and fertilized fields, direct discharges of domestic and animal sewage, and the emptying of fish ponds add nutrients and other organic compounds to stream waters. This causes levels of BOD to increase and reduces the assimilative capacity of the stream[102]. Nahal Alexander, one of the few streams in Israel whose quality has been studied, is highly sensitive to organic overloads. In August, 1970, the emptying of a single fish pond caused a tremendous fish kill in the stream due to a heavy decrease in dissolved oxygen[103].

Since the founding of the State few studies on accumulations of pesticides in surface water have been performed. Two early studies in 1966 and 1969 were performed in the Kinneret basin[104]. Both

reported no pesticides in water, but this could be because only the water was tested. Studies performed in the United States show that lake sediments, flora and fish are more reliable indicators of pesticide concentrations than the water itself[105]. A second reason for the difficulty of finding pesticides in water is due to their change in composition after use. In Israel, 56 different types of pesticides are in use state wide[106]. Use has increased from 100 tons in 1950 to 1,200 tons in 1972, or one kilogram per dunam of agricultural land[107]. The most recent test for pesticides in water[108] showed pesticides in the following bodies of surface water: the Kinneret, the Bet Netupha Reservoir, the lower Jordan River, the Qishon River and in the domestic sewage of Tiberias and Gush Dan.

Agricultural activity is a significant source of pesticides found in surface water. Pesticides reach both streams and fish ponds indiscriminately through run-off from agricultural land or from crop dusting by air[109]. Indiscriminate use of herbicides, or weed killers, kill plant life along the sides of and in streams, clogging them and preventing sunlight from getting through, thereby preventing photosynthesis from taking place[110].

In summary, the agricultural sector of the economy is the largest user of surface water, including sewage. At the same time, agricultural settlements discharge their unwanted human and animal sewage into natural bodies of surface water, generally after primary treatment

in oxidation ponds. Non-point sources from agricultural settlements add significant concentrations of nutrients, pesticides and silt particles to surface water.

(2) Industry

(a) Point Sources

Industry in Israel uses water for steam, cooling, carrying, cleaning, as part of the product produced, and in-plant sanitation facilities[111]. Demand for water by industry, in 1971, was 87 MCM[112]. Sewage effluent is estimated at 47 MCM annually[113]. These rough figures do not tell the entire story of industrial use and pollution of stream water, however.

With the noted exception of the Haifa oil distillery, which annually uses approximately 900,000 cubic meters of sewage for cooling purposes[114], most industries receive their water from the Kinneret, via the National Water Carrier or from ground water sources. The largest industrial consumers of water are paper mills, tanneries, textiles, chemical producers, and the food processing industry[115]. Despite the tremendous rise in total number of industries from 1962 to 1972, total water consumption by the industrial sector rose only 32 MCM, from 55 MCM in 1962 to 87 MCM in 1971[116]. This decrease use in water by industry resulted from in-plant recycling of water for industrial processes and the switch from wet to dry processes,

especially for cooling purposes[117]. It has resulted in a tremendous savings of water, but an undesirable by product of this savings is the build up of heavy concentrations of unwanted residuals in industrial sewage.

In general, industrial processes result in the discharge of sewage effluents with concentrations of organic materials twice as high as those found in municipal waste water[118]. A study performed by the Ministry of Health for the city of Petach Tikvah[119] produced the following information. Of the 2,600 industries located in the Petach Tikvah area, 30 of the largest industrial consumers of water produce 90% of the BOD for all industries; and the 2,600 industrial consumers of water produce a BOD equivalent to a population of 163,000, while Petach Tikvah's population is 90,000. BOD is only one indicator of the pollutant concentrations found in industrial waste, however. Industrial water pollutants cover the spectrum of pollutant categories and produce biological, chemical, physiological and physical changes in receiving water. The strength and type of pollutant concentrated in industrial effluent is determined by the process used and the product manufactured.

From the water pollution standpoint, the most troublesome industries are the petroleum refining, paper manufacturing, electroplating and food processing industries, (such as slaughterhouses, fruit and vegetable canning, meat and fish packaging and dairy processing)[120]. Since there are no data on the effect of industrial sewage on Israel's streams, the following information on industrial pollution of the Haifa Bay portion of the Qishon will serve as an

example of potential industrial pollution of streams in Israel.

A study carried out by the Ministry of Health in 1971 of industrial pollution of the Qishon and its tributaries, the Gadura and the Yovlin, presents the following picture[121]. The petroleum refinery located close to the mouth of the Qishon and her sister petrochemical industries, discharge close to 3 MCM a year of unwanted residuals into the Qishon. In 1971 this waste contained oils and phenols, had concentrations of BOD to 1,027 milligrams per liter of water (mg/l), 18,450 mg/l of total dissolved solids (TDS), and chlorides at over 8,000 mg/l[122]. A second major polluter of both Nahal Qishon and its tributary Nahal Tsippori is Chemicals and Phosphates Ltd., manufacturers of fertilizers. The waste from this plant is discharged directly into both streams and contains a pH as low as 2.0, plus concentrations of nitrates, copper, barium and ammonia. Nahal Gadura, a tributary of the Qishon is the recipient of wastes from Ata Kordani Ltd., with a pH of 9.0 and TDS of 3,000 mg/l. Aside from these outstanding contributions, the Qishon and the Gadura receive cement dust from the Nesher Portland Cement Company and sewage from the preservatives, food, dairy and detergent industries. The Ministry of Health study also notes that an eight inch sewage outfall pipe discharges industrial sewage directly into the Gadura, but the source of this sewage was unknown to both those performing the study and members of the City of Haifa's health department. According to the Ministry of Health's report, relentless doses of industrial waste has had the following effects on the Qishon. The mouth of the Qishon is deoxygenated, non-sustaining of life, including algae, a source of unpleasant smells and contains enormous quantities of oily,

sticky sludge.

(b) Non-Point Sources

Aside from the discharge of industrial waste water into surface water from point sources, there is also the damage to surface water caused by non-point industrial liquid waste. Two examples of industrial pollution of a stream from non-point sources are chemical spills, accidental or induced, and leaks from oil pipes, trucks and tanks[124]. Another non-point source of industrial pollution of streams is from air pollutants. A documented instance of such pollution was described in the Ministry of Health's study of the Qishon. Cement dust particles from the Nesher plant in Haifa Bay reach the Qishon on the order of hundreds of tons a year[125]. The immediate effect of this non-point pollution is increased turbidity and reduced photosynthetic activity.

(3) Household

Major household water uses are for cooking, washing, cleaning and home heating. Water for household needs must be of a quality that is safe enough for drinking, soft enough for washing and hard enough to prevent corrosion of water and radiator pipes[126]. Unlike stream biota, water for domestic uses need not contain a prerequisite amount of dissolved oxygen. Yet as cities expand it becomes more and more essential that domestic water supplies be protected and domestic waste water be properly treated to prevent the spread of disease.

Although this thesis structurally separates domestic, industrial and agricultural waste water, in reality this is not the situation. In rural settlements, domestic sewage contains human and animal wastes, plus unwanted by products of milking operations[127]. Domestic sewage from cities often contains significant quantities of industrial effluents, when such effluents are permitted in the city's sewerage system. City sewerage systems may also be combined with storm sewer systems and may contain surface water run-off from streets, rooves and highways. Since industrial and agricultural pollution of surface water has been briefly described, emphasis here will be placed on household sewage and street surface run-off.

In 1970, a population of $2\frac{1}{2}$ million produced 165 MCM of municipal sewage, 78% of which was sewered[128]. Thirty-five per cent of the sewered wastes received at least primary treatment[129]. Most of this water reaches streams and other bodies of surface water from a single point source, usually a sewage outfall[130]. The non-sewered sewage was directly discharged into surface water from individual pipes or discharged into septic tanks[131].

Generally speaking, domestic sewage is high in chemical and biological pollutants[132]. Unlike industrial sewage, domestic sewage is low in concentrations of stable metals and synthetic organic substances. It is high in organic compounds, however, and it contains high concentrations of pathogenic bacteria, viruses and protozoa which thrive in human excreta[133]. Aside from the biological pollutants, domestic sewage contains significant quantities of chemical

pollutants, generally surface active agents and pesticides[134]. Surface active agents are in the synthetic organic chemical family and do not break down easily in the environment. Therefore they pass directly into streams. Surface active agents are used in detergents, emulsifiers and foaming agents. These agents are of particular nuisance to sewage treatment plant processes. Detergents increase the BOD load of municipal sewage, and foam both adds to the burden of sewage treatment plants and also increases the risk of disease because it acts as a carrier of bacteria and worm eggs in streams receiving municiapl waste water[135]. Hard detergents are soon to be removed from the domestic market by a regulation promulgated by the Minister of Agriculture[136], but normal household detergents will remain, and they pose another problem for surface water pollution in Israel.

Normal phosphate detergents are widely in use in Israel and add to the heavy phosphate and boron load in municipal waste water. Phosphates are added to detergents because they act on water and dirt (soil) hardeners by binding calcium and magnesium ions in such a way as to prevent them from forming salt deposits on fabrics.[137] The by product of this process, however, is high concentrations of phosphates in municipal waste water, which adds to the nutrient load of domestic sewage water[138]. Boron is added to detergents as a brightener. It is a fluorescent dye which adheres to fabrics and gives them greater reflectance and the appearance of brightness[139]. Concentrations of boron in sewage restricts its use for irrigation on those plants highly sensitive to boron in concentrations above 0.5 mg/l, e.g. apples, citrus and nut crops[140].

The quality of run-off water from street surfaces has never been analyzed in Israel. From a study performed for the United States Environmental Protection Agency[141], the following information is pertinent. First and foremost, run-off water from city streets is no "rainwater" as that term is understood by laymer and scientists. Street surface run-off is highly contaminated. The first hour of a moderate storm can produce run-off with a heavier pollutional load than ordinary municipal sewage. The parameters affecting run-off quality include variations in street suraces, number of times cleaned, area drained i.e. industrial or residential, and number of air pollutant sources in the city. Street water run-off was found to be high in BOD, zinc, lead, mercury and pesticides.

Another domestic source of surface water pollution is septic tanks. Septic tanks may contaminate surface water in one of two ways. First, indirectly by overflowing or percolating into ground water. Second, those emptying septic tanks have been known to discharge the withdrawn effluent directly into streams and wadis. Examples of such discharges have been reported by members of the Nature Reserves Authority[142], but there is no data on the amount, location and effect of these discharges in streams and wadis.

THE LEGAL FRAMEWORK FOR THE PREVENTION AND CONTROL OF SURFACE WATER POLLUTION

Introduction

The previous section briefly described Israel's western flowing streams. It was seen that, today, these streams act essentially as carriers of waste. Since the Water Law of 1959 hinges rights in water on a multiplicity of beneficial uses, this section tests the ability of Israel's water legislation to plan for, and sustain, a policy of multiple uses for the country's western flowing streams. As in the chapter on ground water, comparison will be made with the California Water Code to provide insight into the weaknesses and strengths of Israel law. California law is considered the toughest and most comprehensive water code in the Unted States[143], and it was the first state whose discharge permit program was approved by the Environmental Protection Agency[144] under the Water Pollution Control Act Amendments of 1972[145]. Thus California's legal framework for surface water management and pollution control should serve as a vigorous springboard to discussion of Israel's water protection legislation.

California Law: A Comparison

Unlike the Israel law of water, California water law retains vestiges of common law rights in water use, which place limitations on the State's water policy and water legislation. California is an unusual state in that both the riparian rights and prior appropriation

doctrines exist side by side[146]. Under riparian rights doctrine, a person owning land contiguous to a stream has, by his proximity to that stream, rights and duties in the use of stream water[147]. In California, this means that a riparian need not file a claim for water use with the State Water Resources Board. Therefore, there is no inventory of his water use[148]. A California riparian has the right to use water in the contiguous stream, but only for beneficial uses[149]. Beneficial uses are now defined by statute to include gainful as well as domestic and recreational uses[150]. A riparian's right to use stream water is contingent on its use being reasonable; reasonable in the sense of consumption and pollution. As between riparians, an upper riparian may, depending on his use, degrade the quality of stream water and reduce its quantity[151].

Prior appropriation in California is the right to divert water and appropriate it for a beneficial use only after a request for appropriation has been filed and approved by the State Water Resources Board[152]. The Board considers in-stream values, including recreational uses, before issuing an appropriation permit[153]. Appropriators are only allowed to divert that water not used by riparians and prior appropriators[154], and their right to receive stream water of a certain quality is fixed by their use[155]. Thus an appropriator, irrigating his crops with stream water, is not entitled to receive water of a quality consistent with domestic uses[156]. In comparison with other states in the United States[157], the riparian rights and appropriation doctrines have been considerably eroded in California[158] but they have survived and influence water quality legislation and control.

waste into state waters. Explicitly stated waste discharge requirements should be expressed and coordinated with the effects of these discharges on the quality of receiving waters.

These basic concepts were incorporated into the Porter-Cologne Act in the following manner. The Act's definition of beneficial uses was broadened to include recreation, aesthetic enjoyment of water and preservation of fish and other aquatic resources[163]. Regional boards are required to formulate, adopt and administer water quality control plans to protect beneficial uses and prevent public nuisances[164]. Finally, each person whose discharge might affect the quality of stream waters must file a notice of discharge with the regional board and adhere to the board's requirements[165]. The boards are also authorized to adopt regulations for use of water reclaimed by treatment, and no person may use reclaimed water until regulations have been adopted or waived[166].

These then are the essential provision of the Porter-Cologne Water Quality Control Act for the protection of surface water quality in California. In essence, the Act favors a regional, watershed approach to protecting streams, with regional plans approved and coordinated at the state level[167]. The nine regional boards are to control what goes out and what comes into the watershed of their respective rivers, to the extent possible. Watershed management is executed by approving or disapproving water diversion requests, establishing requirements for waste discharges and setting objectives for in-stream quality.

The regional boards' powers are limited, however, by the legal framework in which they operate. The boards may not interfere with the reasonable use of water by riparians and prior appropriators. The boards cannot refuse to accept a discharge; they may only set requirements for the discharge to implement existing water plans. The boards have little power over non-point sources of pollution from the use of pesticides, fertilizers and pollution of ground water. The boards are faced with state-federal conflicts in navigable streams, and state-state conflicts where streams cross state borders[169]. In short, the limitations confronting comprehensive, regional, watershed management in California are limitations on the jurisdictional powers of the boards themselves.

This is not the case in Israel. As the next section will show, the Water Commissioner and the Minister of Agriculture are only limited by their own imaginations and other pressing demands on the state treasury in the planning and execution of a watershed management policy. In order to prove this thesis, the following section investigates whether Israel's legal framework grants the Minister of Agriculture and the Water Commissioner the power to plan and execute a comprehensive policy of surface water management.

Israel's Water Code

The California approach to prevention and control of surface water pollution has been discussed, and other models for surface water management are to follow. Yet no matter what national water plan or model is eventually chosen for Israel, there is a need for information and some method of control over the following parameters: pollution inflow, beneficial uses, and in-stream quality. It will be the aim of this section to test how Israel's legal system provides a framework for information gathering and control over these three parameters. To more clearly see the operations of the legal system it is hereinafter divided into three components: the legislative, administrative and judicial processes. The section opens with a discussion of the legislative framework because it is the backbone on which the entire system rests.

(1) The Legislative Framework

(a) Prevention & Control of Pollutant Inflow

[1] Point Sources

[a] Information & Monitoring

Point sources of pollution are discernible sources of unwanted liquid residuals flowing into streams and wadis. In order to understand the nature of inflow from point sources, the legislative framework must provide a mechanism for the continual gathering of information on natural and cultural discharges directly into a stream. Under

section 17 of the Water Law, the Water Commissioner, or his duly appointed representative, has the power to enter any place, after notifying the occupant in writing. Once inside the premises, the investigator may do any act necessary to protect a water source. This would include surveillance of the outflow of any business enterprise or municipal sewerage works. It would not automatically include inspection of water use in any government installation or army camp, however, as the State is outside the law's provisions. In regard to business establishments, the Water Commissioner has the power to order them to file a sewerage plan for his approval. He is empowered to set any conditions to execute the plan, and this would presumably include monitoring by the business of the quality and quantity of effluent discharged into a stream. This power granted to the Water Commissioner is not circumscribed, as in other countries, by protection against disclosure of trade secrets[170]. The Water Law allows no protection for trade secrets, if any such secrets can in fact be gleaned from industrial waste[171].

There are parallel provisions in other statutes for entry and inspection besides the authority vested in the Water Commissioner. Under Section 64A of the Public Health Ordinance, an inspector appointed by a District Doctor, and authorized by the Minister of Police, has the power to enter any business premises at any reasonable hour for the purpose of sampling and taking samples for laboratory inspection of industrial effluent. Under Section 48 of the Local Authorities (Sewerage) Law, an inspector authorized by the local authority, may enter any premises including a government installation, after notice, for the purpose of protecting the local authority's

sewerage system.

Three government bodies monitoring and testing sewage quality for three different reasons, can only lead to friction and poor management of resources. The Knesset, instead of reducing this number, added the Ministry of Health as late as 1973. There was no need for this 1973 Amendment. Health has the responsibility of supervising local authorities. Therefore, the Ministry should not compete with such authorities. Furthermore, the Water Commissioner should voluntarily limit his intervention into the affairs of local authorities. One way to do this would be to monitor non-sanitary industrial effluent, effluent discharged by the local authority and effluent discharged outside the local authority sewerage system.

[b] Sewered Sources -- Industrial

The Water Law declares that any discharge into or near a water source of any gas, liquid or solid is a violation of the law[172], unless such discharge is permitted by the Water Commissioner under a discharge permit[173]. If this were not enough, the Water Commissioner has complete control over the quantity, quality and method of disposal of industrial effluent by his ability to order any polluter to file a plan for sewage disposal[174]. A polluter is defined under the Act to include any agricultural or industrial undertaking, any building under the Planning and Building Law, any installation (including a sewerage installation), any machine or vehicle whose location, establishment, operation, maintenance or use causes or may

cause water pollution[175]. A sewerage plan filed by a polluter must include the manner of discharge, its quality and quantity, its chemical, physical and biological make-up and any other detail requested by the Water Commissioner. The Water Commissioner has the power to reject or accept with conditions any plan submitted. Once accepted the party discharging must comply with the plan's requirements. Failure on the part of a firm to prepare a plan ordered by the Water Commissioner means preparation of the plan by the Water Commissioner at the expense of the party for whom the plan is prepared. Failure on the part of a party fo follow the plan as approved means potential loss of his water supply[176] or a fine[177].

One weakness in the formulation of the section on sewerage plans is its applicability only to "disposal of sewage". Sewage is not defined by the Act and its common sense meaning would be limited to unwanted liquid residuals. Thus a firm could argue that a plan prepared by the Water Commissioner to recycle his unwanted residuals would not be covered by the Act as it does not "dispose of sewage". As this point is technical, it could be changed by a rewording of the section. In the meantime, the Water Commissioner has the power to solve this problem under other sections of the Water Law.

The Minister of Agriculture has the general power to issue regulations for the quality, quantity and use of water, and the power to devise rules for its efficient and thrifty use[178]. The rules devised and published by the Minister in 1964[179] cover industries built or expanded after that date, which are troublesome, as defined by the Ministry of Health, or whose water use exceeds 5,000 cubic meters of

water a year. No industry, according to the rules, will receive a supply of water, and no contractor constructing an industrial complex will receive water until a water plan has been submitted to the Water Commissioner. Such plan must designate the water system and sewage disposal system to be adopted in the plant. If requested by the Water Commissioner, those requesting water for a new or expanded plant must describe how the water system is to be used in producing the industry's product, the quality of water needed, the manner of sewage disposal and the measures to be taken to conserve water in the plant. Approval of a sewage disposal plan under these 1964 rules is given by the Water Commissioner only after he has received the prior opinion of the Minister of Health or his deputy.

In addition to the above provisions on in-plant use of water and effluent discharge, a new amendment to the Water Law gives the Minister of Agriculture, after consulting with the Minister of Health, the power to prohibit or condition the use of certain industrial processes and products to prevent water pollution[180]. To strengthen his hand in this area, the law authorizes the Minister of Agriculture to promulgate regulations for the production, importation, distribution and sale of any product that may pollute a water source[181]. These regulations may be issued only after prior consultation with the Minister of Trade and Commerce and after prior notification to the Knesset finance committee. By these regulations the Minister of Agriculture could prohibit use in Israel of those products known to pollute streams or disrupt sewerage treatment plant processes. To date, the Minister promulgated one such regulation, prohibiting the sale and

importation of "hard detergents" because of their damaging effects on sewage treatment plant processes[182].

In addition to the explicit powers of the Water Commissioner and the Minister of Agriculture set out above, the Water Law authorizes the Minister of Agriculture, with approval of the Knesset finance committee, to list those "polluters" whose locating in a certain area may potentially pollute a water source[183]. This gives the Minister the power of positive planning for certain industries, whose known potential for intentional or accidental water pollution should keep them away from surface water sources.

The Water Commission is not the sole administrative body regulating the quality of sewage flow into natural water sources and sewerage systems. Due to exigencies of the parliamentary system, hold-over legislation from the period of the British Mandate, and a desire to grant self rule to local authorities, three additional bodies have some power to regulate the quality of sewage -- the Ministries of Health and Interior, and local authorities.

The Licensing of Businesses Law empowers the Minister of Interior to list businesses requiring an operating license in order to insure environmental quality, the prevention of nuisances and prevention of pollution of water sources by pesticides, fertilizers and medicine[184]. Licenses are issued by local authorities[185] with the approval of the Ministry of Health[186]. Standards for prevention of water pollution from pesticides, fertilizers and medicines are to be formulated by the Minister of Agriculture[187]

This is not the place to enter into a discussion of the merits and demerits of one ministry listing industries for licensing, another defining standards for industrial discharge, and a third supervising what the local authority actually issues. Suffice it to say that with regard to sewage discharge, national goals often clash with local solutions. In addition, industry is battered with a barrage of differing requests by different ministries in regard to solution of the same problem. Diffusion of authority here does not prevent the Water Commissioner from preparing and executing a national or regional sewerage plan. Yet it does force him into conflict with other agencies, thus inhibiting his formulation of such plan.

The above provisions outlined the powers of the Ministries of Agriculture, Health and Interior and local authorities over control of pollution of streams by industrial sewered sources. No mention has been made of control over those who empty fish ponds and septic tanks directly into streams and wadis. Do these activities fall under the Water Law's definition of "polluter" i.e. an enterprise which causes water pollution? Without stretching the imagination, one could consider these activities as enterprises. Thus their siting and processes used can be controlled by the Water Commissioner.

Unlike discharge of industrial effluent, however, emptying fishponds and septic tanks directly into streams are not continuous activities. The Water Commissioner might, therefore, find it more expedient to proceed criminally against these intermittent discharges under section 20B of the Water Law. This section prohibits the

discharge of any substance, liquid, gas or solid, into or near a water source without regard to whether it pollutes the source or not. The penalty for violating this section is a maximum fine of IL 3,000 plus IL 100 a day for continual violations[188]. Under the Criminal Code Ordinance, criminal sanctions up to three years in jail are also available for prosecution of one who wilfully "corrupts stream water" to make it less fit for the purposes for which it is ordinarily used[189]. This section would sanction most any sewage discharge into Israel's western flowing streams, as they are ordinarily used for assimilating such discharges.

[c] Sewered Sources -- Municipal

All of the above powers granted to the Minister of Agriculture and the Water Commissioner for controlling and monitoring industrial discharges into streams and wadis apply equally to such discharges into sewerage systems. The Water Law does not distinguish between sewage and other surface water sources. This is not true of the Licensing of Businesses Act, however. This Act empowers local authorities with the approval of the Ministry of Health to control pollution of water sources from fertilizers, pesticides and medicines. Since the Act does not define sewered sources as a water source to be protected, it is doubtful that such source is covered under the Act. Municipalities however, have other methods of control over inflow into municipal sewerage works.

Under the Local Authorities (Sewerage) Law, no party, including a governmental installation[190], may hook up to a municipal sewerage system without abiding by conditions set by the local authority[191]. Furthermore the Minister of Interior is authorized to promulgate regulations for the construction of any private purification system prior to hook-up to a municipal sewer line[192]. Once the hook-up has been completed, no party may intentionally discharge any material from his establishment that might stop up or damage the sewage treatment system[193]. A fee for initial construction of the sewerage system, including a sewage treatment center, is charged to all those to be served by the system[194]. The charge is determined by the local authority, according to the square metrage of the property hooked up, or to be hooked up, to the system. A second charge for sewerage maintenance may be levied by the local authority as an additional fee to that it receives for water usage[195].

For industrial and trade establishments, a local authority may charge both a construction fee and a maintenance fee based on the quality, quantity and effect of sewage on the system[196]. To date, Tel-Aviv and Haifa require a sewerage charge based on the quantity of industrial effluent, but only if such sewage enters the city's sewerage system[197]. No municipality determines its sewerage charge on the basis of sewage quality. Such a charge, if adopted, would require a series of local by-laws for continual reporting, monitoring and surveillance systems. It would also require a system of special charges, or fines, for industrial "spills" into sewerage systems. Present legislation does not satisfy these needs[198].

Aside from domestic and industrial sewage discharges into municipal sewerage systems, an appropriate legal framework for the prevention and control of surface water pollution would need a control mechanism over maintenance of the system and effluents discharged from it. Since provisions of the Water Law regarding sewerage plans apply equally to industrial and municipal sewerage systems, the Water Commissioner would have the power to determine the type of municipal sewage treatment works planned, its scope of operation, its purification methods and the quality and location of its eventual discharge. In addition, the Water Commissioner may permit the discharge of effluent from a municipal sewerage plant if he is convinced that such discharge is unavoidable or betters the quality of the receiving water[199].

Whether the extensive power given the Water Commissioner empowers him to issue rules defining the type of training necessary for those working in a municipal sewage treatment plant is not answered by the Water Law. In California, the Water Resources Control Board has such power[200]. In Israel it would seem that the Water Commissioner has been pre-empted by the Minister of Health. A 1973 Amendment to the Public Health Ordinance grants the Minister of Health the power to define the type of training necessary for local authority sanitary personnel[201]. Although the power has not been exploited, it would serve little purpose to grant the Water Commissioner parallel authority.

Aside from the Water Commissioner's power to control discharges of municipal waste from point sources, other governmental bodies also have supervisory responsibility for planning and monitoring local

authority sewerage systems. Under the Local Authorities (Sewerage) Law, if ordered by the Minister of Interior, a local authority must build a sewerage system within its jurisdictional boundaries. The plan for a local authority sewerage system must be approved by the District Planning and Building Commission and the Minister of Health. If such plan includes a plan to discharge sewage from a sewage purification plant outside the city's limits, it requires approval of the Minister of Agriculture[202]. Discharge of untreated municipal sewage outside the jurisdictional limits of the local authority requires approval by the Minister of Interior[203].

Re-Use of Municipal Sewage

Recognition of reuse of municipal sewage appears in a 1965 regulation under the Water Law[204] and a 1973 Amendment to the Public Health Ordinance. The 1965 Regulation encourages reuse of sewage that has undergone treatment. Such sewage, if reused at a quality approved by the Minister of Agriculture, after consultation with the Minister of Health, ensures tax benefits for the supplier and the user. There are no other provisions in the Water Law and subsidiary legislation under it for the reuse of purified effluents. Likewise, the Minister of Agriculture has never promulgated regulations for purification systems, sewage quality and reuse of untreated sewage. Such authority is available to him, but it is slowly being eroded by the Ministry of Health.

In the 1973 amendment to the Public Health Ordinance, the Minister of Health, after consultation with the Minister of Agriculture,

received power to devise rules for purification of sewage to be used for irrigation and other commercial purposes[205]. With all due respect to the Minister of Health's desire to prevent a repetition of the Jerusalem cholera outbreak of 1967, the 1973 Amendment may be of little help. First neither the amendment nor the Public Health ordinance defines the key words "sewage" and "other commercial (economic) uses". Is sewage that water which flows out of an outfall before treatment? Probably so. After treatment? The Ordinance gives no answer. Is sewage that water that has left a sewage outfall and is mixed with other water in a stream or wadi? For how long? An hour? Ten minutes? Is sewage that water that has run off from streets, farms, feedlots and fish ponds? In other words, does the new amendment empower the Minister of Health to require purification of "surface water" used for irrigation and other commercial purposes? Probably not because this would conflict with specific power given the Minister of Agriculture.

With regard to "commercial uses", what if a kibbutz uses the sewage for irrigation of crops for its own use? This would not be covered. What about sewage used for watering grass in a national park? This would also not be covered, and, yet, are there not health hazards associated with use of sewage for ~~such non-commercial~~ purposes? Does the new amendment empower the Minister of Health to prescribe standards for sewage purification to protect farm workers? Probably not because this conflicts with power goven the Minister of Labor. In short, the Minister of Health's attempt to get into the water pollution prevention and control field raises more questions than it answers.

In summation, the following points are relevant. The Water Commissioner and the Minister of Agriculture have received authorization from the Knesset to plan and execute a comprehensive program for the prevention and control of surface water pollution from point sources. Such a program may consist of positive measures, such as control over the importation of products, or the use of a manufacturing process, or the siting of certain establishments in order to prevent their water pollution effects. The Water Commissioner may plan all industrial and municipal sewerage works in Israel, or require that such plans be submitted to him for approval. Of most importance, no one has the right to discharge any liquid, gas or solid into a water source without permission from the Water Commissioner. This means that any intentional discharge into a water source, regardless of its effect on water quality, is pollutant until proven innocent.

Weaknesses in the existing framework are as follows. There is legislative overkill in the extensive power given the Water Commissioner to control pollutant inflow from sewered sources. By legislative overkill the Knesset has placed the Water Commissioner in an uncomfortable administrative position. He has been provided with such extensive power that he, himself, may be awed by the range of control techniques that lie within his grasp. At the same time, hard political, socio-economic questions have not been resolved, which would set the Water Commissioner's priorities for action. The Knesset did not direct the Water Commissioner to attack surface water pollution from point sources and ignore pollution of ground water. The Knesset did not require the Water Commissioner to clean up Israel's streams

within a specified time. Thus the hard decision of where to operate, given the resources and knowledge available to him have been left to the Water Commissioner.

One could argue to the contrary, that the Government's decision to allocate resources to a national sewerage project essentially determined the Water Commissioner's priority item for control of stream pollution. Yet, even if this be true, it is here, in the control over pollutant inflow from sewered sources, that the Water Commissioner must share his power with local authorities, the Ministries of Health and Interior. To make matters worse, these latter bodies are not concerned with the use and reuse of water in Israel as a precious natural resource. Sewage presents the Ministry of Health with a health hazard. It is a local government problem in the eyes of local authorities and the Ministry of Interior, and a land use planning problem for District Planning and Building Commissions.

This does not mean that the Ministry of Health should be deprived of its authority to prevent nuisances and health hazards. Nor does this mean that local authorities need not provide sanitary services for their inhabitants. What it does mean is that in a country as small as Israel, with a national water grid supplying water to most of the country's towns, there is a need for national control on use and reuse of sewage. This was the aim of the Water Law of 1959 and its pollution control amendment of 1971. Health and Interior have no role to play either in licensing or approving industrial and municipal discharge and purification of sewage. Interior can properly control siting of sewage treatment plants. Health can

properly prevent the spread of disease from sewage. But neither ministry should have regulatory control over the use and reuse of sewage, over sewage charges and over the operation of sewage treatment plants. Giving Health the authority to both license industrial and municipal sewerage plants, and fix the quality of sewage used for commercial purposes simply destroys the effectiveness of the Water Law in its attempt to view water as a national resource under the control of the Water Commissioner.

[2] Non-Point Sources

Non-point sources of water pollution are those water pollutants that do not enter a stream through a single source or conveyeance. By definition this would include pollutants carried into streams and wadis by such natural causes as rain or air, or by cultural causes such as accidental leaks and spills. Any model set up to protect streams and wadis must authorize data collection for the control of non-point pollutant sources. This can be done by indirect measures, as this section will show.

[a] Information and Monitoring

One of the essential problems surrounding the control of non-point sources of pollution is that they do not lend themselves to continual surveillance. In order to determine inflow of non-point pollutants into a stream, those authorized to protect the stream must

know the stream's quality and the quality and quantity of point sources of pollution. With this information, a deduction for quality and quantity of non-point sources of pollution can be made. Israel's legal framework does not in any way authorize a single body to measure non-point sources of pollution to better control their effects on surface water. This omission is meaningless, however, in the context of the Israel legal system. The Water Commissioner may order any activity, including presumably data gathering, in any part of Israel for the protection of water sources[206].

[b] Agricultural Sources

As was seen earlier in the section describing Israel's western flowing streams, the major source of non-point pollutants is agricultural activity. Agricultural methods are highly advanced in Israel and they include all the modern techniques associated with intensive agricultural production -- heavy fertilizer use, heavy pesticide use, and closed feedlots. Each of these techniques acts as a source of nutrient load or pesticide load in streams, and a comprehensive legal framework for the protection of surface water must authorize an appropriate body to measure and control these pollutant sources. In Israel, the Minister of Agriculture, and specifically the Water Commissioner, have the power to measure and control not only the types of agricultural methods of production, but also run-off from agricultural land.

One of the first significant water laws adopted by the State of Israel is known as the Drainage and Flood Control Law, 1957[207]. Although

the law in its early form excluded control over sewage sources from its provisions, it set up a regional framework for protection of surface water in general and prevention of soil erosion in particular. As the Act relates to in-stream quality, its provisions will be discussed later; here its provisions providing for drainage control will be discussed.

The Drainage and Flood Control Law sets up a National Drainage Board with the Water Commissioner as its chairman, whose duty is to advise the Minister of Agriculture on drainage policy in Israel. The Minister of Agriculture, after consultation with the National Drainage Board, may set up drainage districts, whose duties include attending to proper drainage, establishing and maintaining drainage projects and preventing sanitary nuisances. In order to properly attend to the drainage affairs in its region, a drainage authority is to prepare a drainage project or scheme. The scheme is to set out the land to be acquired, width of protective strips on both banks of any artery within the project area, and the arteries to be protected. Once a scheme has been approved and deposited, the erection of any facility and the planting of any crop on land intended for acquisition by the authority requires a permit from the Water Commissioner. In executing a drainage control scheme, the drainage authority may enter any place except a domestic dwelling, erect any structures, remove any structures or crops, demand the eviction of any occupier of property, or purchase or lease any property. In short, a drainage authority has practically unlimited power in planning and executing the orderly flow of run-off water in Israel.

The Minister of Agriculture also has the power to issue regulations on the cultivation of land to prevent soil erosion[208]. Such regulations have been issued and further authorize a drainage authority to act as a soil conservation authority to prevent and repair damage from soil erosion[209]. Each year, the soil conservation authority must present a plan to the director of the Soil Conservation Division of the Water Commission for his approval.

Aside from these general provisions for the control of run-off from agricultural land, the Minister of Agriculture has recently been granted authority for the direct regulation of causes of non-point pollution of streams. Under the Water Law, the Minister has the power to prohibit or condition the use of certain agricultural methods, including the use of fertilizers and pesticides to prevent water pollution[210]. The Minister has yet to issue such regulations but he could limit, define and prohibit the use of certain pesticides and fertilizers known to be water pollutants. He could also control the siting of animal feedlots to prevent run-off into surface water, or limit the use of spraying with pesticides near or above a water source, unless the operation was conducted by another government minitry. In addition, the Ministry of Agriculture may prohibit the production, importation, distribution and sale of certain pesticides known for their inability to break down in the aquatic environment. He has yet to take any of these important steps.

[c] Miscellaneous Sources

Another source of non-point pollution of streams is run-off from solid waste dumps. The major "disposal" method for solid waste in Israel is dumping and burning, carried out by local authorities or contractors licensed by them. The Minister of Agriculture may have the power to regulate local authority dumping operations by arguing that such operations are a "polluter", i.e. an industrial enterprise that might pollute water. The Water Law, however, probably does not contemplate giving the Minister of Agriculture such extensive power over local government; their activities are not normally considered industrial enterprises. If unable to regulate, the Water Commissioner could prosecute those operating a dumping operation, if such operation polluted stream water. Yet prosecution of local government by a government ministry is "not done" in Israel[211].

Major responsibility for control and prevention of water pollution from solid waste landfills would therefore fall on the local authorities, the Minister of Health and the District and National Planning Commissions[212]. Local authorities are responsible for removal of solid waste under such conditions as set by the Minister of Health. No such conditions have as yet been proposed, and it seems unlikely that the Minister of Health will issue such provisions for the protection of surface water from solid waste run-off. If the water is not used for drinking and no nuisance or health hazard is caused by such run-off, the Ministry has little authority to prevent or control its pollution.

The District Planning Commission and the National Planning Council have the power to supervise operation of the site to prevent actual water pollution. Thus the solution to this particular problem must be found in cooperation between the Water Commission and local authorities. To the same effect is run-off from cemeteries. The Ministers of Religion, Interior, Health and Agriculture would be required to coordinate their authorities to find an appropriate solution to cemetery pollution of surface water[214], if such pollution in fact exists.

Street surface run-off and air pollutants are also two non-point sources of water pollution that require coordinated action in preventing their water pollution effects. Street surface run-off is a water source, as that term is defined under the Water Law. It is known to be polluted by cultural activities, mainly from industry and automobiles. In Israel, street surface run-off is a winter phenomenom, and its effects on streams and wadis as yet unmeasured. It could be controlled at its discharge point by the Water Commissioner, by requiring that street surface run-off water be treated in the local authority's sewerage system. Control by the Water Commissioner of the sources of pollution of street surface run-off, industrial activity and automobiles, would be difficult and involve conflicts with local authorities, the Ministries of Trade and Commerce, Health, Interior and Transportation.

The Minister of Agriculture has the power to control air pollution sources which pollute streams and wadis. Under the Water Law, the

Minister of Agriculture may list those factories and those devices whose air polluting activity causes water pollution. The Minister of Agriculture may also set conditions for the type of fuel used and the type of industrial processes employed to prevent water pollution[215]. Such extensive power, if exercised by the Minister of Agriculture, would require cooperation from the Ministries of Health, Interior and Trade and Commerce.

Accidental oil spills from oil trucks, depots, pipelines and diesal operated pumps are a potential non-point source of surface water pollution. All of these devices are polluters under the Water Law and their use and place of operation may be controlled by the Minister of Agriculture and the Water Commissioner. The Water Commission staff is presently engaged in writing regulations for the type of oil pipe and oil tanks permitted in certain areas to protect water sources from pollution[216]. The Minister of Agriculture will be forced to coordinate his activities in this field with the Minister of Trade and Commerce. The operation of diesal operated pumps for fish ponds and sewage treatment plants can be controlled by the Minister of Agriculture by power granted him under the Water Law. Oil exploration and mining activities can be controlled by the Minister of Agriculture as polluters under the Water Law. Any control exercised by the Minister of Agriculture should be coordinated with the Minister of Trade and Commerce.

Recreational uses, swimming, boating, hiking along stream banks, and sport fishing are potential non-point sources of stream pollution. Although in Israel, such activity is limited. Certain streams and

springs in Israel have been declared by the Minister of Interior to be nature reserves or parts of public parks[217]. Authority for the control and prevention of water pollution in these areas rests with the Nature Reserves Authority and the National Parks Authority respectively. Both these organizations supervise the streams and springs under their jurisdiction through the auspices of qualified inspectors, and certain nature reserves are protected from man's intrusions. In other areas, fees are levied to discourage overcrowding, but as yet no regulations have been issued by the Prime Minister or the Minister of Agriculture limiting the number of visitors to a park or other recreation area to protect its water sources. With regard to one stream, the Yarqon, the city of Tel-Aviv has authority to issue by-laws for its protection. A by-law promulgated in 1949[218], forbids the use of the Yarqon or its banks in such manner as to pollute them.

Summary

Most of the sources of stream and wadi pollution discussed above contribute insignificant amounts of pollutants to streams and wadis. This is not true of agricultural non-point sources of surface water pollution. Run-off from agricultural land saturated with fertilizers and pesticides can be controlled, however, by the Water Commissioner, if the Minister of Agriculture promulgates regulations controlling agricultural methods of production. Yet the Minister of Agriculture knows that increased agricultural production results from heavy use of fertilizers and pesticides. Thus he will have little incentive to control agricultural methods of production to prevent pollution of

(b) Control of Beneficial Uses

Once data on the inflow of point and non-point sources of pollution have been gathered, in order to set stream quality objectives, the authority responsible for these objectives must understand the effect the point and non-point sources of pollution have on the stream's beneficial uses. The authority must also be in a position to control the pollutants that act as limiting factors on the use of stream waters. It has been pointed out that with the exception of government installations, the Minister of Agriculture and the Water Commissioner jointly have the power to gather data on pollutant inflow and control of point and non-point sources of pollution. It will be necessary to next discover whether the Minister of Agriculture and the Water Commissioner have the proper legislative authority to determine a stream's potential beneficial uses[219] and protect the quality of stream water for each beneficial use.

[1] Information Gathering and Monitoring

Information gathering and monitoring with regard to beneficial uses of surface water means the collection of data of existing uses of streams and wadis. The Water Commissioner has the power to collect such data with regard to the five uses set out in the Water Law. He has no power to gather data on the use of surface water, including the Kinneret, for boating, hiking, fishing and scientific uses. No one body in Israel is responsible for gathering data on uses not covered by the Water Law. And no such data exist. Consumptive uses of water can be monitored by the Water Commissioner because no one is permitted

to withdraw water from a surface water source without a license from the Water Commissioner and without measuring the amount withdrawn. Discharge of unwanted residuals into a stream or wadi can also by monitored by the Water Commissioner. He has the power to issue a discharge permit, in which he could demand the measuring of the quality and quantity of sewage discharged into surface water.

[2.] Disposal and Assimilation

The major use for streams in Israel is for disposal and assimilation of unwanted residuals. Each community in Israel, except those in Gush Dan, dumps its treated or untreated sewage into one of Israel's streams or wadis. This is true for most industrial liquid waste not permitted in local authority sewerage systems. In addition, farmers empty their fish ponds into streams and often dump unwanted solid residuals into wadis as well. Since this is the most persistent existing beneficial use, one questions whether it is permitted, and to what extent.

The practice of disposing unwanted residuals into streams and wadis is not permitted in Israel except with permission of the Water Commissioner. To date, no discharge permits have been issued, thus all of the above activities are forbidden by law. On the other hand, a stream has unique attributes for the assimilation of unwanted liquid residuals, provided its assimilative capacity is not overburdened and provided that other stream uses are not destroyed. Since disposal and assimilation of unwanted residuals is a domestic, agricultural and industrial use of streams, it is a legally recognized

beneficial use under the Water Law which must be considered by the Water Commissioner in any comprehensive program for stream management.

[3] Support of Human Life

At first glance, it seems ridiculous to look at Israel's fragile network of streams, generally overburdened with waste, as supportive of human life. They are not, but one must not forget that streams are only one part of the hydrologic cycle. Pollution of streams could seriously disrupt Israel's life support system, if such pollution destroyed the usefulness of the Kinneret or ground water supplies. Thus, although it would be ridiculous to argue that a beneficial domestic use of Israel's streams is their life supportive feature, care must be taken not to allow the entire hydrologic cycle to become an assimilator of unwanted residuals.

Furthermore, there is recognition today that the last frontier in water resource exploitation is surface water and purified effluents. The Water Commissioner plans to dam, store and exploit flood waters and intermittent streams[220]. He also plans to supply agriculture with 300 MCM a year of purified sewage to replace water intended for domestic and industrial use[221]. Failure to meet this challenge will have serious consequences for the development of the State. The legislative framework is capable of meeting this challenge. By declaring that the State's water resources are intended for domestic, agricultural and industrial use, the Water Law recognized the need to protect the life supportive nature of Israel's water resources.

[4.] Amenity Services

Examples of amenities provided by surface water in general are swimming, fishing, boating, hiking and relaxation. The perennial flowing streams in Israel were used for all of the above amenities prior to the time when their flow was captured and their waters became overburdened with waste[222]. Even today there is fishing in parts of the Qishon and boating on the Yarqon. Aside from the protection offered by the legal system in the control of pollutant inflow, the following laws serve to protect each of the above beneficial uses.

[a] Swimming

To be lawful, swimming in one of Israel's streams would have to be permitted by the Water Commissioner under his power to prevent any object from coming in contact with a water source. Protection of the swimmer from the water, however, is under the jurisdiction of the Minister of Health, the Minister of Interior and local authorities. Health has the authority to prevent health hazards and dangers to the public from nuisances caused by water sources[223]. The Minister of Interior has the power to designate appropriate places for swimming or forbid swimming at designated places[224]. It is the duty of the local authority, in whose area the swimming facility is located, to execute the Minister's orders and pass by-laws for the health and safety of the swimming public[225]. Therefore setting standards for stream quality to allow swimming as a beneficial use would require coordination of activity among the Ministries of Agriculture, Health, Interior and local authorities. To date, no stream quality criteria have been

set, nor stream pollutants prohibited to enable swimming in Israel's streams.

[b] Sport Fishing

Sport fishing is practically unknown in Israel's streams. The Minister of Agriculture has the power, under the Fisheries Ordinance, to protect fish from being destroyed by dynamite or any "poisonous or noxious" matter[226]. He also has the power under the National Parks & Nature Reserves Law to prevent pollution of water for sport fishing within a nature reserve[227]. He was recently given the power under the 1971 Amendment to the Water Law to prevent water pollution which endangers in-stream biota. In spite of these grants of power, the Minister of Agriculture has yet to regulate the quality of streams to protect existing forms of fish life. Furthermore the combination of these above powers does not enable the Minister of Agriculture to designate streams for use by sport fishermen. Such power can only be granted him by legislation. It would, therefore, seem appropriate to add sport fishing, swimming and recreational uses to the list of beneficial uses under the Water Law.

[c] Aesthetic Enjoyment

Aesthetic enjoyment of stream waters, from the shore or in a boat is not a protected beneficial use under the Water Law. Although for aesthetic uses, water need not be of a quality to sustain fish, a comprehensive program for stream use would need to limit pollution to the extent that odors and distasteful sights do not limit aesthetic

uses[228]. This potential beneficial use is protected by the National Parks and Nature Reserves Law[229] within such designated areas. There is some question, however, whether pollution caused upstream of a Nature Reserve, which pollutes water within a reserve is forbidden by regulations issued under the National Parks and Nature Reserves Law. Boating is not permitted in a Nature Reserve except with permission of the Authority[230]. Boating along the Yarqon is permitted only by license from the City of Tel-Aviv. Here too, it would seem appropriate that the Water Law be amended to include aesthetic uses as a protected beneficial use.

[5.] Materials Inputs

Streams in Israel are used as a source of materials inputs for domestic, agricultural and industrial productivity. Stream waters are captured in reservoirs and recharged into aquifers to supply water for drinking. The Yarqon springs have been captured as a source of water to the Greater Gush Dan area. Certain streams are used for industrial uses, mainly for cooling industrial processes or mixing with industrial sewage. Stream bottoms have been mined for raw materials[231]. The largest user of stream waters as a source of materials inputs is agriculture, however. In agriculture, stream water, partially or wholly composed of sewage, is used for irrigation and fish ponds.

In using surface water as a source of materials inputs, questions relating to protection of its quality arise on two levels: (1) quality to meet an intended beneficial use, and (2) quality to prevent secondary

health problems. It has been seen that the power to prevent and control pollution of receiving waters for beneficial uses rests with the Water Commissioner and the Minister of Agriculture[232]. There is little question that the Minister of Agriculture can set standards, to be enforced by the Water Commissioner, for the prevention of water pollution to enable stream waters to be used as a source of materials inputs. This power flows from the Minister of Agriculture and the Water Commissioner's power to protect water for five beneficial uses. The question arises, however, as to whether the power to prevent harmful, secondary health effects from use of stream water also flows from the power to protect streams for beneficial uses. Since streams are a source of irrigation for crops, may the Minister of Agriculture set conditions for pollutant inflow to maintain or enhance stream quality to protect farm workers and the ultimate consumer from health hazards? Put another way, is the agricultural beneficial use met when stream water for agriculture does not harm crops? Or is protection of the worker and the ultimate consumer also to be considered in setting standards for stream water to meet agricultural uses?

Similar questions arise in use of water for fish ponds. May the Minister of Agriculture adopt a program of water pollution control such that no chemical be allowed in the stream that lowers its quality, thus making it unsuitable for fishpond use? The answer would seem to be an affirmative yes. But whether the Minister may adopt such a program to prevent mercury from reaching fish because of its effect on the ultimate consumer is another question. To the same effect is stream water used for industrial and household use, both

legitimate beneficial uses under the Water Law. The Minister of Agriculture has the power to adopt a program of stream water protection so as to enable industry to use stream water for all purposes. Does such authority granted the Minister enable him to prevent the pollution of streams by those pollutants known to cause corrosion in pipes and industrial machines?

These secondary effects questions are difficult, but they must be raised to understand the depth of the Minister of Agriculture's statutory authority. Since the Minister of Agriculture and the Water Commissioner are responsible for protection of surface water for legislatively declared beneficial uses, the standards for water protection established by the Minister and enforced by the Water Commissioner must be such that in fact the water as supplied can be used for its intended purpose. If the Minister of Health, responsible for standard setting for drinking water and water used in the food industry, declares that such water must be of a certain quality, then water supplied from a water source protected by the Minister of Agriculture must meet that standard. If the Minister of Health declares that foods containing a certain pesticide above a specific concentration cannot be sold,[233] then water containing high concentrations of that pesticide, whose effect is to increase the pesticide concentrations in crops above the standard set by Health, does not serve its beneficial use as mandated by the Water Law. It would appear then, that in his comprehensive scheme for surface water protection, the Minister of Agriculture must set standards for stream water quality and pollutant discharges, such that the ultimate water

quality corresponds with standards set and enforced by other ministries. This would be the rule for pesticide concentrations in water for irrigation as well as pollutant concentrations in water designated for industrial and domestic use. In the case of stream water with high concentrations of sewage to be used for irrgation, the Minister of Agriculture will have to coordinate stream standards with standards set by the Ministers of Health and possibly Labor.

(c) Stream Quality Objectives

Once control over inflow and beneficial uses has been provided by the legal framework, the final ingredient necessary for a comprehensive policy of stream protection is the setting of objectives for stream quality as a mechanism for limiting pollutant inflow, defining potential beneficial uses and protecting the in-stream environment. There is no one perfect mechanism for setting stream quality objectives, just as there is no one mechanism for integrating data and controlling pollutant inflow or beneficial uses. Models have been proposed for integrating these three ingredients into a plan for stream management. The strengths and weaknesses of some of these models will be discussed below, not for the sake of developing model theory, but rather to continue the investigation into whether Israel's legal framework authorizes the adoption of any of the models. Following that, a suggested model for protecting Israel's streams is proposed which is amenable to her streams and her legal system.

[1] Information and Monitoring

In setting objectives for stream quality, information on quality of inflow, beneficial uses and the quality of the recipient stream must be gathered and monitored. Discussion of information gathering and monitoring of inflow and beneficial uses preceded this section, therefore it is necessary here to discuss whether Israel's legal system authorizes the gathering of data on, and surveillance of, in-stream quality. As was previously mentioned, no section of the Water Law specifically authorizes surveillance and data gathering by the Water Commissioner of in-stream quality. A general provision of the law allows entry into any place by the Water Commissioner or his deputy for the purpose of protecting and supervising stream waters. At the same time the Minister of Agriculture may set standards for water quality in accordance with their beneficial uses. In order to carry out the authorization granted the Minister for setting standards for water quality, the Water Commissioner would be authorized to inspect, gather data and monitor in-stream quality for the protection of stream water for beneficial uses.

[2] Setting Objectives -- Proposed Models

[a] The Cost-Benefit (Ruhrverband) Approach

The cost-benefit model recognizes and adopts welfare economic theory in developing a comprehensive program for stream protection[234]. Under the cost-benefit approach, an expert group quantifies the marginal

costs involved in abating stream pollution and the marginal benefits of each cost to society. These data are then computed such that marginal costs of abatement equal marginal benefits, and a program of water protection is produced which optimizes all stream uses. In order to avoid the problem of externalities[235], all costs, including social and pollution costs are computed; in order to avoid "free-loaders"[236], all users must pay a sum of money to the river protection authority equal to the cost of removing his pollutant load or equal to the cost of compensating downstream users, (the famous Ruhrverband approach).[237]

In Israel, the legal framework allows for the adoption of such a model. If he desired, the Water Commissioner could appoint an expert committee for determining marginal costs of abatement and optimal stream uses. With such a model the Water Commissioner could then proceed to execute the model himself or authorize local authorities or drainage authorities to abate pollution, collect fees and, in general, bring stream quality to a level where marginal cost equals marginal benefit. A member of the Water Commissioner's economics department has in fact suggested such an approach, arguing that the present extensive prohibitions in the Water Law are tantamount to a state-wide zero-discharge standard[238]. Such a standard, goes the argument, would require the outlay of tremendous sums which are economically un-justifiable and would not serve to optimize water use. On the other hand, continues the argument, any program short of full enforcement of the Law's provisions makes a mockery of water legislation. The Water Commissioner has tended to lean more toward non-enforcement of

the law than enforcement through the use of effluent charges. Nevertheless, it will be necessary to state some disadvantages to adoption of the cost-benefit model of stream protection.

A main objection to such an approach is its built-in inability to properly analyze and accurately compute all costs and all benefits on a mathematical scale[239]. A second difficulty is its ignoring the public at large in the decision making process. The public could hardly contribute to the planning process in any significant way under the cost-benefit approach. A scientific body presenting hard data to an all-powerful Water Commissioner would only find public input an intrusion into the clean lines of a mathematical model. Yet public input is an axiom of modern planning[240]. In the final analysis, the plan affects the public's costs and their benefits.

Third, the concept as applied to rivers in Germany has no application to streams and wadis in Israel. The Rhurverband model presupposes numerous upstream and downstream users, all interested in receiving water of good quality. Therefore each is charged for his burden on the river with regard to downstream uses. Those users discharging sewage at a river's mouth pay little compensation because there are no downstream users. In Israel, this approach for streams and wadis, with little natural flow and significant quantities of sewage flow, is unrealistic. If existing uses are used as a model, no compensation to downstream users would be necessary because downstream users use streams only as cheap conduits for their unwanted residuals. If the downstream or estuary use is recreational,

e.g. in the Yarqon Park, the Water Commissioner has no power to demand compensation from upstream polluters because recreational uses are note protected by the Water Law. Assuming a change in the Law's provisions, there still will be no change in the nature of Israel's streams to justify an effluent charge approach. In a country with intermittent streams and year round flow only in the streams' estuaries, the Ruhrverband approach is unsuitable.

Using economic theory for resolving problems in purification of sewage is another matter. Here, an approach similar to that adopted in Los Angeles County would be suitable to Israel[241]. Los Angeles County charges those parties hooked up to its sewerage system according to the strength of their sewage effluent. The Water Law allows for but does not contemplate the adoption of such a system. Local authorities are presently authorized to collect fees for water use and effluent discharge. The Water Commissioner would therefore be required to accept the existing framework, or set up drainage or river boards to collect effluent charges. This latter program, however, would clash with local interests. The Water Commissioner has the power by law to override this clash, but can he, in fact, do so?

[b] The Common Law Model

The common law model suggests no overall planning, but rather that conflicts involving pollution of Israel's streams be brought before a neutral party for settlement[242]. The major disadvantages[243] to this approach are that it is generally after the fact, narrowed in

scope and limited in its ability to maintain a proper surveillance program. The advantages of such an approach to protecting Israel's surface water are as follows. First, the judge is totally neutral to the parties before him. He has none of the bias an administrative agency feels towards its constituency. He does not work with the parties on a day to day basis and will not work with either of them after his decision. Second, the court is one of the finest forums in the world for fact finding. A judge will want to know the state of stream pollution and the accused party's role in causing that pollution. Third, a court proceeding and the record attached are open to the public. This enables exertion of public pressure on the offending party or the administrative agency, and it allows researches free access to data. Fourth, the judge makes a decision on who is to bear the costs of pollution.

The present legal framework for prevention and control of water pollution effectually prevents adoption of the common law model as a scheme for protecting Israel's surface water. Private rights in the protection of a water source were abrogated by the Water Law of 1959. Pollution has been defined so absolutely under the 1971 Amendment, that it need not be proved in a court of law. Any discharge into a water source, even if it improves stream quality is forbidden without a permit from the Water Commissioner. Furthermore, the Water Commissioner is armed with such power for positive planning, that if he turns to the courts, it will be for punishment purposes only.

What rights remain to private individuals for the protection of surface water in Israel are highly circumscribed. Nuisance theory, codified in Israel in the Civil Wrongs Ordinance, does not allow private suits against a party whose effluent discharge pollutes a stream and creates the following situation: (1) the stream is unfit for amenity uses; (2) the flora and fauna in the stream are killed (unless the complaining party suffered monetary loss).[244]

There are rights available to the public against those administering the Water Law, which, if used effectively, could improve the quality of Israel's streams and wadis. The 1971 Amendment to the Water Law allows a petition to the Water Court by one who feels injured by the Minister of Agriculture or Water Commissioner's act or failure to act under the 1971 Amendment[245]. This would allow petitions to the Water Court for a decision by the Minister of Agriculture to publish or not publish standards for water quality. It is too early to determine the effectiveness of this right, but it does extend citizens' rights under the common law model. Even with this expansion of rights, however, the common law model has no ability to clean up and protect Israel's streams and wadis.

[c] The Water Commissioner's Model

Neither the Water Commissioner nor the Minister of Agriculture have publicly adopted a national plan for water pollution prevention. Yet the Water Commissioner has embarked upon a program leading to legislation for the protection of streams in the following manner.

He has appointed an expert panel to devise standards for stream classification, which will categorize streams from zero-pollutant quality (A) to sewage conveying quality (H)[246]. Once this panel completes its work, another panel will determine, after intensive study, where Israel's streams actually fit in each of the designated categories (A through H). Then the Water Commissioner will have the unpleasant task of either placing each stream in the next highest category as an objective to improving stream quality.

The task will be unpleasant because categorizing each stream according to its present use means placing most of the streams in category H, and it means nothing as regards prevention of stream pollution. Such an act would also be subject to attack under the citizen suit section of the Water Law. On the other hand, placing each stream in a category higher than its actual quality is a positive step toward preventing stream pollution, but it will be subject to attack from another source. It immediately subjects the Water Commisioner to attack from those dischargers made criminals by the Water Commissioner's categorization because their discharge reduces stream quality below its designated category. One could argue that the Water Law as amended in 1971, makes all those discharging into a stream criminals, anyway, so why should a reemphasis of their criminality be offensive? The answer is several fold.

First, a seemingly unresolved internal inconsistency in the Law itself prevents one from concluding that those presently discharging into streams are by definition criminal. The Water Law of 1959

declares industrial and household uses to be among the five beneficial uses protected by law. The law does not limit its protection only to consumptive uses. Therefore it could be argued that assimilation of household and industrial sewage by streams and wadis is a beneficial use protected by law. It is without doubt the most extensive service performed by streams and wadis for industry and householders in Israel. The 1971 Amendment to the Water Law, however, amended the 1959 Law to forbid the discharge of any substance into a stream or wadi, without permission from the Water Commissioner. This would seem to make all dischargers prima facie criminals under the law, except that a later section authorizes the Water Commissioner to permit such discharges "where circumstances leave him no choice". In other words, the 1971 Amendment recognizes assimilation of effluent by streams and wadis as a beneficial use under the Water Law, permitted, as are consumptive uses, by permit from the Water Commissioner. And, at least for a period after passage of the Amendment, such permits are to issue because the circumstances leave the Water Commissioner no choice.

In short, the Knesset forbade all discharges, but it gave the Water Commissioner the power to issue discharge permits so that thousands of criminals would not be created immediately upon passage of the 1971 Amendment. Likewise, the Water Commissioner cannot demand that a stream be placed in a category higher than its existing quality, when by that act he, overnight, as it were, turns hundreds of happy dischargers into criminals.

Second, as part of his pollution prevention program, the Water Commissioner, himself, is approving sewerage plans adopted by local authorities[247]. These plans are to go into effect in the early 1980's. In the meantime, can the Water Commissioner on the one hand approve sewerage plans which will improve stream quality in the 1980's while today set stream quality at a category which he knows will not be met until the 1980's? Third, just because the Knesset automatically made every discharger in Israel a criminal by amending the Water Law in 1971, does not mean that the Water Commissioner has the same privilege. Finally, how does making criminals of dischargers clean up stream waters?

In answer to this question, the Water Commissioner will present his next plan: standards for permitted discharges directly into stream waters. These standards will be prepared by an expert committee and be integrated with receiving water standards established by the stream classification committee[248]. Thus if a stream is categorized in a higher category than its present quality dictates, standards for effluent discharges will be set to meet that higher quality.

In essence what the Water Commissioner is doing is copying the United States' program on water pollution prevention as authorized under the Federal Water Quality Control Act[249]. This Act[250], in 1965, ordered States to categorize streams according to beneficial uses. In 1972, the Act was amended to authorize each state to create an agency for the issuance of discharge permits to eliminate the effect of effluent discharges on those navigable bodies of water

previously classified by the States[251]. But this system was adopted in the United States because it was compatible with that country's legal framework. No State in the United States has power comparable to that given the Water Commissioner for the protection of streams. No State has ever engaged in positive planning of the uses of its natural resources[252]. Each State has resorted to negative planning, or zoning, because of the protection afforded property and the right to use property by the American ~~legal system~~. Since use of surface water in most States is considered to be a right attached to property, stream zoning was chosen by the Federal Government as the legislative method best suited for protecting this resource in all the States.

If the system worked in the United States, one could exonerate the Water Commissioner for adopting such a conservative approach to protecting stream quality, instead of the more radical approach desired by the Knesset in its 1971 Amendment to the Water Law. But the system has not worked in the United States[253]. Standards for in-stream quality are impossible to formulate[254]. Stream quality changes by the minute at different points along the stream and during different times of the day, night and year. Therefore any authority charged with the responsibility of measuring stream quality will need explicit guidelines for different parts of the river at different hours of the day -- an unreasonable proposition. Also, the concept of standards for receiving waters is an admirable one, but it should be more of a flexible goal than a hard and fast standard. Onceit has been made into law, it is hard to enforce and even harder to change. It means that everyone will pollute up to the standard. Therefore it does not lead toward continual improvement of water quality.

Other objections to the adoption of standards for receiving waters have been raised by critics in the United States[255]. They all boil down to the fact that standards for streams do not recognize the nature of the stream ecosystem. Thus, even if the Water Commissioner succeeds, where States in the United States have failed, in enforcing his proposed model, he will still fail to protect stream quality because the model's theoretical basis does not recognize the dynamics of the stream environment. It brings the stream to the model, instead of the model to the stream.

endangered species act?

[d] A Proposal:

Stream Water Management

All of the above models have positive atributes which should be integrated into a model applicable to Israel's streams and authorized under her water laws. The model proposed here is simply one of watershed management planning, using the present administrative arrangement in existence for water protection and with few suggested changes in water protection legislation. No attempt will be made here to elaborate on the workings of the model because the author's competency is limited to evaluating whether a regional watershed management approach has sufficient legislative backing to be effectively implemented.

It is suggested first that a national water plan be prepared under the auspices of the National Planning Council, created under

the Planning and Building Law. This law has been little discussed in this thesis because its passage made no change in water policy, despite the law's authorization of comprehensive positive and negative (zoning) planning in Israel[256]. Under its provisions, any project of national significance, including water projects[257], may be planned by the National Planning Council and approved by the Government. The National Planning Council is a large body composed of representatives of every government ministry, certain private organizations and expert planners. It is advised by the Environmental Protection Service, a newly created organization within the Prime Minister's Office, charged with getting environmental input into the planning process in Israel.

The national water plan should be prepared by the Water Commissioner's office for the National Planning Council. The master plan would in general show how Israel's water sources are to be used for a given period in the future to meet all beneficial uses. Included in the plan would be programs for a national and regional sewerage network, national exploitation of ground and surface water, and suggestions for national policy in the siting of major water polluters[258].

In all likelihood, the Water Commissioner's master plan for water management in Israel would be coordinated with regional watershed management plans, to be prepared in coordination with existing drainage authorities. Each watershed plan will be submitted to the District Planning Commission for the submission of objections by

the public[259]. Decision by the District Commission would be final after approval by the Minister of Agriculture and the National Planning Council. Responsibility for executing the regional watershed plans would be by the regional drainage authorities. Under present legislation, this is the weakest part of the plan and deserves fuller discussion.

The Drainage and Flood Control Law was originally set up to create a body whose responsibility would be the prevention of soil erosion from flooding and poor drainage. The original drainage authorities were authorized to abate sanitary nuisances, but they were forbidden to control sewage flow or provide for sewage treatment on a regional scale. This prohibition was removed in the 1971 Amendment to the Water Law. Today drainage authorities have the power to execute those provisions of the Water Law dealing with sewerage plans and pollution control, if so authorized by the Water Commissioner[260].

The problem remains, however, as to the make-up of the boards. By law they are political bodies, composed of the representatives of local authorities within their boundaries, and representatives of the Government. There is nothing inherently wrong with this set up; "decisions generated by the political process are generally accorded legitimacy in the contemporary polity."[261] Furthermore, jurisdictional conflicts involving maintenance and control of local authority sewerage treatment works could be more easily ironed out in a political forum[262]. And the levying of sewage charges by local

authorities could be continued. On the other hand, drainage authorities are not equipped with an expert staff for necessary monitoring. It is possible that they would not need such a staff, if professional help from the Water Commission were available to aid each authority. At present the National Drainage Board can appoint an expert engineering committee for drainage affairs[263]. If this committee were able to act also as an expert committee on water pollution control, it could advise each regional watershed authority on questions concerning water quality and pollutant inflow. At the same time, the Water Commissioner could rely on drainage authority inspectors[264], nature reserve and fish inspectors appointed by the Minister of Agriculture, for monitoring and surveillance of sources of water pollution.

Two further weak points in using existing drainage boards to implement a comprehensive water management program are as follows. First, the boards have for years dealt only with drainage matters, and this is the extent of their expertise. Second, they have no power to prevent pollution of ground water sources and protect surface water sources for amenity uses. It is therefore recommended that the boards be given this power. If not, legislative help is available in the Streams and Springs Authorities Law of 1965.

This law authorizes the Ministers of Interior and Agriculture to set up river authorities for any water source if they feel that the existing drainage boards are not competent for the purposes they want served. According to the Act's provisions, the authority is to

be composed of representatives of the Government, local authorities within the watershed, cooperatives served by the stream and riparian landowners. The river authority has similar power to the drainage authority, plus it is specifically empowered to prevent stream pollution, arrange for beneficial use of stream water and protect amenity uses in and along the banks of a stream. This law has been "on the books" for almost nine years and no river authorities have been designated by the two ministers. The reason given for non-execution of the law is its grant of power to two ministers; cooperative ventures by several ministers have not been effective in the past. It is therefore recommended that the law be amended to grant the Minister of Interior advisory power only, with full executory power to the Minister of Agriculture.

Summary and Evaluation

This concludes the section on the legislative framework for protection of surface water. From the model posited in the closing pages of this section, it can be seen that Israel's laws grant adequate authority to the Water Commissioner and the Minister of Agriculture for the protection of surface water. Proper utilization of these laws demands the creation of watershed authorities. Such authorities would be required to understand the inflow and outflow of all streams; designate and protect consumptive and beneficial uses; set objectives for stream quality and standards for effluent discharge; and supervise the siting, construction and operation of municipal and industrial

sewerage works. With minor changes in existing legislation, this model for stream protection can be implemented.

Present legislation fragments control over licensing of sewerage works and systems and the quality of sewage discharged and exploited. In order to trim the layers of authorization, questions involving the conflict between local and national authorities must be resolved as well as the question of the Ministry of Health's role in licensing sewerage works and regulating sewage quality. The question of local control over local services that become national problems is too large a topic to be properly discussed here. Suffice it to say that for sewage, a recommended approach is one of areawide waste treatment centers, controlled (and possible operated) by watershed authorities.

The second question relating to the role of the Ministry of Health in licensing sewerage works and regulating sewage quality is easier to resolve. Health has too narrow a view of environmental problems to properly resolve them in the national interest. The Ministry is circumscribed by its mandate to protect the citizens of Israel from immediate health problems. It fails to see sewage as a national resource. Instead, Health's view of sewage is as another health problem, not as part of an unending hydrological cycle. Health should, therefore, be divested of its role in licensing sewerage works and strictly limited to controlling health hazards. The Water Commissioner should be the sole authority responsible for regulating the quality of all beneficial uses of water, including sewage.

(2) The Administrative Framework

The preceding section described legislation authorizing various government bodies with the power to prevent and control surace water pollution in Israel. No attempt was made in that section to consider whether the legislative scheme as presented was in fact enforced. That is the essence of this and the succeeding chapter.

(a) Prevention & Control Over Pollutant Inflow

[1] Industrial Point Sources

[a] Present Policy

In order to carry out any program of prevention and control of industrial point source pollution of surface water, some organization or mechanism must be constantly testing, monitoring and reporting to a decision making body the quality, quantity and location of industrial discharges. At present, no such organization or mechanism exists in Israel. Neither Mekorot, Tahal, the Water Commission, the Ministry of Health nor a local authority monitors industrial discharges into streams, wadis and sewerage systems. Reporting of a sporadic nature, for example, of specific industrial waste in Tel-Aviv, has been done by Tahal[266]. Reporting, but not monitoring, of point sources directly into streams and wadis has been undertaken by the Nature Reserves Authority[267]. Tests of an individual firm's effluent have been performed by the Ministry of Health[268]. Yet no continual city, regional or state-wide testing of industrial effluent

exists in Israel[269]. Nor does there exist in Israel a standard analytical method for wastewater sampling and testing[270]. Thus data which appear in scientific reports prepared by different organizations in different laboratories according to different analytical methods cannot be unified in a national report to present a picture of overall industrial pollution of streams and wadis in Israel.

[b] Future Plans

Despite this fact, the Water Commissioner each year reports to the Knesset that industry is the largest polluter of Israel's water sources in general and surface water, in particular[271]. Yet without studying the quality, quantity and location of industrial discharge, the Water Commissioner has little proof to back up this claim[272]. In order to get the necessary proof, the Water Commissioner has embarked on a five year program of study of industrial effluent and prevention and control of industrial discharges[273]. The Water Commissioner plans to gather data on the quality, quantity and location of industrial effluent. He further plans to study Israel's streams and set standards for their quality. With this information, the Water Commissioner will then proceed against the country's forty largest industrial polluters of streams and wadis and order each one, individually, to produce a satisfactory sewerage plan that will meet stream quality standards as set[274]. For those firms discharging into municipal sewerage systems, a zero discharge standard will be set for certain pollutants that do not break down in sewage purification plants or actually harm such plants' processes. For concentrations of BOD and organic pollutants, a limit will be set, and those firms

whose effluent exceeds the limit will pay a sewerage charge to be fixed by the Water Commissioner. Monitoring of industrial effluent is contemplated in this five year plan, and it will be carried out by the Water Commissioner or under his strict supervision.

This is the Water Commissioner's plan for prevention and control of stream pollution by industrial discharges. The plan raises several interesting questions. First, one wonders why data on industrial discharges are not presently available to the Water Commissioner. Since 1959 the Minister of Agriculture has had the power to set standards for sewage quality to prevent and control pollution of water sources. In order to issue effluent standards, the Minister should have early requested, or the Water Commissioner should have provided, knowledge of the quality of industrial effluent and its effect on stream pollution. Since 1959, the Minister could have promulgated standards for surface water quality and the Water Commissioner could have ordered those firms whose discharges reduced water quality to purify their sewage to diminish such pollutant effects. For fifteen years this was not done, however, and the country developed, industry grew and expanded and water pollution reached its present levels. Now the Water Commissioner has a plan to control industrial discharges, but two troubling questions remain unanswered. What does the Water Commissioner plan to do while waiting for data? Second, what kind of mechanism will be set up to obtain data on new firms and new processes introduced into Israel during and after his comprehensive study?

[c] The Reality

Despite the awesome powers available to him, the Water Commissioner is actually moving forward rather timidly in attacking industrial point sources of pollution. He has, to date, issued twelve orders to industrial firms requiring them to take measures to clean up their effluent and hook up to municipal sewerage lines[275]. The orders were issued under power granted the Water Commissioner by the 1971 Amendment, but similar power was available to him under the Water Law of 1959. This shows, first, that the Water Commissioner had this power all along and failed to exercise it. Second, it raises questions as to the Water Commissioner's just exercise of power granted him. Although the twelve firms have taken positive action to the satisfaction of the Water Commissioner, he has refused to issue a discharge permit, permitting each of the complying parties to discharge their effluent into a stream or municipal sewerage works. Thus each firm continues to be in violation of the Water Law even after full compliance with the Water Commissioner's order. Not only is this an injustice to these twelve firms, but it is an injustice to the public at large.

Under the 1971 Amendment, the Water Commissioner must make all discharge permits available to the public, and he is required to report to the Knesset annually on their contents[276]. His failure to issue a permit for an industrial discharge prevents the public from discovering, and, either bringing pressure on industrial

polluters, or praising industrial action, as the case may be. Furthermore, the Water Commissioner's refusal to get public reaction to his activity in the area of industrial discharges and to the national sewerage plan, to be discussed later, raises serious questions as to his desire for public participation in the work of the Water Commission.

Other than issuing clean up orders to twelve industries, the Water Commissioner works with industry to change processes to reduce pollution concentrations. The Department of Water for Industry gives advice to industrial firms on conservation of water in industrial processes. In addition, a fund for aiding industrial firms in the purchase of sewage purification equipment has been available to industry since the middle of 1973. As of this writing, no funds have been provided to industry out of this fund.

Major efforts have been directed toward water conservation in industry[277], following the precepts laid down by a 1964 report on industrial water use[278]. Conclusions of that report were as follows. Due to the cost of installing sewerage works and laying sewerage pipe, and considering all costs and all benefits, it would be cheaper for the state if industry used less water and thereby created less effluent than if it increased water use to produce a less concentrated effluent. One wonders today whether the considerations of 1964 are still tenable. At any rate, the policy continues, untested anew, and it is the rock on which the Water Commissioner's policy for pollution control in industry rests today. It is a submerged rock, however; a policy carried on beyond the view of the interested public and the Knesset.

So much for existing policy. What mechanism will the Water Commissioner set up to ensure that he is informed of future plant locations and effluent discharges so that the gamut of legal measures available to him can be brought to bear on an industrial enterprise to prevent or control its pollution of a surface water source? There are several options open to the Water Commissioner, from positive planning to pollution control to abatement, but there are also stumbling blocks on the road to implementation of each of these options, as the next section will show.

The Minister of Agriculture now has the power, under the 1971 Amendment to the Water Law, to promulgate a regulation listing those polluters he feels will seriously pollute surface waters. He can then require their sewerage plans or their location to be approved by the Water Commissioner prior to construction of the plant. The Minister could also forbid the introduction into Israel of certain industrial processes known for their water pollutant effects. But the Minister has done neither of the above. Therefore it is incumbent upon the Water Commissioner to set up his own early warning device to locate potential, polluting firms and prevent their effluent from degrading Israel's streams or disrupting municipal sewerage works.

The best time for action by the Water Commissioner would be at the investment stage, that stage when a firm is considering locating in Israel and requesting approved status[279] from the Ministry of Trade and Commerce. Notice of a firm's intention to do business at this

stage would enable the Water Commissioner to early study the firm's plans, suggest changes in sewage treatment or recommend alternate sites more favorable to water pollution prevention and control than the proposed site. Such an early warning device was suggested by the Assistant Water Commissioner in cooperation with the Ministries of Health and Trade and Commerce[280]. Yet as of this writing, this early warning device has proven a dismal failure[281]. This does not leave the Water Commissioner without an early warning signal, however.

In Israel, the construction of any structure, including a government installation, needs approval by the Local and District Planning and Building Commissions.[282] On the district commission sits a representative of the Minister of Agriculture and the Minister of Health. Both of these ministries could request that each contractor who appears before the district commission have his plan for sewage discharge approved by the Water Commissioner and the district health doctor. But such action has not been taken[283]. In the absence of this policy, the representative of the Ministry of Agriculture could, at the least, bring to the attention of the Water Commissioner planned construction of an industrial enterprise. But this has not been done either[284].

In the absence of these two early warning signals, the Water Commissioner must fall back on his final warning system -- a request for water supply[285]. This request usually comes after the plant has been built and an operating license approved by the local authority

and the Ministry of Health. At that stage, it is late for the Water Commissioner to demand process changes to prevent water waste and water pollution, but he often does so, as the following "case" points out.

[d] The Case of the Kosher Chicken, or How do You Pass the Salt?[286]

In 1972, the Water Commissioner received a request from Armorcoor Company, for the supply of water. The company had established itself in an old abandoned refrigerating plant in Hadera, making the necessary changes to convert the plant into a slaughtering and koshering plant for chickens. Licenses from the district planning commission, the Ministry of Health and the city of Hadera had been obtained without the Water Commissioner hearing of the existence of the plant. A few days before the plant's planned opening date, the Water Commissioner received a request for water supply. The Water Commissioner objected to the request for two major reasons. First, the plant was located in a region with great limitations on water use; second, no plan had been submitted to the Water Commissioner for disposal of the plant's liquid effluent. A visit to the plant by members of the Water Commission further revealed that the plant was not equipped with water saving devices and the sewerage system "was a big arrow pointing to Nahal Hadera"[287]. Further investigation revealed that the plant intended to separate the liquid waste produced in the slaughtering process (blood, fat and feathers) from the koshering waste (salt water with chloride concentration to 5,000 mg/l)[288]. The slaughtering waste was to be

dumped into a settling pond and from there to be discharged into Hadera's sewerage system to be completed in three years. The salt water was to be discharged directly into Nahal Hadera. In light of these facts, the Water Commissioner rejected the company's request for water supply and rejected its sewerage plan. In response, the company turned to the city of Hadera for water supply, and received it.

So far, the early warning devices available to the Water Commissioner proved less than helpful, but he has such extensive powers under the Water Law that the gamut of legal measures available to him has yet to be tun. Once prevention and control tactics failed, the Water Commissioner turned to abatement tactics. He refused Armorcoor's allotment request, but instead of cutting off the company's water supply as authorized by law, the Water Commissioner opted for an economic stick to beat the company into compliance. The Water Commissioner's refusal to allot the company water meant that every cubic meter supplied to the company over its allotted amount (here zero) would be charged with a penalty[289] amounting to approximately one Israeli pound percubic meter. Under the Water Law, this amount is charged to the supplier, here Mekorot, who has the power to collect any penalty paid by it from the offending water consumer[290], here the city of Hadera. Yet the Water Law did not contemplate the following chain of events.

The city of Hadera refused to pay the penalty price for water. It argued, that if pressed, it would pay the penalty price out of

tax funds to keep Armorcoor from going bankrupt. Thus, in the final analysis, assuming the city would pay Mekorot the penalty price for water use, the taxpayers of Israel would be required to reimburse the city, not the Armorcoor chicken plant. Under these circumstances, the Water Commissioner did not press for collection of the penalty charge and Armorcoor is presently slaughtering 4,000 chickens a day and dumping 33,000 cubic meters of sewage a year into Nahal Hadera[291].

The Case of the Kosher Chicken reveals a gaping hole in the Water Commissioner's ability to properly administer the comprehensive pollution prevention and control measures available to him. None of the early warning signals available to the Water Commissioner worked, e.g. plant siting, construction license, water license, nor did abatement measures, e.g. water supply cut off, penalty charge. And Armorcoor is a large corporation which actually requested the necessary licenses required by law. There are hundred of electro-plating industries in Tel-Aviv, for instance, whose whereabouts are unknown and whose effluent quality remains a mystery to the Water Commissioner[292].

Because of the abject failure experienced in the Case of the Kosher Chicken and cases like it, the Water Commissioner's staff on water for industry has turned to a new approach, neither authorized nor forbidden by legislation. The head of the Department on Water for Industry has formed a gentleman's agreement with five of the six district doctors of the Ministry of Health in order to get early notice

of plant operation[293]. Under the agreement, each plant licensed by Health must have his sewerage plan approved by the Department on Water for Industry of the Water Commission prior to issuance of an operating license. It is too early to tell how effective this plan of action will be, but one thing is sure: Gentleman's agreements do not provide the comprehensive pollution prevention and control scheme authorized by the Water Law. And use of such a policy instead of the extensive legislative controls available to the Water Commissioner raises serious questions as to his desire to implement the controls granted him by the Knesset under its supervision and under the supervision of the interested public.

[e] Ministry of Health and Local Authorities

The Water Commissioner and the Minister of Agriculture are not the only governmental bodies involved in preventing and controlling pollution of surface water from industrial point sources. The Ministry of Health has drawn up a list of conditions for quality of industrial sewage permitted in local industry sewerage systems. These conditions are attached to businesses licenses issued by local authorities. In addition, by being "on the scene" and with the powers granted them for the prevention of nuisances and protection of the general welfare, local authorities, supervised by the Ministry of Health, can influence industrial discharge methods to prevent pollution of municipal sewerage systems and prevent health hazards in streams and wadis.

There are numerous weaknesses in this administrative process, however, which prevent it from becoming a comprehensive scheme for prevention and control of industrial point source pollution of streams and municipal sewerage works. First the local authority is interested in protecting local industry from demands made by governmental ministries. This was seen in the Case of the Kosher Chicken. Second, the local authority is interested in protecting its sewerage system from harmful pollutants and would prefer industrial effluent to be discharged outside the sewerage system. This, as in the case of Hadera, Jerusalem, Haifa, Beer-Sheva, Arad and most other local authorities means discharge into the nearest stream or wadi[294].

The Minister of Health is, for his part, not overly concerned with industrial effluent being discharged into streams and wadis (a) because the discharge of industrial waste usually contains no pathogenic bacteria and viruses and therefore creates no direct health problems[295]; (b) in some cases, e.g. in Nahal Hadera, the discharge of industrial effluent actually improved health conditions by ridding the area of the anopheles mosquito, which cannot breed in such water[296]; (c) the Ministry is fearful of industrial effluent corroding and bursting local authority sewerage pipes or breaking down sewerage treatment works and causing health hazards[297]. In addition, the Ministry has adopted a passive role in the prevention of water pollution from industrial effluent. The Ministry prefers to supervise the local authority rather than take direct action against industry[298]. Yet, in most instances, it is the local authority which permits continuation of the nuisance.

Second, the licensing process itself is a huge job, probably beyond the present competence of most local authorities. In Petach Tikvah, alone, there are over 2,600 industries requiring licenses under the Licensing of Businesses Act, and the city does not even have a rudimentary system for monitoring industrial effluent[299]. The cost of such a system could be staggering, and considering the local authority's traditional inability to control and monitor industrial effluent[300], one questions whether the local authority's maintenance of a monitoring system will justify its cost. Third, assuming that a program can be developed for monitoring industrial effluent, industrial effluent standards promulgated by the Minister of Health will relate to different parameters than standards issued by the Water Commissioner[301]. Such standards may encourage industry to mix fresh water with effluent to reduce BOD, thus conflicting with the Water Commissioner's water conservation program[302]. Assuming that standards can be developed, there will still be the question of monitoring and enforcement, at present the job of local authorities[303]. Fourth, this program for standard setting and monitoring of industrial effluent, although divided among at least three governmental bodies, must somehow be unified with the Water Commissioner's plan for stream quality standards. Finally the more bodies demanding more action by industry, the more instances like the Case of the Kosher Chicken, where industry will simply operate without a license[304].

[2] Municipal Point Sources

[a] The National Sewerage Plan

In the section on legislation, it was noted that the Ministries of Agriculture, Health and Interior are responsible for local authority sewerage systems, plant locations and processes. In recognition of this fact, the three Ministers created a national sewerage council in 1963 and again in 1969[305]. On the council sit representatives of the Ministries of Health, Interior, Housing and the Water Commission, and Tahal. Attached to the council is an advisory committee, with representatives from Tahal, the Water Commission, the Nature Reserves Authority and the World Bank. The national sewerage council is an advisory body to the three Ministers on national sewerage policy and the National Sewerage Plan. The National Sewerage Plan[306] is the name given to an investment of Il 325 million in a program that will increase the capacity, collection and treatment of local authorities' sewerage works. The plan encompasses 79 local authorities and three associations of towns[307]. Seventy percent of the plan's cost will be offset by the World Bank and the Government of Israel equally, with the remaining thirty per cent to be funded by local banks to be repaid by the local authorities[308]. The plan is to be carried out over the next five years and is expected to increase local authority sewerage capacity to a level of development sufficient for the following ten to fifteen years. At the plan's optimal operating point, approximately in 1992, it will serve 3.5 of the then five million population.

The National Sewerage Plan is a giant step beyond existing local authority sewerage systems, but a look at the plan raises questions as to its ability to effectuate the legislative mendate laid down in Israel's water code. First of all it must be emphsized that the plan is neither national nor regional in character. It is funding of local authority sewerage projects to be planned, built and operated on a local level[309]. This in light of the fact that local communities in Israel have failed in the past to properly maintain and operate sewage treatment facilities[310]. Second, reports both in Israel[311] and the United States[312] point to the desirability of areawide waste water treatment plants. From an economic standpoint, areawide plants are cheaper to build and cheaper to maintain at a higher level of quality than small community treatment works[313]. From a planning standpoint areawide management of waste treatment is preferable to local treatment because it can be more easily integrated into a watershed management plan, and it is not bound by artificial jurisdictional boundaries.

Third, the national sewerage plan deals with sewage purification in the abstract; it does not relate the method of purification nor the final purified effluent with actual disposal of the sewage[314]. If, for instance, the sewage is to be used exclusively for agricultural use, then a purification standard for that use should be adopted. If the sewage is to be purified and poured directly into the nearest stream or wadi, then the purification method should prepare the sewage to be assimilated in the stream or wadi during different periods of the year. This was not done by the national sewerage council. As a

result, it is possible that the purification method chosen by the council is too advanced for the use to be made of the purified effluent and therefore the cost of the project will not justify the benefit flowing from it[315]. It is also possible that just the opposite has taken place. The plan is too modest for the clean up needed and the purified effluent discharged will seriously pollute stream waters or be unfit for agricultural and industrial use[316]. In the latter case, the quality of effluent discharged will have a dominant effect on stream quality, and, in effect, fix stream uses. Thus the job of the Water Commissioner in categorizing streams according to their quality and uses will be made easier for him, unless, of course, he is interested in improving stream quality.

Fourth, the plan leaves street water run-off outside the sewerage system, without measuring the pollutant load of this water source or its effect on receiving streams and wadies. Fifth, maintenance of the system is left to the discretion of local authorities. Sixth, the plan continues present policy of sewerage charges based on square meters of property and amount of water consumed. Backers of the plan insist that this system of charges has been calibrated to distribute the cost of construction and maintenance evenly among water users "...on the assumption that the amount of water that comes in stands in direct relation to the amount coming out."[317] Aside from the fact that this statement (a) is false and (b) discourages the saving of water, it also ignores (a) the fact that the quality of water coming out does not relate to the amount used, and (b) it is sewage quality which will ultimately determine the load on the sewerage system and its purification methods. It is this latter factor which should determine sewerage

charges, in addition to the quantity of water consumed.

Seventh, the plan does not demand qualitifed sewerage works operators. It does not demand monitoring, testing and reporting by the local authority, and it does not demand testing of air currents for odors prior to construction of sewerage plants[318]. Finally, the plan by its emphasis on local control and operation, will make any comprehensive plan for watershed management much more difficult, if not impossible to implement.

[b] The National Sewerage Council

Some of the objections raised above could have been presented to the council had it been duly created by law to hear and decide on national sewerage policy. This was not the case. In the instance of the national sewerage council, the Minister of Agriculture, Interior and Health did not want a statutory body invested with the power to approve local sewerage plan projects. The Minister of Agriculture rejected outright the suggestions of legal council for the Water Commission to invest the national council with statutory powers[319].

The result was the formation of a select body who approves and recommends adoption of sewerage plans for the entire State of Israel without proper legal safeguards. The public does not receive notice of the council's deliberations nor may public participation in the council's meetings be demanded.

The council's membership was chosen by three Ministers and it constitutes those governmental and private organizations felt necessary to make sewerage policy. Yet the council is not representative of the government nor the people. The only semi-private organization allowed on the council, Tahal, is also the chief advisory body to the council and planned the most extensive sewerage operation to be approved by the council, the Gush Dan Reclamation Project. Thus it had the distrinction of being judge, advocate and executor of the biggest project approved by the Council.

On the other hand, it could be argued that the council is not a deciding body. It only makes "recommendations" to the three Ministers who have the power of approval over sewerage plans. And, too, the public has the right to enter the decision making process when a sewerage plan is brought before the District Planning and Building Commission. Yet neither of these arguments are persuasive. The Ministers rubber stamp the council's decision, and a party appearing before the District Planning & Building Commission to argue rejection of an expensive, intricate, fully developed and approved sewerage plan stands little chance of advocating the adoption of an alternate solution.

[3] Non-Point Sources

Major non-point sources of surface water pollution are fertilizers, feedlots, pesticides and fishponds. Prior to 1971, the Minister of Agriculture had powers to control these pollutant sources under various laws unrelated to prevention and control of water pollution. After

1971, however, the Minister was specifically given the power to control agricultural methods and practices, including fertilizer and pesticide use for the purpose of preventing water pollution. The Minister has not exercised this authority[320], however, and this will make any program of surface water pollution control by the Water Commissioner difficult to initiate and implement.

At the same time, the Water Commissioner has not formulated an extensive plan for the protection of streams from non-point sources, as he has done for point sources of pollution. In fact, in annual reports to the Knesset on the state of water quality, the Water Commissioner has never mentioned the possibility of stream pollution from pesticides, feedlots and fertilizers. This could be because he has little data on non-point sources of stream pollution[321], but, then, he has little data on point source pollution either. It is more than likely that this "oversight" is due to the Water Commissioner's close attachment to his agricultural constituency. Whatever the reason, no comprehensive program for the prevention and control of agricultural sources of non-point pollution of streams has been formulated by the Water Commissioner.

There has been admirable work performed by Drainage Authorities in preventing soil erosion[322]. As a by-product, run-off from cultivated land has been decreased. Yet Drainage Authorities continue to operate in the narrow field of drainage and flood control. They have not received formal authorization by the Water Commission or the Minister of Agriculture to operate in the water pollution prevention and control area[323].

The Water Commissioner has initiated activity to prevent stream pollution by trash dumps, oil pipes and tanks[324]. He has not studied pollution effects from air pollution, weather modification[325], run-off from feedlots[326], roads[327], forests[328], and recreation areas[329]. It is actually impossible to determine if these are trouble spots because there has just been no study of the effect of these non-point sources of pollution on stream quality.

(b) Control of Beneficial Uses

The previous section on pollutant inflow discussed attempts by the Water Commission and other governmental bodies to locate and control point and non-point sources of pollution. One of the most serious criticisms leveled against the Water Commissioner in the previous section related to his failure to relate pollution control plans for point sources with a stream or wadi's beneficial uses. By elaborating on this thought, this section briefly describes attempts by various governmental units to exercise their legislative authority in the protection and forumation of beneficial uses for streams and wadis.

[1] Disposal & Assimilation

The major use made of Israel's streams and wadis is by industry and municipalities for the disposal and assimilation of unwanted residuals. Such use of surface water was a properly declared use under the 1959 Water Law unless proved that the discharge prevented use of the stream for a beneficial use. The 1971 Amendment to the

Water Law changed this by prohibiting any discharge in or near a water source without a permit from the Water Commissioner. As described under the 1971 Amendment, a discharge permit is to be an individual order, good for one year, which will be open to public inspection. Reports of discharge permits are to be sent to the Knesset Finance Committee annually, or at more frequent intervals as fixed by the Committee.

Despite this elaborate procedure, and despite the fact that industry and local authorities freely discharge their unwanted residuals into stream and wadis, not one discharge permit has ever been issued by the Water Commissioner. The Water Commissioner argues that he has not the staff to handle the monumental task of issuing permits to "hundred of factories and scores of local authorities".[330] In the alternative, the Water Commissioner argues that had he the staff, he is not sure he would issue discharge permits because of his fear that such permits will be misinterpreted by both the public and the discharger as a license to pollute[331]. Neither of the Water Commissioner's arguments are overly persuasive, and the fact that the second negates the first does not add to their persuasive nature.

His first argument relating to manpower ignores the fact that for years a whole department in the Water Commission handled all problems relating to water for industrial use. Had one asked the Water Commissioner in 1971 the amount of water supplied to an industrial firm in any year succeeding the passage of the Water Law of 1959, the Department of Water for Industry could supply figures not only for water use, but also specify the quantity received during a particular season of the

year[332]. This department should have apprised the Water Commissioner, immediately after passage of the 1971 Amendment, of the location and strength of industrial waste and its impact on surface water in Israel. The fact that the Water Commissioner embarked on a five year study of industrial waste only after passage of the 1971 Amendment indicates this knowledge was unavailable to him prior to that date. It also indicates, indirectly, the depths of his pollution control program between the years 1959 and 1971.

Had the Water Commissioner been apprised of the strength of point source pollution of streams and wadis in 1971, he could have immediately issued the appropriate discharge permit, or, as the case may be, the appropriate clean up order. Issuing the permit should not have greatly taxed the Water Commissioner's staff, if they had the necessary data. Governmental agencies everywhere in the world are overburdened and understaffed. Yet if the Environmental Protection Agency can review 65,000 discharge permits[333], and the City of Los Angeles, California 13,000[334], then the Water Commission staff can review discharge permits for the hundred-odd firms discharging effluent directly into streams and wadis[335]. Had the Knesset ordered the Water Commissioner to act within a time limit, as did the Congress of the United States of the Administrator of the E.P.A.[336], it is possible that he would have found a way to determine the strength of industrial effluent and issue the appropriate orders. Why hasn't the Water Commissioner ordered every large industrial water user in Israel to supply him with data on the quality, quantity and location of their effluent[337]? In the five years he will spend studying

industrial emissions and stream quality, industrial processes could change radically and his data may be obsolete[338].

The Water Commissioner's second argument for refusing to issue discharge permits, the ticket-to-pollute argument, also does not appear valid under close inspection. First, industrial effluent is actually being discharged whether the Water Commissioner permits it or not. Yet without some attempt to regulate the discharge it will continue apace totally uncontrolled. Nc one knows what industry is dumping into Israel's streams and wadis. A discharge permit will at least be a step in the right direction in finding out what and how much is being dumped and into what stream. And since the discharge permit is open to public inspection, public pressure could then be brought to bear on individual firms to force them to clean up their effluent.

Second, a discharge permit is limited by law to one year, unless renewed by the Water Commissioner. Therefore it could hardly be considered a license to pollute in perpetuity. Third, a problem faced by all pollution prevention agencies is the cry of injustice often raised by a polluting firm that "everyone else is polluting, so why the attack on me."[339] This problem is exacerbated when all dischargers are equally violating the law, as is the case in Israel. A discharge permit program would allow the Water Commissioner to permit some firms to pollute for a year while he pressured others into submitting and executing a sewage treatment plan. This was contemplated by the Knesset when it enabled the Water Commissioner to permit the discharge of effluent in cases where circumstances leave him no choice. Issuing

permits in such circumstances would limit industry's use of a legitimate equity defense during administration of the program and in a court proceeding for abatement. In short, although it is conceded that use of Israel's streams and wadis for industrial effluent is the major beneficial use of these water sources, no permit program regulating such use has been developed.

The above discussion related only to beneficial use by industry of streams and wadis for disposal and assimilation of their unwanted residuals. With regard to municipal effluent, the Water Commissioner has a policy, known as the National Sewerage Plan, for permitting municiple effluent to be disposed of in streams and wadis under certain conditions. As in the case of industry, however, the Water Commissioner approves municipal sewerage plans and refuses to license their discharge into streams and wadis. The arguments made above relating to this policy with regard to industry apply equally well here. Secondly, in those streams where one finds a beneficial use other than disposal and assimilation of waste, the Water Commissioner should require interim arrangements for municipal sewage to prevent further degradation of the stream[340]. Since he takes no formal action, however, in permitting municipal discharges or requiring interim arrangements for such discharges, no person who feels injured by the Water Commissioner's policy has the right to turn to the judicial forum for a redress of grievances.

[2] Support of Human Life

Israel's streams do not support human life. If they did, life would have ceased to exist in this country in the early sixties. Streams and wadis are essential to the country's growth as a source of water, a source of recreation and as an assimilator of waste. They are not breeding grounds for higher life forms in Israel, nor do essential life forms grow in their estuaries and ecotones.

[3] Amenity Services

It was discussed in the section on legislation that the Minister of Agriculture and the Water Commissioner have the power to protect surface water from amenity uses, e.g. boating, swimming and hiking near streams. Yet neither has the power to protect Israel's surface water for such amenities, except in so far as the Minister of Agriculture acts under power granted him by the National Parks and Nature Reserves Law, within a national park or nature reserve. Springs, streams and wadis are protected within nature reserves under regulations issued by the Minister of Agriculture authorizing close supervision by the Nature Reserves Authority[341]. Yet there is no authority authorized to prevent upstream users from polluting a stream for a downstream recreation use.

In the case of Binyamina, the town's sewage is polluting a part of Nahal Taninim, which has been declared a nature reserve[342]. The Water Commissioner has the power to protect the flora and fauna

in Nahal Taninim, but he has not required Binyamina to adopt a sewerage plan such that its purified effluent will be of a quality to sustain flora and fauna in the Taninim nature reserve. The same is true for Nahal Soreq[343] or Nahal Yarqon. In Nahal Yarqon, the city of Tel-Aviv has begun work on transforming the mouth of the stream to a park, but the city cannot control upstream discharges[344]. The Water Commissioner, for his part, is working on a plan for stream categorization, such that stream water will be of a quality amenable for swimming and other primary contact uses. Yet he has no authority to implement this plan, and the Minister of Agriculture no authority to issue regulations for use of streams for swimming and boating or any other recreational use. The Minister of Interior, who is vested with the authority to protect swimmers in Israel has taken no steps to ensure swimming in any stream in Israel. The Minister of Health has set standards for swimming in licensed swimming pools under the Licensing of Businesses Law. He has no authority to regulate swimming in streams and wadis.

It is possible that in approving local authority sewerage plans, the Ministers of Health and Interior could have required purification to a degree to allow primary contact. Yet, as was previously mentioned, the National Sewerage Plan does not require purification of municipal waste to a degree to meet any specific use. And if a deicision were made to purify municipal waste to a degree that would allow recreational use of streams, there would need to be an overhaul of the effluent charge system now in operation.

In short, there has been little attempt to prevent degradation of stream quality to increase stream use as a source of recreation in Israel. This is in keeping with the Water Law's disregard of recreation as a beneficial use. It is also on par with government expenditures for recreation in general[345]. The Water Commissioner, for his part, has yet to amend the Water Law to add recreational and amenity uses to the Law's list of beneficial uses[346].

[4] Materials Input

Materials input uses of streams and wadis in Israel are limited to their use as a source of water for agricultural, industrial and domestic productivity. There is no commercial fishing in any western flowing stream in Israel[347], nor are stream rocks used in commercial enterprises. The major productive use of stream water is for irrigation and fish ponds. Responsibility for monitoring and control of such use rests with the Water Commissioner, and in fact, there is monitoring of the quantity of stream water diverted from streams for agricultural uses. The figures for water appropriated from Israel's streams and wadis is recorded by the Water Commission or Mekorot, and reported to the public at frequent intervals[348].

[a] Agriculture

At the same time, no mechanism exists for determining the quality of stream water appropriated for agricultural use. Likewise there are no standards requiring stream water to be of a certain quality to

meet agricultural needs. The Minister of Agriculture's regulations for chlorides in water supplied to agriculture refer only to water supplied to agriculture[349], not to water appropriated by the farm itself. Also there was no attempt in the National Sewerage Plan to fix purified effluents from municipalities at such a quality that they could be used for agricultural needs[350]. On the other hand, the Water Commissioner intends to categorize streams such that certain streams can be used for irrigation and fish ponds. The problem then, will be to hope that once categorized the streams will not be so overly burdened with approved municipal sewage effluent to prevent their use by agriculture.

In any case, the Water Commissioner understands that streams presently overburdened with untreated sewage, like Nahal Hadera, and wadis which contain only raw sewage most of the year, like Nahal Soreq, are being exploited by agriculture for irrigation and fish ponds[351]. He should have devised standards for agricultural use of sewage, but, to date, has not taken this important step. Instead, the Water Commissioner has tended to work behind the scenes, prodding and guiding farmers into carefully using sewage so as not to harm themselves, their crops and the ultimate consumer.

Guidance offered the farmer is through personal contact and scientific bulletins. At the same time, the Water Commissioner has distributed a pamphlet on irrigation with sewage water[352]. The pamphlet was issued two years after the cholera epidemic in Jerusalem and is a scholarly, economic justification of utilization of sewage for irrigation. At the same time, the pamphlet warns farmers of the

danger involved in using sewage on their crops and suggests safeguards to prevent the spread of disease. This pamphlet and the guidance offered by the Water Commissioner's staff represent the total effort expended by the Water Commissioner in protecting stream water quality for agricultural use.

The Minister of Health has no power to regulate stream quality for agricultural use, but he was recently granted the power to regulate exploitation of sewage for economic gain. It is too early to tell what the Minister intends to do with his new found power. The following is an explanation of the Ministry of Health's past attempts to regulate agricultural use of sewage[353].

In the 1950's, the Minister of Health had his staff develop a series of criteria to be attached to business licenses as a condition of doing business[354]. Licenses were issued by local authorities to those businesses listed under the Licensing of Businesses Act. As a part of his program, the Minister of Health drew up conditions for agricultural use of sewage to be attached to each license issued by local authorities. Yet farming is not listed as a business under the Licensing of Businesses Act. Thus there was nothing to which the special conditions could attach. As a result, Health's attempt at regulating agricultural utilization of sewage, although admirable, was not legally binding and acted at best as a guide to farmers, similar to the Water Commission's pamphlet.

With regard to secondary effects in the use of sewage by agriculture, pesticide residues in food and health effects on workers, present

policy in the Ministry of Health and Ministry of Labor gives no answer. Health maintains a policy of checking food sold to the customer; it does not require that water used on crops contain no more than a certain amount of pesticides[355]. Labor only recently became aware of any occupational hazards involved in the use of sewage by workers[356], and, therefore, has made no effort to resolve this problem. The National Sewerage Plan, by requiring primary, secondary and, in the case of Gush Dan, tertiary treatment for municipal sewerage works, will certainly limit the concentrations of disease carrying bacteria in municipal sewage. Yet primary and secondary treatment do not remove the possibility of disease, nor will they reduce pesticides, heavy metals, chlorides and other substances that are harmful to crops in high concentrations, or harmful to man[357]. On the other hand, raw municipal sewage, without industrial sewage, may contain few substances harmful to crops. It is possible that direct application to certain crops, after settling and under strict supervision, may be the simplest, most economical and safest solution to stream pollution and municipal waste problems as well[358]. Yet the National Sewerage Plan deals with sewage treatment in the abstract, not with its disposal or potential uses.

[b] Industry

Industry makes very little use of stream water, and the water used need not be of the highest quality. In Haifa, Haifa Chemicals uses the Qishon for mixing with its effluent, and the Refinery uses the Qishon for cooling purposes[359]. The arguments expressed

above relating to agricultural use of streams are equally applicable here. Nothing has been done by the Water Commissioner to prevent stream pollution to protect this water for industrial use. For future agricultural, industrial and domestic use, the Water Commissioner has asked Tahal to prepare a plan for capturing flood waters in reservoirs and recharging ground water[360]. Tahal attempted a similar plan in the 1950's, but failed in its execution[361]. The present plan is a final attempt to squeeze the last drop of water out of Israel's surface water system. The water thus appropriated will be of a quality to meet domestic, agricultural and industrial use. Yet the plan, when executed, will further reduce natural stream flow in Israel's western flowing streams, thereby increasing the concentration of sewage flow.

When completed, Tahal's plan to capture Israel's flood waters will surely influence stream quality. Yet the plan was not integrated with the two other water plans being prepared simultaneously under the leadership of the Water Commissioner -- the National Sewerage Plan and the stream categorization plan. Had the Water Commissioner chosen a watershed approach to plan stream flow, beneficial uses and stream quality, trifurcation would not have occurred.

(c) Objectives for Stream Quality

It has been mentioned repeatedly that the Water Commissioner has no data on the quality of Israel's streams. To that end, he has embarked upon a study of stream quality, which, within five years, will supply him with the necessary data. Why did not the Water Commissioner

act previously to study streams to determine their pollutant inflow, uses and stream quality? Members of the Water Commissioner's staff argue that pollution really was not a problem in Israel until recently[362]. To this explanation, there are several rejoinders. Does this mean that the staff members did not know of the pollution, or that the pollution did not exist? In either case, they are not on firm ground. In 1956, in a study prepared and delivered to the Government of Israel, Professor S. Heukelekian, then of the Food and Agricultural Organization of the United Nations, concluded that stream pollution was advanced and needed study. He recommended:

> Survey of stream pollution. Determine the present status of pollution of all streams with all the year round flows. Determine the chemical and biological status of pollution. Locate sources of pollution. 363

Before the Knesset, in August 1959, in answer to questions about odors emanating from the Yarqon, Kadis Looz, the then Minister of Agriculture, had this to say: "The source of the smell in the Yarqon is due to the fact that the Yarqon has become a sewerage channel"[364]. In 1964, a study on industrial use of water, prepared by a distinguished team of scientists, noted that not only is industrial waste ruining streams for industrial use, but all other uses as well[365]. In short, there were early signs of surface water pollution prior to 1971. If the Water Commissioner failed to recognize these signs or was unaware of them then the problem is far more serious.

The Water Commissioner is responsible for protecting Israel's water resources for five major uses. To that end he is authorized with extensive power in the pollution prevention and control field

and is advised by an array of scientific and lay personnel inside and outside the Water Commission. The Minister of Agriculture is advised not only by the Water Commission and the Water Board but also by Tahal, a professional organization with years of experience and achievement in the water resources field. If it is true that the Water Commissioner had no knowledge of stream pollution during the period in Israel's history when stream after stream turned into an open sewer, this raises serious questions as to the effectiveness of the advisary bodies attached to the Water Commission and the Minister of Agriculture. What chance does the Water Commissioner have today of foreseeing problems confronting Israel's water resources if his scientific advisors failed him in the past? If, on the other hand, the Water Commissioner and the Minister of Agriculture were apprised of failing stream quality and did nothing for political-economic reasons, then the blame for failure to protect Israel's water resources rests not with the scientific community, but rather with the Water Commissioner and the Minister of Agriculture. They should have had the political foresight to realize that open sewers are not the most economically or socially desirable use for Israel's streams.

On the other hand it is quite possible that the Water Commissioner and the Minister of Agriculture did not see streams carrying unwanted residuals as "polluted", i.e., in the sense that their waters were made less fit for the beneficial purposes for which they were intended. Instead these men looked at streams overburdened with waste as another source of water for agriculture, and a cheap source at that. There is nothing intrinsically wrong with this approach. It can be quite

healthy because it dispels fears of using "polluted" water for irrigation and fish ponds. Yet if there be nothing intrinsically wrong with this approach, there is something legally wrong with it.

The Minister of Agriculture is authorized by law to protect water for five uses, not one. And although he had no power under the Water Law to protect streams for recreational use, he received this power for nautre reserves under the National Parks and Nature Reserves Law. Thus he should have protected water for more than one use. Furthermore the concept of beneficial uses is an elastic phrase -- it does not mean every drop of water in Israel is to be exploited for five beneficial purposes. Possibly the Minister of Agriculture and the Water Commissioner assumed that such, however, was their mission. Therefore water for these two men lost its quality of uniqueness and took on the characteristics of a marketable commodity. Stream water was not part of an ecosystem, a fragile link in the unending chain known as the hydrological cycle. Rather streams were to be considered as a source of materials input. Their headwaters were captured and streams dried up; they became beasts of burden for man's unwanted residuals and fish and flora died. With natural flow replaced by sewage flow, wadis and streams took on the characteristic look and smell of sewers.

Whether this was the program planned deliberately by the Minister of Agriculture and the Water Commissioner, or a program that just happened over time, matters little today. This is the program that resulted, and full responsibility for it rests on their shoulders. Granted, since 1971, there has been an outward manifestation of change

in policy. Yet, until those entrusted by law to protect Israel's streams for a multiplicity of purposes, change their fundamental attitude toward the resource they are by law bound to protect, there is little hope that any program for pollution prevention and control directed by them will succeed.

Summary and Evaluation

This concludes the section on administration of Israel's legislative framework for prevention and control of surface water pollution. It hardly bears repeating but there has been little administration of the legislative framework. Some movements in the direction of administration are evident. There is some jockeying for positions of power between the Water Commissioner and the Minister of Health, but since the passage of the 1971 Amendment to the Water Law, no real accomplishments are visible. On the other hand, the disjointed nature of the Water Commissioner's several plans for surface water protection give one the feeling that he is purposefully embarked on an endless program of committees with no central theme unifying their decisions, and no central purpose directing their deliberations.

Tahal is planning to dam up flood waters in certain streams and wadis. In another plan, Tahal plans to transport sewage from Jerusalem to the central part of Israel. And there is the Tahal plan to transport sewage from the central (Gush Dan) part of Israel to the Negev. There is a committee setting standards for industrial sewage effluent.

A separate committee is setting standards for effluent charges. A third committee is setting standards for commercial use of sewage, under the sponsorship of the Minister of Health. And there is a fourth committee categorizing streams, and a committee in the wings waiting to determine stream quality.

At the same time, actual execution of the National Sewerage Plan continues apace, oblivious to the deliberations in other committees. It would be facile to say that the Water Commissioner can control the deliberations of these committees; he can not. But the impression is given that as the Water Commissioner, he holds the rudder controlling the direction of the committees he has appointed. Actually, he is being pulled along, like Ahab, behind the great white whale. The choking this time, however, will be of Israel's streams.

(3) Judicial Framework

It has been pointed out that Israel's legislative framework for the prevention and control of surface water pollution is comprehensive, and that under this framework, the administrative arm of government, essentially the Water Commission, is given the enforcement tools necessary to carry out the legislative mandate. The Water Commissioner, therefore, need not turn to the courts to order industrial firms to clean up their liquid waste, or require farmers to change their agro-techniques, or require municipalities to purify their sewage. Despite the independence of administrative bodies charged with enforcing

Israel's water protection laws, the courts do have a small but important role to play in abating pollution of Israel's streams and wadis.

First, challenges can be addressed to the courts for lack of exercise of administrative power. Often such challenges serve to grease the wheels of administrative action or signal legislators on the need for legislative reform. Second, private parties have the right to turn to the courts for a redress of grievances resulting from damage caused by water pollution. Such a turn of events could force polluters to internalize their pollution costs, presently being borne by society at large. Third, the Water Law contains provisions for criminal sanctions for those found guilty of violating its provisions, and for enforcement of such provisions the administrative agencies can not act independently of the courts. The courts' exercise of their power to punish water polluters would be instructive to other polluters and deter others from polluting streams and wadis. Yet the courts, by their nature, do not initiate actions against polluters. In this respect, they are very much dependent upon administrative action or private initiative. It is the purpose of this section to demonstrate both the extent of such initiative, and the reception it receives in the courts.

(a) Prevention & Control of Pollutant Inflow

[1] Industrial Point Sources

Discussion will begin with a review of those cases brought for abatement of industrial pollution of streams and wadis. Only a handful of such cases have been brought, the most famous being Attorney General v. American-Israel Paper Industries, Ltd. -- Hadera[366], initiated by the Ministry of Health in 1963. American-Israel Paper Industries, Ltd. -- Hadera is a pulp paper mill which began operations on the banks of Nahal Hadera in 1953. The plant was duly licensed to operate by the city of Hadera and the Ministry of Health. Attached to the plant's license were special conditions for the quality of industrial sewage, issued by the Ministry of Health, but the plant was not required by the Ministry of Interior or the city of Hadera to hook up to the city's sewerage system. Therefore the plant's liquid waste, some three million cubic meters a year, was discharged directly into Nahal Hadera. The following facts relating to the effects of the plant's sewage on Nahal Hadera were revealed at trial.

Nahal Hadera was a beauty spot prior to 1953, used by the residents of Israel for fishing, picnicking and hiking. In that year, 150 fishing licenses were issued by the Ministry of Agriculture. A recipient of one of these licenses testified at trial that on the first day of the paper plant's operation, fish were killed from a point beginning at the plant's sewerage outfall, and extending to the Mediterranean Sea. From that day on, fishing in Nahal Hadera was limited to points east of the plant's operations.

It is not known today why the Ministry of Health waited ten years to bring suit against the Hadera paper plant, nor is it known why suit was brought at all, after this ten year lag. Today, the man who represented Health at the trial before the magistrates court judge, gives two reasons why suit was finally brought: "I was a lot younger then, and you just can't let a plant get away with a thing like that"[367]. Whatever the motivation, a criminal action was brought in the magistrates court of Hadera by the Ministry of Health, alleging a violation of section 10(1)(b) of the special conditions for industrial sewage attached to the defendant paper company's license. Section 10(1)(b) read:

> No one shall dump liquid waste into sewerage or a public or natural channel the quality or quantity of which might damage the sewerage system or channel..or might endanger the normal use of the water body, stream, lake, ocean or other place which is used for the disposal of liquid waste.

The only question before the court was whether the normal use of Nahal Hadera was endangered by defendant's waste. The magistrate's court judge held that the stream's normal use was as a recipient of industrial sewage, and, therefore, it was not endangered by defendant's wastes. On appeal[368], the District Court found that, indeed, Nahal Hadera had once been used for hiking, picnicking and fishing, but that its use in 1963 was as an open sewer. Since, held the court, this was the normal use of the stream at the time the act complained of was committed, and since the plant did not violate any other provisions of the special conditions attached to its license, the decision of the magistrates court judge was affirmed.

The only expert testimony introduced at the trial was for the defendant, to the effect that the plant did not violate the standards for industrial sewage as set by the Ministry of Health. According to this scientific evidence, the pH of the plant's waste was between 6.0 and 9.0 with suspended solids and BOD below 1,200 mg/l, all well within the standards set by the Ministry of Health. Yet two points need to be clarified. The special standards for industrial sewage were designed to protect municipal sewerage systems, not flowing streams with a healthy fish population. Second, tests today of the effluent from the Hadera paper plant come up with an entirely different picture. The three million cubic meters of sewage annually discharged into Nahal Hadera have a pH of between 4.4 and 7.6, chloride concentrations reach 3,057 mg/l, dissolved aluminum at 0.2 to 6.6 mg/l, suspended solids between 650 and 1,500 and BOD between 150 to 390 mg/l.[369]

A lengthy analysis of the Hadera paper case is unnecessary. Health had no legal authority to protect Nahal Hadera for beneficial uses; such authority was given to the Water Commissioner under the Water Law of 1959. The Water Commissioner's indifference[370] to pollution of Nahal Hadera forced Health to attack the stream's largest polluter under the theory that the plant was violating conditions of its license. These "Special Conditions for Industrial Discharges of Liquid Waste into Sewers or Pipes" as the name implies, were aimed at protecting sewerage systems, not flowing streams. Health could have attacked the plant for creating a nuisance or health hazard. Yet this may have helped little, since the anopheles mosquito was eliminated not introduced, into Nahal Hadera by industrial pollution.

The Ministry of Health was more successful in its attack on small polluters for creating nuisances, as defined under the Public Health Ordinance. In 1966, cases were brought against Kibbutz Gvat Haim and the "Gat" plant for polluting a tributary of Nahal Alexander and creating a nuisance in violation of the Public Health Ordinance[371]. Both parties pleaded guilty and were fined fifty pounds each, and each party agreed to follow Health's instructions to hook up to an enlarged sewerage treatment plant.

There were other cases brought between 1948 and 1971 by the Ministry of Health to abate nuisances caused by industrial polluters of streams. Some of these cases will be discussed in the section on the Kinneret. No further cases were brought for the protection of surface water, however, after Health's defeat in the Hadera pulp and paper case.

During this same period, 1959-1971, the Water Commissioner failed to bring a single case for abatement of industrial pollution of streams and wadis. Even with the passage of the 1971 Amendment, only two cases have been brought by the Water Commissioner for surface water pollution caused by industrial waste[372]. One case involved the "accidental" spilling of crude oil into Nahal Ayalon by the defendant Yitzhar factory. The defendant's plea of guilty was accepted by the court, and argument was limited to the degree of punishment. Defendant requested a light sentence, justifying his refusal to close down operations to stop the spill because every other factory bordering Nahal Ayalon discharges its waste into the stream. The prosecutor also asked for

a token fine as this was the first case brought under the 1971 Amendment. The court sentenced the company to pay a thousand pound fine, symbolizing a change in attitude by the courts since the Hadera paper case in 1963.

[a] Nuisances

In addition to the above cases brought by the Ministry of Health and the Water Commission, there have been cases instituted by local authorities for nuisances caused by commercial discharges into streams and wadis. In a case which reached the Supreme Court, the local authority of Tamra brought suit against the defendant Haimovitz for dumping animal wastes into a wadi outside the local authority's borders[373]. The waste flowed through town, however, causing foul odors, mosquitoes and flies. The plaintiff town of Tamra brought suit against defendant under the Civil Wrongs Ordinance, claiming a violation of the private and public nuisance section of that ordinance. The Supreme Court refused to grant the plaintiff standing. The court noted that within the borders of the local authority, Tamra could act to prevent nuisances by power granted the local authority under its bye-laws. Outside the local authority limits, however, Tamra could act only as a private citizen. Since the public nuisance section of the Civil Wrongs Ordinance authorized the Attorney General or a private citizen suffering monetary damages to bring suit, the city would have to turn to the Attorney General or represent a private citizen who had suffered monetary loss from defendant's pollution of the wadi. For a private nuisance, the city would have to represent a private citizen who had suffered damage to his real property from defendant's pollution.

Later Supreme Court opinions have mitigated the harshness of the Tamra opinion in one respect; the fine distinction between public and private nuisances has been dulled in those cases where a party couples a right under the Abatement of Nuisances Law (the Kanowitz Law) and the Civil Wrongs Ordinance[374]. This combination essentially allows a party to sue for a public nuisance without proof of monetary loss. Yet the Kanowitz Law is available only for industrial pollution of streams and wadis which gives rise to unbearable odors; odorless industrial waste would give rise to no action. As to rights of private citizens in general against industrial pollution of streams and wadis, it will be necessary to discover what rights are available in Israel and the extent of their use. The second question can be answered in less space than the first, for there have been no recorded cases of private actions to abate pollution of surface water in Israel. Private parties do have the right to bring such actions under nuisance theory, or corporate law theory.

Nuisance actions by private citizens can be brought on both the criminal and civil side of the court. A civil nuisance action is closely circumscribed within statutory limits and is divided into public and private nuisances. Without a lengthy discussion of the distinguishing features of these two indistinguishable nuisances[375], it will suffice here to say that industrial pollution of a stream or wadi could create either a public or private nuisance under the Civil Wrongs Ordinance. For public nuisances, private parties must show actual out of pocket damages to recover against an industrial polluter[376]; for private nuisances, damage to their use of real property[377]. But if the party successfully shows damage to real property or out of pocket loss, the

courts are often at a loss to supply appropriate remedies. This judicial impotence stems both from judicial inadequacy, generally, in the face of environmental issues[378], and also from the common law rule of balance of conveniences used for measuring damages in nuisance action[379].

Under this balancing test, the court considers all the benefits and all the costs caused by the industry's pollution of the stream. The results are usually to penalize the industry as compensation to the injured party, but to allow the business to continue operating. Thus nuisance theory is of little help in preventing pollutant inflow from industrial sources. What private actions can achieve, however, by forcing industrial polluters to pay for their pollution of streams and wadis, is internalization of pollution costs[380]. This will act as an incentive to those presently polluting to clean up their wastes. It will also be considered a business risk by those investing in industrial ventures, thereby possibly preventing the establishment of polluting firms or forcing the early installment of pollution control devices

Nuisance theory used for the prevention of pollutant inflow from industry could thus be a positive force in reducing industrial pollution of streams and wadis, if it were not so tightly circumscribed by barriers to entry and lack of imaginative exits. Even in those nuisance cases where imaginative remedies have been initiated by the courts[381], the remedy is still local in nature. It solves a particular problem between particular parties and fails to provide the overall treatment needed for managing Israel's water resources. Further, nuisance theory

is hindered by problems of burden of proof, the cost of litigation to the private citizen and the time consumed by litigation[382]. It is therefore a potential weapon in the fight against industrial pollution of streams and wadis, but, at best, a deterrent more than an actual threat.

In addition to a private citizen's right to bring a civil action for a public or private nuisance, he has the right to bring a criminal action, or kovlana[383] under the following conditions. First the right to bring a kovlana exists only for laws listed in the Criminal Procedure Act. For prevention of water pollution, this means that a kovlana may be brought only for an alleged violation of the Kanowitz Law. As was pointed out earlier, this means, in essence, that the criminal action must be based on the alleged procreation of unbearable odors by defendant's pollution of a stream or wadi. Thus it is very limited in scope. Second the process for bringing a kovlana is time consuming because it involves a petition to the police and an appeal to the Attorney General. Thus water pollution could continue uncontrolled for an extended period. Third, because the kovlana is a criminal action, the burden of proof is heavily in favor of the defendant, and the court is limited in fashioning a remedial remedy. In short, the kovlana is an available tool for the punishing of water polluters in limited circumstances, but it is a blunt edged, unwieldy instrument.

[b] Stockholder Suits

Nuisance theory and the kovlana are hardly radical actions to be used in the fight against water pollution. A more modern approach advanced for abatement of corporate pollutant inflow is for stockholders of a polluting corporation to attack the management or policy of the corporation in which they hold shares. To effectuate this goal, two theories have been advanced, neither of which have been tested in Israel. The first is through positive action by shareholders through proxies. This theory, advanced in the United States during "Campaign GM"[384], is that shareholders can include in proxy contests resolutions, requiring the corporation to support social issues, including the installation of pollution abatement equipment. The argument advanced against the consideration of such issued by the corporation is as follows. Corporations are in the business of making a profit, and social issues are not compatible with corporate goals, and, in fact, may lead to a waste of corporate assets. On the other hand, it is argued, that if corporate directors are to consider social issues in their decision making, then resolution for the installation of water pollution prevention devices are compatible with the goals of the corporation and may be raised during shareholder meetings. This theory has been a dismal failure in the United States[385].

The second theory, with better chances for success, is shareholder suits against the corporate management for failure to prevent the corporation's pollution of surface water[386]. Shareholder or derivative suits can proceed along one of the following lines of action. The shareholders could attack corporate directors for negligent mismanagement

of the corporation by their failure to implement a pollution control plan, in light of State standards for pollution control. Proof of corporate mismanagement may be evidenced by failure on the part of the directors to prevent pollution by gradually phasing out old or inadequate machinery and wasteful methods of production. Failure by the directors to gradually improve the quality of the corporation's effluent, goes the argument, will cost the corporate stockholders much more money if the State later requires a crash program for pollution abatement. A second theory for shareholder derivative suits is that the corporate directors, by not abating pollution are violating legal standards of conduct. They have, therefore, breached their fiduciary duty to the corporation because, by their management tactics, the corporation is subject to criminal liability[387].

Both of the theories raised here for shareholder derivative suits are appealing because a derivative suit as an equitable suit, enabling a court to be more flexible in its remedies. Yet for corporate control of pollutant inflow, neither the proxy contest nor the derivative suit have been tested in Israel. Furthermore, the theories have potential applicability only to publicly held corporations. Non-incorporated business, government owned industry and closed corporations, i.e. the bulk of Israel's corporate structure, are immune to such theories. Finally, without promulgation of effluent standards by the Ministry of Agriculture, corporate stockholders have no basis to argue that corporate directors are violating legal standards of conduct.

[c] Citizen Attack of Administrative Action

Paralleling stockholder action against corporate directors is the possibility of citizen action against the Water Commissioner or the Minister of Agriculture under the Water Law. By the 1971 Amendment to the Water Law, the Knesset made it easier for private citizens to bring suit against the Minister of Agriculture and the Water Commissioner for their exercise of or failure to exercise statutory responsibility. The law allows a citizen to appeal a decision by the Minister of Agriculture or the Water Commissioner in the Water Court twenty one days from the date he is notified of the Minister of Agriculture or the Water Commissioner's decision to act or refuse to carry out their authority. This section of the law has unlimited possibilities. For example, it would allow a citizen to demand regulations for the quality of industrial effluent and upon the Minister of Agriculture's refusal to act, appeal to the courts for an order for such action.

Since no formal action has been taken by the Minister of Agriculture or the Water Commissioner under the 1971 Amendment to the Water Law, this citizen's action section has not been tested. It is also uncertain what action the courts will require to trigger operation of this section in a case where a concerned citizen's plea for action is greeted by the Water Commissioner or Minister of Agriculture's reply that regulations are being written or orders are being prepared. Despite the "ifs" surrounding the citizen's action section of the Water Law, it remains a powerful, although as yet undiscovered weapon in the arsenal protecting Israel's water resources.

[2] Municipal Point Sources

The preceding section was divided up into governmental and private attacks on industrial point sources of stream pollution. This section deals with suits against municipalities by government and the private citizen for pollution of streams and wadis resulting from municipal sewerage systems. In juxtaposition to the preceding section, where government but no citizen suits were brought against corporate polluters, here citizen, but no government suits have been brought against municipal discharges into streams and wadis. This is the result of custom, no law. Citizen suits against municipal sewerage plants have been brought under nuisance theory, codified in Israel under the Abatement of Nuisances Law and the Civil Wrongs Ordinance. The citizen suits to be discussed relate only to prevention of pollutant inflow from municipal sewerage systems.

It is nothing short of the absurd to note that the most costly and time consuming case against a municipal sewerage system related to Israel's famed Gush Dan sewerage plant. Planning for the Gush Dan plant began in 1959 by Tahal, with advice from a committee of distinguished scientists from several countries of the world. During a meeting with these scientists early in the plant's planning stages, one of the foreign experts asked the Israeli planners if studies had been performed to test the wind direction from the planned site and whether on the basis of these tests, there was sufficient distance between the site and the nearest existing or planned residential area[388]. According to the plant's planners, tests showed that the wind from the plant site blew in the direction of a planned residential area only

30 to 40 days a year, and a buffer area of one and one-half kilometers separated the plant from the planned residential site. This was considered adequate by the Israeli planners but the foreign experts repeatedly emphsized the importance of checking these data to prevent later public opposition to the plant site[389]. More than ten years later, with the plant not operating at full capacity, a judge of the Rehovot Magistrates Court held the operators of the plant in violation of the Abatement of Nuisances Law for causing unbearable odors which were a source of nausea, dizziness and sleepless nights to residents of surrounding settlements.

The case of Yitzhak Aran v. Mekorot began in the Rehovot Magistrates Court in 1971[390]. Several residents of moshavim surrounding the Gush Dan plant brought a criminal action or kovlana, for violation of the Kanowitz law aginst the operators of the plant, Mekorot, and the owners of the plant, the Association of Towns Gush Dan. The complaint alleged that unbearable odors emanating from the plant caused residents of the surrounding settlements to vomit and faint. In the magistrates court, both parties argued that the Kanowitz law, forbidding unbearable odors, could not be properly enforced without standards laid down by the Ministers responsible for its enforcement. The court accepted this argument, relying on earlier precedent in the Supreme Court[391], and dismissed the charge. On appeal, the District Court disagreed with the Magistrates Court and reversed the case for a decision on the merits[392]. Such decision, handed down in March, 1973, held the defendants guilty and required each to pay a fine in the sum of five hundred pounds[393]. In handing down the sentence, the Magistrate's

Court judge received testimony to the effect that present, proper maintenance of the plant prevented diffusion of odors beyond the confines of the sewerage works itself[394]. The court apparently felt that operation of the plant should, therefore, continue, but a token fine should be levied.

The importance of the Gush Dan case is not in its protection of surface water from pollution because the purified effluent from Gush Dan is not discharged into a stream or wadi. The case's importance rests in its deterrent effects on the operation of other municipalities' sewerage works. Aran v. Mekorot forces municipalities to consider appropriate measures for the purification of their citizens' effluent in planning and operating a waste water treatment system. The case may, therefore, have, indirectly, a positive effect on stream and wadi pollution caused by minicipal discharges.

Before leaving this issue of the effect of judicial decision making on the construction and maintenance of municipal sewerage works, it will be necessary to analyze the courts' attitude toward sewerage charges, levied by local authorities for the construction and maintenance of sewerage systems. The courts have not attacked sewerage construction and maintenance charges but they have clearly delineated their purpose and the local authority's responsibility in their collection. First a local authority may bill a party for sewerage construction after the system has been built; it need not send him notice beforehand[395]. Second, if the local authority intends to collect such a charge, it must pass a bye-law stating the type of charge

and whether it relates to construction of the system in stages or as completed[396]. Third, a local authority has no authority to require a party to pay a sewerage construction fee if once paid[397]. Payment of the construction fee, as the name implies, is for construction of the system. A firm's desire to expand its scope of operations, which expansion will result in a greater effluent discharge, does not empower the local authority to collect a second construction charge, unless the local authority intends to expand its sewerage system to meet added capacity. To meet the burden of added capacity, the local authority may levy a maintenance fee, which can be determined by water use, or in the case of industry, by quality of effluent.

(b) Control of Beneficial Uses

One of the supreme ironies of Israel water law is that in its determination to protect Israel's water sources by abrogating riparian rights, the Knesset may have succeeded in doing just the opposite. The Riparian Rights doctrine was fully abrogated by the Knesset in the Water Law of 1959 because it prevents development of a comprehensive program of water management. Yet the doctrine has its appeal. It recognizes the integral relationship between land and water in the watershed of a stream or lake[398]. It sets up a mechanism whereby those closest to the stream are to protect its waters for those users of the stream who use its waters within the confines of the watershed. Thus it recognizes the taking of stream water from the watershed and its return to the watershed in a continuous cycle of use and reuse.

This, granted, is an idyllic picture of the operations of riparian rights theory. It has its detriments and they are many, but its one positive feature is that a class of people is set up to protect stream waters for beneficial uses. This class does not exist in Israel. Under Israel water law, as codified and interpreted by the Supreme Court, no one has the right to receive water of a certain quality from a certain source[399]. If the source of one's supply is polluted, he has the right to request an alternate source of supply. He has no right to demand that the pollution be stopped due to the fact that "his" source of water is becoming polluted because he has no source of water that is "his".

The lack of a class of riparians may have been a significant factor allowing Israel's streams and wadis to reach their state of pollution. Yet, the fact that the Knesset sounded the death knell to riparian rights theory in 1959 does not mean that all common law theories for the prevention of water pollution for the protection of beneficial uses have been dead. Nuisance theory is very much alive and available for use in protecting commercial beneficial uses of streams and wadis. If a party can show that a discharge from a point or non-point source destroyed his enjoyment of real property or caused him to suffer monetary loss, he has grounds for a public or private nuisance under the Civil Wrongs Ordinance. On the other hand, nuisance theory, even coupled with the Kanowitz law, is of no help to those who use streams for pleasurable or recreational purposes. Thus just as the Water Law descriminates against recreational uses of Israel's surface water, so too does the common law theory of nuisances, as codified in the Civil Wrongs Ordinance.

Conclusion and Evaluation

The legislative framework for the protection of surface water has its weaknesses, but most of them could be corrected by effective administrative action. In the Water Law of 1959, as amended in 1971, the Knesset refused to recognize recreational uses to be legitimately protected by the Water Commissioner. Although this weakness was remedied in the Streams and Springs Protection Law of 1965, effective administrative action was not forthcoming. The Water Law of 1959 prohibited pollution of a stream which prevents its use for a designated purpose. Yet the Water Commissioner never designated stream waters for any of the law's declared beneficial uses. The Water Law of 1959 permitted the Minister of Agriculture to regulate the quality of streams and pollutant inflow. Yet the Minister ignored this legislative mandate.

Certain points in the existing legislative framework cannot be remedied by effective administrative action. They are local control over sewerage systems and effluent charges and the trifurcated control over quality of industrial sewage discharges. The Knesset intended to give the Water Commissioner full power to control the quality of all sources of water in 1959, including sewage sources. Yet this power has been slowly eroded by grants of power to local authorities and the Ministry of Health in the area of quality and reuse of sewage. This trend must be reversed by effective legislation.

More disturbing than diffusion of authority in the area of control over sewage quality is the Water Commissioner's refusal to execute

the awesome powers granted him under the Water Law. He has essentially refused to operate within the guidelines of a declared, visible legal framework. The Water Commissioner has pointedly refused to issue discharge permits. Yet this is what the law impliedly demands of him when he approves a sewerage plan. The Water Commissioner prefers to work through gentleman's agreements, rather than through formal regulations siting polluters and banning the distribution and sale of polluting substances. The Water Commissioner has set up numerous ad hoc committees whose members will determine the fate of Israel's surface water sources. Yet there is no openly declared water policy guiding the deliberations of these committees.

Non-visibility gives the Water Commissioner tremendous flexibility in managing Israel's water sources. In addition, it makes the Water Commissioner's job more comfortable by limiting to a minimum confrontations with industry, agriculture and the public. Finally, it makes more difficult citizen suits against the Water Commissioner for incompetent administration of the Water Law. For it is just this non-visibility which has enabled the Water Commissioner to turn Israel's streams and wadis into open sewers without censure from a public, judicial or legislative body.

One final word about the judicial framework for the protection of surface water quality. It is true that the courts are not the proper forum for deciding policy questions on use and quality of streams and wadis. This does not mean, however, that nothing should be done in the case of a flagrant violation of the Water Law or the Ministry of

Health's conditions for industrial sewage. Violators of the Water Law and the Licensing of Businesses Law should be reminded by a court of law of the cost their criminality fosters on society.

Footnotes

1. "If a man has charged a man with sorcery and then has not proved [it against] him, he who is charged with the sorcery shall go to the holy river; he shall leap into the holy river and, if the holy river overwhelms him, his accuser shall take and keep his house; if the holy river proves that man clear [of the offense] and he comes back safe, he who has charged him with sorcery shall be put to death; he who lept into the holy river shall take and keep the house of his accuser." Code of Hammurabi §2, Driver & Miles, The Babylonian Laws (1955).

2. "Water is a chemical compound of unique properties and is too useful as a solvent and as a mechanical carrier to remain unused. The basic problem in water quality management and control is that of determining the degree to which the available amounts of water can (or should) be used as a receptacle and transport mechanism for the discarded by-products of civilization." Recommendations of the Study Panel to the California State Water Resources Control Board for Legislative Changes and Administrative Practices Relating to Water Quality 13 (1969) [Hereinafter cited as Recommended Changes.]

3. Section Six of the Water Law declares the right to use water subject to one of the following conditions: domestic; agriculture; industry; handicraft, commerce and services; public services.

4. Although there are a few Israel streams flowing east into the Jordan and the Dea Sea, it was decided not to discuss them for three reasons. First, the question as to Israel's eastern boundaries is unsettled, including its border, if any, on the Jordan River. Second, some of the eastern flowing streams and the headwaters of the Jordan will be discussed as they relate to the Kinneret basin. Third, most of Israel's population lives near, affects and is affected by those streams flowing into the Mediterranean Sea.

5. The data presented below on size of stream flow, natural level of flow and size of catchment basin were taken from the Hydrological Year Book of Israel 1970/71, Ministry of Agriculture - Water Commission - Hydrological Service (1972). Unless indicated elsewhere, general data on sources of pollution were taken from Y. Raveh, Sources of Stream Pollution in Israel, Nature Reserves Authority (1973) (Hebrew).

6. H. Saliternik, Water Quality in Israel, Israel National Council for Biosphere and Environment 122 (1973). [Hereinafter cited as Water Quality in Israel.]

7. Id.

8. Raw sewage from Lower Nazereth and treated sewage from Upper Nazereth is dumped into Nahal Majra, which is a tributary of the Qishon. A Comprehensive Sewerage Plan for Israel Part Two, Individual Engineering Reports, Vol. 3, A-7 (1971). [Hereinafter cited as Sewerage Plan for Israel, Part Two.]

9. Avital, et al., Health Study of Nahal Qishon & Yovlin, Ministry of Health - Haifa District at 90 (1972). [Hereinafter cited as Health Study of Nahal Qishon.] The estimated fish catch by sport fishermen in 1971 was 150 tons. Id. at 8.

10. Id. at 26; Study of the Collection, Purification & Exploitation of Sewage 1971, Ministry of Agriculture - Water Commission - Division of Water for Agriculture & Sewage, at 31 (1972). [Hereinafter cited as Collection, Purification & Exploitation of Sewage.]

11. Health Study of Nahal Qishon, at 16.

12. Id. at 16; Collection, Purification & Exploitation of Sewage, at 31. "Nahal Gadura is so polluted, it would be difficult to find specific input sources." J. Kronfeld & S. Mandel, Investigation of Cd, Co, Cr, Cu, Ni, Pb and Zn in the Waters and Sediments of the Qishon-Gadura River System, and Its Implications to Groundwater Quality, Hebrew University, at 8 (1973).

13. Y. Zak, Study of Nahal Daliya, at 1 (1973)(Hebrew).

14. Y. Zak, Study of Nahal Taninim, at 1 (1973) (Hebrew).

15. Id.

16. K.T. 2881, 5732, p. 1510.

17. Balasha-Yalon, Master Plan for Sewerage in Hadera Area 19, 22, 40 (1972).

18. For a description of the disposal of Netanya's wastes and the interruption of the Avihail near Kfar Vitkin, see Prozinin, Stream Pollution in the Northern Sharon: The Connection between Geographical-Settlement Conditions and the Type of Political Organization for Treatment of the Streams 32-38, August, 1973 (Unpublished thesis in the library of the Geography Department of the Hebrew University, Jerusalem). On a tour of the treatment area on January 1, 1974, I was greeted by a resplendent display, some three meters high, of detergent foam at the continued "headwaters" of the Avihail. R.L.

19. M. Agami, Effect of Pollution on Plant Life in Nahal Alexander and the Yarqon 4, June, 1973 (Unpublished thesis, University of Tel-Aviv.)

20. Water Quality in Israel at 132.

21. Agami, supra note 19 at 6; Zak & Gilboa, Nahal Yarqon -- Sanitary Quality, Nature Reserves Authority (1974) (Hebrew).

22. Agami, supra note 19, at 6.

23. The figure is 16,500 cubic meters a day. Collection, Purification & Exploitation of Sewage at 46.

24. Measurements of the Yarqon in March 1, 1974 showed hydrogen sulfide had reached concentrations above the measuring capability of the machines used. M. Natan, I. Isili, Study of Air & Olfactory Pollution from the Yarqon, Ministry of Health, at 2 (1974).

25. Collection, Purification & Exploitation of Sewage at 82.

26. Zak, Nahal Lakhish, Nature Reserves Authority (July, 1974).

27. Id. at 90.

28. Water Law §20B(b).

29. Water Law §20K.

30. Water Law §20A.

31. M. Bernarde, Our Precarious Habitat, 136 (1970).

32. Unless otherwise indicated, the description of chemical pollutants is taken from numerous sources, including the following. M. Bernarde, Our Precarious Habitat, 136-38 (1970); A. Freeman, R. Haveman, A. Kneese, The Economics of Environmental Policy, 53-62 (1973); Ackerman & Sawyer, The Uncertain Search for Environmental Policy: Scientific Factfinding & Rational Decisionmaking Along the Delaware River, 120 U.Pa.L.Rev. 419,436-71 (1972). For a quick reference in Hebrew, see S. Kishoni, Industrial Liquid Waste as a Source of Water Pollution, in Man in an Antagonistic Environment 161, Israel Nat'l Council for Biosphere and Environment (Marinov ed. 1971) [Hereinafter cited as Man in an Antagonistic Environment.]

33. A normal fish population requires a minimum of 5 milligrams of dissolved oxygen to one liter of water and a minimum of 8 mg/l of dissolved oxygen for a 24 hour period. At no time should the oxygen level drop below 3 mg/l. For a coarse fish population, dissolved oxygen should not be below 5 mg/l for more than 8 hours of a 24 hour period and never below 2 mg/l. T. Camp, Water & Its Impurities, 119 (1963).

34. Two other modern tests for oxygen demand, not discussed in the text, are expressed as Chemical Oxygen Demand (COD) and the volatile solids tests. The COD test consists of reacting a sample of organic waste with strong chemicals at high temperature. The volatile solids test consists of burning a dried portion of the waste at 600 degrees centigrade to measure its oxygen load. J. Sartor, G. Boyd, Water Pollution Aspects of Street Surface Contaminants, 50, EPA Report (1972).

35. It has also been described as follows. BOD is measured by feeding waste to bacteria and measuring the oxygen breathed during a five-day period. Id.

36. Known in the trade as nitrogenous oxygen demand or Second Stage Ultimate Oxygen Demand (SSUOD). Ackerman & Sawyer, supra note 34, at 440.

37. Known in the trade as either carbonaceous oxygen demand or First State Ultimate Oxygen Demand (FSUOD). Id.

38. Known in the trade as benthic oxygen demand. Id. at 441.

39. In the Minister of Agriculture's committee report on the classification of streams, eight parameters, including BOD were included in the recommended regulations for ambient stream quality.

40. Often called "persistent" or "exotic" pollutants. See Freeman, Haveman, Kneese, supra note 34, at 59.

41. Toxic Substances at 3, EPA Report (1971). "Approximately 9,000 synthetic organic compounds were in commercial use in 1968." Id. Most synthetic organic compounds are obtained from coal, crude petroleum, natural gas, wood, vegetable oil, fats, resins and grains. Id:

42. Id. at 13.

43. Id. PCB's activate metabolic enzymes in the liver and cause the breakdown of certain hormones, possibly resulting in changes in reproduction. Emmelin, Environmental Contamination by PCB in Sweden, 1 J. of Env'l Planning 44, 45 (1972).

44. Toxic Substances, supra note 43, at 14.

45. See, K. Mellanby, Pesticides & Pollution, 52-54 (1967).

46. Toxic Substances, supra note 43, at 13; Rudd, Pesticides & the Living Landscape, 5 (1970).

47. 0.005 of a pound of endrin in three acres of water one foot deep is acutely toxic to fish. O. Herfindahl & A. Kneese, Quality of the Environment: An Economic Approach to Some Problems in Using Land, Water & Air, 16 (1965). An application of DDD to gnats in Clear Lake, California resulted in an increase in the gnat population and the death of the bird population (grebes) that nested there. Studies showed that the DDD concentration in grebe livers was 80,000 times greater than the lake concentrations. R. Rudd, Pesticides & the Living Landscape, 251 (1970).

48. Freeman, Haveman, Kneese supra note 32 at 58.

49. Id.

50. Toxic Substances. Mercury remains active in aquatic environments for 10 to 100 years. K. & P. Montague, Mercury, 23 (1971).

51. Toxic Substances, supra note 41, at 11.

52. Santaniello, Water Quality Criteria and Standards for Industrial Effluents, 4-30, in Industrial Pollution Control Handbook (Lund ed. 1971).

53. An example in Israel is pollution of Nahal Daliya by boron discharged from the Zohar detergent factory. Water Quality in Israel, 130.

54. Santaniello, supra note 52, at 4-31.

55. M. Bernarde, Our Precarious Heritage, 136 (1970).

56. E. coli (escherichia Coliform) are not considered pathogenic but the presence of 100 to 1,000 per 100 milliliters of water indicate potential contamination by other bacteria. Hogge, Bacterial Contamination of Water, 113 in The Pollution Reader (De Vos et al. ed. 1968). In Israel, the presence of 2 or more coli per milliliter of water is suspect. Standards for Drinking Quality, K.T. 3117, p. 556.

57. Interview with Badri Fatal, Environmental Health Laboratory, Jerusalem, Jan. 20, 1973. The tests are expensive because they include cell growth. Id.

58. See, Santaniellok supra note 52, at 4-27.

59. Id. at 4-28

60. Ackerman & Sawyer, supra note 32, at 446.

61. Santaniello, supra note 34, at 4-24.

62. Id.

63. Id.

64. Heat, by raising water temperature, both reduces the amount of oxygen in water and also prevents fish from reaching the oxygen at the air-water interface. Comment: Thermal Electric Power & Water Pollution: A Siting Approach, 46 Ind. L. J. 61, 68 (1970).

65. At 40 degrees Centigrade, fully saturated fresh water contains 13 mg/l oxygen, while at 27 degrees Centigrade, it contains only 8mg/l. Ackerman & Sawyer, supra note 34, at 456.

66. The ocean gets the bulk of Israel's untreated sewage. Only 35% of Israel's sewage was treated in 1970. Data on the collection and treatment of domestic sewage have been gathered into one volume, Study of Collection, Purification and Exploitation of Sewage 1971, Ministry of Agriculture - Water Commission (1972).

67. See, Freeman, Haveman, Kneese, supra note 34 at 60.

68. Collection, Purification & Exploitation at 3.

69. "There is not one local authority with an elementary sanitary solution to its sewage problems". G. Shelef, Disposal & Treatment of Sewage in Israel in Man in an Antagonistic Environment, 157. "Not a single sewerage system in Israel is completely adequate". A Comprehensive Sewerage Plan for Israel, Part I, Project Report, vol. I, 1-3 (1971). In a study performed in 1956 for the United Nations, it was noted that the operation of sewage treatment plants in kibbutzim and small towns

was poor or non-existent. "In some instances, the plant was covered with brambles to testify to the neglect". S. Heukelekian, Report to the Government of Israel on the Agricultural Utilitization of Sewage 53 (F.A.O. 1956).

70. A study of the Haifa plant and its history was performed by the State Comptroller in 1964. Report of the Inquiry into the Establishment of the Sewage Purification Plant in Haifa, State Comptroller (1964) (Hebrew).

71. See Collection, Purification and Exploitation 14; Interview with Mair Vachinsky, Section on Water for Agriculture and Sewage, Water Commission, Dec. 3, 1973; Shelef, supra note 71 at 158. The Haifa plant only serves 50% of the City, however. Id.

72. In aeration, oxygen is supplied by mechanical devices to speed up the natural biological decomposition process. In lagooning, the sewage is discharged into long, narrow, shallow channels to speed up decomposition. For activated sludge, microorganisms and oxygen are pumped in to break down organic compounds. For a more detailed description of these processes, see Spencer, Pollution Control in the Chemical Industry 14-29, in The Industrial Pollution Control Handbook (Lund ed. 1971); Lewin, Gordon & Hartelius, Law & the Municipal Ecology, 114, 115 (1970).

73. Collection, Purification & Exploitation at 31.

74. There are numerous reports on the Gush Dan Project. Of special interest are the following. A. Amramy, Re-Use of Municipal Waste Water, speech delivered at the International Conference on Water for Peace, Washington, D.C. (1967); Board of Review in the Dan Region Sewage Recharge Project, Conference held in New York, Oct 11, 12, 1962; Report, Summary of Discussions by Council for Disposal and Re-Use of Gush Dan Sewage, Tahal (1966) (Hebrew).

75. Haskins, Toward Better Administration of Water Quality Control, 49 Ore. L. Rev. 373, 374 (1970).

76. Cost of Clean Water. Vol. II Cost Effectiveness & Clean Water 25, EPA (1971).

77. The Tiberias sewage plant, with removal of BOD to 85% only reduced viruses by 24%. Shuval, Public Health Aspects of Water-Borne Enteric Viruses 39 (HEW 1971).

78. Exploitation of Sewage -- Principles & Data for the National Plan, 14, Tahal (1972).

79. H. Saliternik & D. Souid, Poisonous Metals in Gush Dan Sewage & their Potential Effect on the Gush Dan Reclamation Plant 32, Tahal (1971) (Hebrew).

80. See G. Shelef & A. Wachs, Recycling & Reuse of Sewage in Man in an Antagonistic Environment, 205.

81. Exploitation of Sewage, supra note 79, at 16.

82. Shelef & Wachs, supra note 81 at 206.

83. Shelef supra note 69, at 158-59

84. Dalinsky, Development of Surface Water Sources, Part B, Master Plan, 1973-1988, at 1. Tahal (1973) (Hebrew).

85. Id. at 10.

86. Id. at 15.

87. Id. at 17.

88. Collection, Purification & Exploitation, at 2, 3. For a discussion of agricultural use of sewage in Israel and limitations on such use, see Hershkovitz, et al. Utilization of Sewage for Crop Irrigation, Ministry of Agriculture - Water Commission (1969).

89. Exploitation of Sewage -- Principles & Data, supra note 80, at 15.

90. Id.

91. Shuval, Health Factors in the Re-Use of Waste Water for Agricultural, Industrial and Municipal Purposes 78, in Problems in Community Waste Management (WHO 1969).

92. Shuval, Public Health Implications of Waste Water Utilization, 2, presented to Int'l Conf. on Water for Peace, Washington, D.C. 1964.

93. "There is undoubtedly a direct relation between sewage collection and disposal and mortality rates from gastro-enteritis and other intestinal diseases." A Comprehensive Sewerage Plan for Israel at IV-3.

94. Id. at I-4, IV-4. Real economic costs of the cholera epidemic are estimated to be over IL 2 million. Id. at IV-4.

95. Id. at IV-4.

96. Compare S. Heukelakian, supra note 71, at 5, with M. Bernarde, Our Precarious Habitat 142 (1970).

97. Shuval, Water Pollution Control in Semi-Arid and Arid Zones 303, in 1 Water Research 297 (1967).

98. The high organic content of sewage binds soil particles improving soil quality. Hershkovitz et al., supra note 85 at 14.

99. See P. Dar, Plan for the Exploitation and Disposal of Sewage Effluent from Central Israel at 7, Tahal (1973); Green Land -- Clean Streams, Converting Sewage into Valuable Green Growth & Pure Water Through Land Treatment, Center for the Study of Federalism, Temple Univ. (1972).

100. Prozinin, supra note 18, at 29.

101. "The term "point-source" means any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, funnel, conduit, mill, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft from which pollutants are or may be discharged", Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. 1151 (1972).

102. Couzens, State Control of Water Pollution: The California Model, 1 U.C.D.L.Rev. 1,2 (1969); Impact of Fertilizers & Animal Waste Products on the Quality of Waters 1, 51 OECD (1973).

103. I. Argman, S. Alphi, G. Shelef, Mathematical Model to Predict Concentrations of Dissolved Oxygen in Nahal Alexander 42, 43 (1972) (Hebrew) (Translated into English in Advances in Water Pollution Research, Proceedings of the 6th Int'l Conf. held in Jerusalem 271 (Jenkins 1973).

104. See Lahav & Cahanovitz, Pollution of Soil & Water by Agricultural Pesticides, at 71, Tahal (1973).

105. An Evaluation of DDT & Dieldrin in Lake Michigan, EPA Ecological Research Series 2, 3 (1972).

106. Lahav & Cahanovitz, supra note 104, at 69.

107. Id. at 73.

108. Id.

109. The dumping of unwanted pesticides by airplanes polluted badly at least one well in Israel. Shuval, Problems of Water Pollution in Israel 17, in Prevention of Pollution of the Ocean and Ground Water by Oil, Israel Oil Institute (1973).

110. K. Mellenby, Pesticides & Pollution 91 (1967).

111. Efficient Use of Water and Disposal of Sewage in Industry 11, Assoc. of Architects and Engineers (1964).

112. Water in Israel, Part A at 16.

113. Collection, Purification & Exploitation at 9.

114. Avital et al., Health Survey of Nahal Qishon, at 26. The refinery discharges this water into the Qishon at 55 degrees, more than 30 degrees higher than the highest natural temperature recorded for the Qishon. A. Litai Stream Pollution, in Man in an Antagonistic Environment 186, 187.

115. Summary of Water Uses in Industry for the year 1970-71, Water Commission (1971). For a look at industrial sewage in a tannery, chrome plating plant, plant producing alcohol from molasses and the Hadera Pulp and Paper Mill, see H. Cohn & S. Loeb, Industrial Waste Water Treatment in Israel Using Membrane Processes, Nat'l Council for R & D (1973).

116. Water in Israel at 16. Water consumption amongst the largest industrial users rose from 19 MCM in 1963 to 26.2 MCM in 1972, a rise of only 38%. Selbst, Water Consumption in Comparison to Industrial Investment in the years 1962-1972, at 3, Water Commission (1974).

117. Shuval, Public Health Implications of Waste Water Utilization, supra note 89.

118. Couzens, supra note 98, at 3. This is also true in Israel. The strength of industrial effluents polluting the Hadera are equivalent to a population of 70,000, whereas the actual population today is close to 60,000. Balasha-Yalon, Master Plan for Sewerage in Hadera 6, 53 (1972).

119. Study of Industrial Effluents in the City of Petach-Tikvah, Ministry of Health - Central District (1973).

120. Couzens supra note 98, at 3. For a study of sewage from the electroplating industry in Tel-Aviv, see Saliternik and Souid, Poisonous Metals in Gush Dan Sewage and their Potential Effect on the Gush Dan Recycling Plant, Tahal (1970) (Hebrew).

121. Health Survey of Nahal Qishon; See also A. Litai, supra note 114. An additional study by researchers from the Hebrew University found significant amounts of cadmium, chromium, lead and zinc in sediments of Nahal Gadura. See Kronfeld & Mandel supra note 12, at i.

122. Since no standards for receiving waters or effluent waste have been adopted in Israel, a look at generally acceptable standards for industrial pollution in the United States will clarify the numbers expressed above for industrial waste received by the Qishon and her tributaries. pH is an expression of the acidity or basicity of a pollutant. Due to potential tearing of the eyes, pH levels in waters where swimming is allowed (primary contact recreation waters) should be between 6.5 and 8.3. For public or municipal supplies, permissible concentrations is 6.0 to 8.5. For waters with aquatic life, pH should be between 6.0 and 9.0 unless the waters are saline, and then no change of pH above or below 1.0 is allowed. Total dissolved solids (TDS) is a measure of all the minerals in an effluent. For municipal water supplies, TDS should not exceed 500 mg/l because of its effect on taste, smell and corrosion, especially with high levels of sulfate and chlorides. For water used in irrigation, TDS is preferred below 500 mg/l, but it may be used on some plants at

concentrations reaching 5,000 mg/l. Ammonia affects aquatic life at 1 mg/l. and it is not allowed in public water supplies above 0.5 mg/l. Cadmium is absorbed by the human body and preferably should be absent from municipal water supplies, although it is permitted to 0.01 mg/l. In agricultural use cadmium is not allowed above 0.005 mg/l because of its cumulative effects on man. Copper should preferably be virtually absent from public water supplies. It is known to be toxic to fresh water plants at 0.5 mg/l and to shell fish at 0.1 mg/l. Santiello, supra note 52, at 4-23.

123. Health Survey of Nahal Qishon at 90.

124. See M. Hen, Oil & Oil Products as a Source of Water & Ocean Pollution, in Man in an Antagonistic Environment, 168, 170.

125. Health Survey of Nahal Qishon at 24.

126. Water Quality in Israel 36, 40, 44. Cost of hard water to the housewife is estimated (at 1968 prices) to be 14 pounds (lirot) per month. Id. at 44.

127. Hirshkovitz, supra note 85, at 11.

128. Collection, Purification & Exploitation at 9.

129. Id.

130. See Comprehensive Sewerage Plan for Israel at IV-6.

131. Water Quality in Israel at 138.

132. See Water Pollution 1970, Part III at 942, Senate Sub-committee on Air & Water Pollution, 91st Cong., 2nd Sess. This is true of domestic sewage in Israel, as well. See A. Feinmesser, Survey of Sewage Utilization for Agricultural Purposes in Israel, published by the Ministry of Agriculture - Water Commission.

133. Shuval, supra note 91 at 38.

134. Id. at 84. Lahav & Cahanovitz, supra note 104, at 73.

135. K. Mellanby, Pesticides & Pollution at 89.

136. Water Regulations(Forbidding Hard Detergents) 5734-1974, K.T. 3208, p. 1621. The regulations take effect in March, 1975.

137. Report of the Expert Group on Detergents 16, 17 (OECD 1973).

138. See Okun, Phosphates in Detergents, Bane or Boom? 2 Env'l Affairs 64 (1972).

139. See Report of the Expert Group on Detergents 15 (OECD 1973).

140. Santaniello, supra note 54, at 4-31.

141. Sartor & Boyd, Water Pollution Aspects of Street Surface Contaminants, EPS (1973). Similar results were achieved in tests in Sweden. See G. Soderland & H. Lehtenin, Comparison of Discharges from Urban Storm-Water Runoff in 6th Int'l Conf., supra note 99, at 309.

142. Interview with Y. Zak, Nature Reserves Authority, Jan. 1, 1974.

143. Robie, Water Pollution: An Affirmative Response by the California Legislature, 1 Env. L. Rev. 426 (1970).

144. Environmental Quality, Fourth Annual Report of the Council on Environmental Quality 175 (1973).

45. Public Law 92-500, 86 Stat. 816 (1972).

146. See §101, 103, 1200, California Water Code (West 1971).

147. It is impossible to list the number of books and articles discussing riparian rights theory. Some of those read for preparation for this material are as follows. Coulson & Forbes, On the Law of Waters (6th ed. 1952); 5 Powell, On the Law of Real Property (1956); Hanks, the Law of Water in New Jersey, 22 Rutgets 621 (1968).

148. Robie, Some Reflections on Environmental Considerations in Water Rights Administration, 2 Ecology L.Q. 695, 696 (1972).

149. California Water Code §120 (West 1971).

150. California Water Code § 13050 (West 1971).

151. A household use is reasonable even if the downstream riparian gets no water. Couzens, supra note 98, at 35.

152. California Water Code § 102, 1258 (West 1971); Craig, Prescriptive Water Rights in California and the Necessity for a Valid Statutory Appropriation, 42 Col. L. Rev. 219 (1954).

153. Robie, supra note 143, at 35.

154. California Water Code § 1201 (West 1972).

155. Couzens, supra note 102, at 35.

156. Id.

157. See Davis, Theories of Water Pollution Litigation, 1971 Wis. L. Rev. 738, 739 (1971).

158. See, e.g. Malakoff, Erosion of a Water Right, Or Just a Pile of Sand? 5 Calif. West. L. Rev. 44 (1968).

159. See Craig, California Water Law in Perspective, California Water Code LXVI (West 1971).

160. Recommended Changes, supra note 2, at 2.

161. California Water Code, Divison 7 (West 1971).

162. See Recommended Changes at 4, 5.

163. California Water Code § 13050 (West 1971).

164. Id. at Art. 3.

165. Id. at Art. 4.

166. Id. at §13524.

167. Recommended Changes at 19.

168. Robie, supra note 148, at 442.

169. See Hanks, Peace West of the 98th Meridian -- A Solution to Federal-State Conflicts over Western Water, 23 Rutgers L. Rev. 33 (1968); Westherford, Legal Aspects of Interregional Water Decisions, 15 UCLA L. Rev. 1299 (1968).

170. Federal Water Pollution Control Act Amendments of 1972 §308 (b), Publ.Law 92-500, 86 Stat. 816; Rivers (Prevention of Pollution) Act 1961, 9 & 10 Eliz. 2, c. 56p.582 §12 [against common law actions.]

171. A royal commission appointed to study the subject of trade secrets and effluents in England. concluded that very little useful knowledge can be gleaned from a competitor's wastes. Royal Commission on Environmental Pollution, Second Report: Three Issues in Industrial Pollution, Cmnd. 4894, at 1,2 (1972).

172. Water Law §20B(b).

173. Id. at §20K.

174. Id. at §20E.

175. Id. at §20H.

176. Except for drinking water. Id. at §20H.

177. Id. at §156A(6).

178. Id. at §21.

179. Water Rules (Water Use in Industrial Plants) 5725-1964, K.T. 1642 p. 284.

180. Water Law §20D(a)(2).

181. Id. at §20D(a)(4).

182. Water Regulations (Forbidding Hard Detergents) 5734-1974, K.T. 3208, p. 1621.

183. Water Law §20D(a)(1).

184. Licensing of Businesses Law (Amendment no. 1) 5732-1972, SH 666 p. 154.

185. Licensing of Businesses Law, 5728-1968, S.H. 537 p. 206 §5.

186. Id. at §6.

187. Licensing of Businesses Law, 5728-1968 (Amend No. 2) 5734-1974, S.H. 739, p. 100.

188. Water Law §156(a)(6).

189. Criminal Code Ord. 1936, Supp. I p. 74 § 198.

190. Local Authorities (Sewerage) Law, S.H. 376 p. 96 §49.

191. Id. at §47.

192. Id. at §55.

193. Id. at §43.

194. Id. at §6, 17, 18.

195. Id. at §37, 39(a).

196. Id. at §19,39(b).

197. By-Law for Association of Towns Haifa (Sewage Charge), 5721-1961, K.T. 894 p.1182; By-Law for Association of Towns Dan Area (Sewage Charge), 5722-1972, K.T. 2022, p. 1956.

198. For solution of this problem in Los Angeles, see P. Bergman & W. Gardner, infra note 334 at 774.

199. Water Law §20K.

200. California Water Code §13627.

201. Public Health Ordinance (Amend. No.5) 5733-1973, S.H. 710, p. 230 §3B.

202. Local Authorities (Sewerage) Law, S.H. 376 p. 96 §13.

203. Id. at §5.

204. Rules Concerning Cost of Purified Sewage, K.T. 1719, p. 1911.

205. Public Health Ord. (Amend. No. 5) 5733-1973, S.H. 710 p. 230 §65A.

206. Water Law §17.

207. See Appendix.

208. Soil Erosion (Prevention) Ord., 1941, P.G. I p. 37.

209. Soil Conservation Amendments, 5720-1960, K.T. 1007 p. 1036.

210. Water Law §20D(a)(2).

211. "Exception is taken to the existing practice in Israel according to which the Government and her ministries, do not execute water legislation with regard to Israel local authorities who violate the law." Water Quality in Israel at 23 (Heb) XXVIII (Eng.).

212. Id. at 196, 197.

213. Planning & Building Law, 5725-1965, S.H. 467 p. 307 §57,63.

214. Preferably under the Planning & Building Law. See Y.P. 2027, 5734, 1903. See also Public Health Ord. 1940 §7,9. Section 9 deals specifically with drainage from cemeteries.

215. Water Law §20D(a)(2).

216. See proposed amendments for oil pipes, Water Commission (1973).

217. See Declarations of National Parks and Nature Reserves in Dinim, Vol. 5, p.1879 (Vinograd ed. 1973).

218. Bye-law of the City Council of Tel-Aviv Concerning Protection of the Yarqon and the Beach and the Orderly Boating on the Yarqon, 5709-1949, K.T. 5 p. 125.

219. The titles used for most of the beneficial uses listed are taken from Freeman, Haveman, Kneese supra note 32 at 21,22.

220. See Dalinsky, Development of Surface Water Sources, Tahal (1973)(Hebrew).

221. M. Kantor, Water in Israel, 25 Years of the State, in Water in Israel 7, 9.

222. Some of those interviewed for this thesis remember those halcyon days. Raphael Teplitz, now health inspector for the Ministry of Health in Hadera used to swim in Nahal Hadera as a boy. Interview with R. Teplitz, Jan. 10, 1974.

223. Public Health Ord. 1940 §53.

224. Orderly Control of Swimming Law, 5724-1964, S.H. 434 p. 172.

225. Id. at §5.

226. Fisheries Ord. 1937, P.G. I p. 157 §5.

227. See, e.g. Bye-law for National Parks and Nature Reserves, 5727-1967, K.T. 2079, p. 2863 §20.

228. This is a serious problem in Nahal Soreq. See Knesset Council for Environmental Quality (Ecology), Summary of Action 4 (1973). Parts of Nahal Soreq have been declared nature reserve areas. K.T. 1733, 5725, p.2170; K.T. 2996, 5733, p.1194.

229. National Parks & Nature Reserves Law 5723-1963, S.H. 404, p. 149.

230. Nature Reserves Regulations (Orders & Conduct) 5729-1969, K.T. 3282, p. 1382 §15.

231. Kvutzat Zif-Zif v. Land of Israel Treasury Corp., C.A. 257/47, 11 P.D. 101.

232. The Minister of Health has authority to devise rules for the purification of sewage to be used for irrigation and other gainful purposes. Discussion above relates to streams used for irrigation and not sewage; although it is difficult to distinguish between the two.

233. Such regulations have been issued. Pesticide Residues in Food, 5731-1970, K.T. 2632 p. 131.

234. See Ackerman & Sawyer, supra note 37, at 424. Those championing the cost benefit approach to achieving water quality include the following. Haskins, Towards Better Administration of Water Quality Control, 49 Ore. L. Rev. 373 (1970); Morse, The Cost of Purity: Use of the Effluent Charge in Water Quality Control & Management, 7 Val. L.Rev. 169 (1973); Roberts, River Basin Authorities: A National Solution to Water Pollution, 83 Harv. L. Rev. 1527 (1970).

235. "Essentially the effluent charge system attempts to solve the problem economists refer to as the external diseconomy of water pollution: as long as water is considered a "free good", many users will not internalize the cost of their own water use; instead, these costs will be passed along to other users. Morse, supra note 234 at 170-71. Also see Johnson, An Optimal State Water Law: Fixed Water Rights & Flexible Market Prices, 57 Va. L. Rev. 345, 360 (1971).

236. The freeloader is that party who refuses to pay for the benefits he receives from society, knowing that others will pay for him. For example in Israel, a freeloader commonly found is one who refuses to pay his television charge, knowing he will receive his dose of T.V. anyway. For freeloader problems in environmental issues,

see Calabresi & Melamed, Property Rules, Liability Rules and Inalienability: One View of the Cathedral, 85 Harv. L. Rev. 1089, 1098, 1127 (1972).

237. The watershed system of the Ruhr River, in which effluent charges are levied on discharges in order to distribute the costs of water quality operations. The Ruhr system is the darling of American legal scholars on water pollution control. See E.G. Dolan, TAANSTAAFL, The Economic Strategy for Environmental Crises 37 (1971); Kneese, Water Quality Management by Regional Authorities in the Ruhr Area, in Controlling Pollution, The Economics of a Cleaner America 115 (Goldman ed. 1967); Morse, supra note 234.

238. N. Selbst, An Economic Approach to the Problems of Water Pollution Prevention, Water Commission (1972).

239. Note: Cost Benefit Analysis and the National Environmental Policy Act of 1969, 24 Stan. L. Rev. 1092,1102 (1972); Can Cost Benefit Consider Future Generations? B. Commoner, The Closing Circle, at 206 (1971).

240. "Planning has no intrinsic value. It is given meaning only through the people it affects and by the way it determines their future. Without reference to the social environment, it serves, and by which in turn it must be controlled, it is worthless." R. Nilson, Toward a Philosophy of Planning: Attitudes of Federal Water Planners. 29 EPA (1973).

241. See Bergman & Gardner, note 334 infra.

242. See Ackerman & Sawyer, supra note 32 at 427.

243. See Hanks, The Law of Water in New Jersey, 22 Rutgers L. Rev. 621, 668. (1968). But see Levanthal, Environmental Decisionmaking and the Courts, 122 U.Pa. L. Rev. 509 (1974).

> "No program that consists of 'thou shalt not' laws will effectively solve the environmental crises. Environmental control and protection must be viewed as only one facet of the overall problem of deciding how, when and for what purpose, and by whom the resources of the United States are going to be used and developed." Juergensmeyer, The American Legal System and Environmental Pollution, 23 Fla. L. Rev. 439, 447 (1971).

244. See discussion infra p. 225.

245. Water Law §20R.

246. Interview with Dr. J. Goldschmidt, Head of Section on Water Pollution, Water Commission, April 5, 1974.

247. Annual Report to the Finance Committee of the Knesset at 3, December 29, 1972.

248. Interview with Y. Yanai, Head of Section on Water for Industry, Water Commission Jan. 13, 1974.

249. 33 U.S.C. 1151 (1970). "The historical approach to water pollution problems in the United States was to set in-stream water quality standards and control facilities to treat liquid wastes flowing into those streams", Brunson, Improving Water Quality Management Planning in Non-Metropolitan Areas 9, EPA (1973).

250. 33 U.S.C. 1160(c) (1970).

251. Federal Water Pollution Control Act Amendments 1972, §402.

252. See e.g., Freilich, Missouri Law of Land Use Controls: With National Perspectives, 42 U.M.K.C. L. Rev. 1 (1973).

253. See the criticism of the system in action in Schoenbaum, The efficacy of Federal and State Control of Water Pollution on Intrastate Streams, 14 Ariz. L. Rev. 1 (1972).

254. Standards for drinking water are fine. Drinking water flows in a closed channel and may be checked continually to determine if the water meets the criteria established for its single essential use. But not so streams. They flow in open channels, cannot be easily checked and are used for a multiplicity of uses.

255. Schoenbaum lists the following as deficiencies in the classfication system: (1) the system referees various conflicting uses rather than protects stream quality; (2) the focus is on a particular stream segment, not on the river basin or hydrologic unit; (3) most of the streams were assigned the two last categories and the classifications were never updated; (4) the stream classification system emphasizes industrial and commercial uses of surface water and ignores recreational uses. Schoenbaum, supra note 253, at 9,10.

256. See Goldman, Legal Aspects of Town Planning in Israel, Institute for Legislative Research and Comparative Law, Hebrew University (1965); Terlo, Environment and the Law in Israel, 13 Pub. Admin. 11 (1973).

257. Planning and Building Law 5725-1965, S.H. 467 p. 307 §49.

258. Pending before the National Planning Council at present are separate plans for exploitation of surface water and for a national sewerage network. The idea here is to integrate all of these plans under a master water plan for Israel.

259. Planning and Building 1965 (Amendment No. 4) 5723-1973, S.H. 710 p. 228 §100.

260. Water Law §20L(a) and 20L(e).

261. Ackerman & Sawyer, supra note 32 at 423.

262. One of the most serious questions raised in opposition to regional waste water treatment centers is the conflict between the regional treatment center authority and the municipality it serves. There could be conflicts in the regional authority's right to inspect and build sewerage lines, collect sewage charges and inspect and monitor discharges into the sewerage system. Amramy, Re-Use of Municiapl Waste Water, speech before the Int'l Conf. on Water for Peace, Wash., D.C. 1964. Another serious conflict which will arise will be that between the city's desire for more (and often heavy) industry, and the sewerage authority's desire to decrease or maintain sewage flows. Id. at 10.

263. Drainage and Flood Protection Ord. §3(b).

264. Such inspectors presently exist. Interview with Haim Levy, Deputy Legal Counsel, Responsible for Drainage Affairs, September 18, 1973.

265. Interview with Ora Tamir, Legal Advisor, Water Commission, April 28, 1973.

266. Saliternik & Souid, Poisonous Metals in Gush Dan Sewage & Their Effect on the Gush Dan Reclamation Plant, Tahal (1971)(Hebrew).

267. Interview with Y. Zak, Nature Reserves Authority, Jan 1, 1974.

268. Survey of Industrial Sewage in Industrial Area, City of Kfar Saba, Ministry of Health, Central District (1974).

269. The lack of data has made individual studies practically impossible. See Saliternik & Souid, supra note 264, at 9. Industry has not been cooperative for their part. See H. Cohen & S. Loeb, Industrial Waste Water Treatment in Israel Using the Membrane Process, Nat'l Council for R & D 7 (1973).

270. All tests performed by the Ministry of Health are to be performed according to Standard Methods for the Examination of Water, Sewage and Industrial Wastes of the American Public Health Association. Special Conditions for Industrial Discharges of Liquid Waste into Sewers or Pipes §9 (1963). The need for a state wide standard testing procedure is stressed in Analytical Quality Control in Water & Wastewater Laboratories, EPA (1972).

271. 1972 Annual Report at 3; 1973 Annual Report at 3.

272. In response to a question on the quantities of industrial discharge polluting Israel's water sources, the former head of the Water Commission's section of Water for Industry said: "As to the question of amounts...the truth is that we have done no study of quantity." Man in an Antagonistic Environment at 176.

273. 1972 Annual Report at 3; Interview with Y. Yanai, Head of Dept. of Water for Industry, Water Commission, November 27, 1973, January 13, 1974.

275. Yanai Interview, January 13, 1974. The following firms have received orders:

Firm name	Place of Business	Type of Business
1. Alubin	Kiryat Bialik	Metals
2. Yachin	Kfar Saba	Packaging oranges
3. Ahim Markus	Petach Tikvah	" "
4. Pardess	" "	" "
5. Shamtan	Hod haSharon	Motor Oil
6. Preekoz	" "	Preservatives
7. Yitzhar	Tel-Aviv	Cooking oil
8. Hadera Paper	Hadera	Pulp paper mill
9. Zohar	Kibbutz Daliya	Detergents
10. Gat	Givat Haim	Preservatives
11. Sharsharot Co.	Bet Shemesh	Metals
12. Galnait	Or Akiba	

276. Water Law §20K.

277. Yanai Interview. See Water Rules (Use of Water in Industry) 5725-1965, KT 1642 p. 284.

278. Efficient Use of Water in Industries and the Disposal of Industrial Sewage. [Engineers & Architects Society of Israel, Technical Council (1964). [Hereinafter cited as Efficient Use of Water in Industries.]

279. Encouragement of Capital Investments Law, 5710-1950, SH 41 p. 129.

280. Interview with Saul Arlozeroff, Ass't Water Commissioner, November 24, 1973.

281. In a year and a half of operation, only two firms have filled out the requisite forms. In addition, the form is so general that an answer of no pollutant effect has been accepted. Interview with Ron Etzion, Environmental Protection Service, August, 1974.

282. Planning & Building Law, 5725-1965 §18.

283. Yanai Interview.

284. Id.

285. Water Law §23.

286. The facts of this "case" were related to the author by Y. Yanai, Head of the Dept. of Water for Industry, Water Commission. The story was checked out with the new manager of Tene-Off (formerly Armorcoor) who remembered other facets of the case, e.g. the differing requirements for quality of effluent demanded by the City of Hadera, the Ministry of Health and the Water Commission. Interview with Y. Shinhav, July 28, 1974.

287. This was Mr. Yanai's descriptive phrase.

288. Balasha-Yalon, supra note 118, at 42.

289. Water Regulations (Special Payment) 5733-1973, KT 2969, p. 779 §2.

290. Id. at §5, 6.

291. Balasha-Yalon, supra note 118 at 42. The company received a water allotment of 48,000 cubic meters in June, 1974, on the condition that it find a solution to its sewage problem within four months. Shinhav Interview.

292. And to those researching in the water pollution prevention field. See Saliternik & Souid, supra note 266 at 10.

293. Yanai Interview.

294. See Collection, Purification & Exploitation for details.

295. That is if the sanitary sewage is separated from the waste produced by industrial processes.

296. Interview with Rafael Teplitz, Health Inspector, Ministry of Health-Hadera, January 9, 1974.

297. See Study of Industrial Waste in Petach Tikvah 3, Ministry of Health - Central District (1973)(Hebrew).

298. See Study of Industrial Sewage in Kfar Saba at 17, Ministry of Health - Central District (1974)(Hebrew).

299. See Study of Industrial Waste in Petach Tikvah, supra note 277, at 4, 5.

300. "Our checks revealed that essentially there is no supervising and monitoring of sewage flowing into the special system for non-sanitary industrial waste. Essentially, it could be said that the city has lost all control over industrial hook-ups, and that industry is hooking up to the system without any pretreatment processes and without advance permission from the city." Study of Industrial Sewage in Kfar Saba, supra note 298, at 12.

301. The Minister of Agriculture is to consult with the Minister of Health in writing regulations for quality of sewage. Water Law §20M(b). Yet there is no requirement that both ministers issue the same regulations.

302. Health's present criteria for industrial effluent discharged

into municipal sewerage lines require a BOD standard which has not been approved by the Water Commissioner. See Special Conditions, supra note 267, §4.

303. At present not done. See Study of Industrial Waste in Petach Tikvah, supra note 297, at 8.

304. In the Case of the Kosher Chicken, the Ministry of Health demanded that Armorcoor's sewage be dumped in the ocean. The Water Commissioner demanded that the sewage be sprayed over Hadera's sand dunes. The City objected to both proposals. The firm proceeded to dump the sewage in the river. Shinhav Interview.

305. Interview with Mair Vakinsky, Department of Water for Agriculture and Sewage, December 3, 1973.

306. The following material is found in A Comprehensive Sewerage Plan, supra note 69, at I-1 to I-5.

307. Although the plan is said to encompass three associations of towns, Gush Dan, Haifa and Ayalon, this is not a true statement of the situation. The regional character of the Gush Dan & Haifa treatment plants was developed years before the national sewerage plan was formulated. And under the national sewerage plan each community in the Association of Towns Ayalon (Lod, Ramla, Be'er Yakov, Tsrifin, Lod Airport, Or Yehuda, Kiryat Ono, Beit Daga, Kfat Habad) is to plan, build, finance and operate a separate sewerage system. Collection, Purification and Exploitation at 46.

308. The World Bank's investment is 30 million dollars compounded at 7¼% over 25 years. The Government of Israel has put up 100 million lirot. Local authorities will finance the other 100 million lirot from loans from local banks at 9% interest over 25 years. Y. Barzel, The National Sewerage Plan -- The Financial Aspect, 2 City & Region 64, 65 (1973)(Hebrew).

309. A Comprehensive Sewerage Plan at I-2.

310. See Water Quality in Israel at 147.

311. P. Dar, National Plan for Purification, Exploitation & Disposal of Municipal Sewage: Economic & Ecological Aspects 6, 7, Tahal (1973)(Hebrew).

312. The Federal Water Pollution Control Act Amendments of 1972 require the Administrator of the EPA to identify those areas of urban-industrial concentration that have water quality control problems. After identification of the area, the Governor of each state is to designate boundaries for such areas and set up a representative organization "capable of developing effective areawide waste treatment management plans for such area". FWPCA §208(a)(1), (2) (1972), Pub. L. 92-500, 86 Stat. 816.

313. Dar, supra note 311, at 7.

314. Akiba Feinmesser, Head of the Department on Water for Agriculture and Sewage in the Water Commission agrees. "Each plan for sewage and sewerage works, and the national sewerage plan, which aims to prevent pollution of water sources and health nuisances, requires the setting of standards for sewage quality according to their use, e.g. drinking water, water for agriculture, water for industry, boating and recreation, or according to the quality of the receiving source, e.g. the ocean, lake or stream.. Here we have the need to propose such standards.. for this purpose, a special committee of the sewerage council has been set up, and it is to be presumed that in the not too distant future, it will set standards for sewage quality according to the conditions of this country." Man in An Antagonistic Environment, at 201. Mr. Feinmesser made these remarks in March, 1971. Since the decisions of the sewerage council are not public information, it is impossible to determine if the subcommittee of the national sewerage council actually proposed standards for sewage according to quality of receiving waters. One thing is sure - no such standards have ever been published, and no body has been set up to make sure they are enforced.

315. "Evaluation of programs to abate water pollution on the basis of cost effectiveness is scarcely possible without first determining the prevalence and causes of water pollution." Cost of Clean Water, at 45. In his report to the Government of Israel in 1956, Professor S. Heukelakian advocated primary treatment of sewage and its immediate application to agricultural crops. S. Heukelakian, Report to the Gov't of Israel on the Agricultural Utilization of Sewage 10 (FAO 1956). "I believe it is a perfectly logical and defensible position, e.g. to utilize sewage for restricted crop irrigation after primary treatment only, rather than to treat sewage completely by secondary methods for the dubious privilege of being able to irrigate an unrestricted list of crops." Id. Tahal's 1974 plan for sewage from the Central District of Israel expresses a similar concept, except secondary treatment instead of tertiary is used by Tahal rather than primary and secondary as used by Heukelakian. See P. Dar, Plan for the Use & Disposal of Sewage Effluent from Central Israel 7, Tahal (1973).

316. According to S. Perry, Head of Jerusalem's sewage department, the plan for the north-west treatment center appears today to be unable to handle the sewage load planned for it five years hence. Interview with S. Perry, March 2, 1973.

317. Barzel, National Sewerage Plan, supra note 308, at 66.

318. Testing of air currents from the Gush Dan plant were executed by the Ministry of Health in January-February, 1970, December, 1970 and January, 1971. The tests showed that odors were at an acceptable level. Donagi, Study of Sources of Odors and Air Pollution Near the Dan Reclamation Plant, Dept. for Prevention of Nuisances from Air Pollution & Radiation (1971); Donagi, Measurements for Air Pollution Near Gush Dan Plant (1971).

319. Interview with Judge Shaul Aloni, former legal adviser to the Water Commission, December 2, 1973.

320. To date there are no countries in Western Europe, nor any state in the United States nor any province of Canada that have regulated fertilizer use to prevent water pollution. Impact of Fertilizers & Agricultural Waste Products on the Quality of Waters 55, OECD (1973). The State of Illinois decided against restrictions on fertilizer use because there are no alternatives to producing the needed food. Id. at 56.

321. Y. Avnimelech, Chemicals for Agriculture as a Source of Water Pollution, in Man in an Antagonistic Environment 165, at 166.

322. Interview with Haim Levy, Deputy Legal Adviser Responsible for Drainage, Water Commission, September 18, 1973. The State Comptroller's report on drainage authorities show that most of their activity is in the soil erosion field. See, e.g. Report on Qishon-Yizrael Drainage Authority, State Comptoller (1967); Drainage Authority Avtah-Shikma (1969); Drainage Authority Nahal Alexander (1969). But see Report on Nahal Ayalon Drainage Authority, State Comptroller (1969) [Major efforts spent on building highway over wadi Ayalon.]

323. Levy Interview, supra note 322.

324. 1973 Annual Report 5, 6.

325. Weather modification is practiced in Israel. Huschke, Rapp, & Schultz, Meterological Aspects of Middle East Water Supply 29, Rand Corp. (1970). Weather modification has been cited as a potential water pollutant in Kingis, Technological Challenge to the Shared Environment: U.S. Practice, 66 Am. J. Int'l Law 290, 312 (1972).

326. Feedlots can be a particularly serious water polluting problem Impact of Fertilizers, supra note 320, at 8. The problem is aggravated if the animals are fed fish meal. Id. at 20.

327. Run-off from roads is a source of water pollution in the United States and Sweden. See note 141 supra and accompanying text.

328. Forests are less a source of water pollution than cultivated areas. Impact of Fertilizers, supra note 320, at 6.

329. Recreation areas disturb fish and ecotones. L. Teclaff & E. Teclaff, Saving the Land - Water Edge from Recreation for Recreation, 14 Ariz. L. Rev. 39 (1972).

330. 1973 Annual Report 6.

331. Id.

332. The Department on Water for Industry in the Water Commission has for 10 years published annually a report on the use of water by industry. The report covers every industrial user that annually consumes more than 5,000 cubic meters of water. It is indexed according to area and industrial activity. The latest study covered 574 industrial enterprises and lists the type of industry and the water source. See Study of the Use of Water for Industry 1971-72, Water Commission (1972).

333. Water Quality Strategy Paper, Environmental Protection Agency at 9 (2nd ed. 1974). There are an additional 25,000 permits expected in fiscal year 1974. Id.

334. P. Bergman & W. Garber, The Control & Removal of Materials of Ecological Importance from Wastewaters in Los Angeles, California, in 6th Int'l Conf., supra note 99, at 773, 774.

335. In his annual report, the Water Commissioner speaks of plans for 100 plants. 1972 Annual Report 3. The head of the Department for Water for Industry, Water Commission, speaks of serious problems in forty plants discharging directly into streams and wadis. Yanai Interview. As for municipal sewerage plants, they are presently being approved by the Water Commissioner, under the National Sewerage Plan.

336. Under the FWPCA Amendments of 1973, the Administrator of the EPA is required to publish a list of industrial pollutant sources within 90 days after enactment of the Act. FWPCA §306(b)(1)(A). Within one year he must prepare and publish standards for discharge from new sources listed under each category. §301(b)(1)(B). The Act also contemplates review of all discharge permits by December 31, 1974, but this date is not binding on the Administrator. See §402(k).

337. "Self monitoring is favored because it frees city personnel for the less routine and more difficult industrial wastes control tasks; and helps orient industrial management to waste disposal needs and problems." P. Bergman & W. Gardner, supra note 332, at 776, 777.

338. According to a study by the Environmental Protection Agency in the United States, there are 1.8 million chemical compounds registered with the Chemical Abstracts Service and the list is growing by 250,000 chemicals each year. Of this number, approximately 300 to 500 new chemical compounds are introduced annually into commercial use. Toxic Substances at 3.

339. See State of Israel v. "Yitzhar" Co., Cr.F. 1307/72, Tel-Aviv Magistrates Court.

340. A suggestion was presented to the Water Commissioner for using the town of Binyamina's waste to fill nearby fish ponds, instead of letting them flow into Nahal Taninim. Interview with Y. Zak, Nature Reserves Authority, January 1, 1974. The Water Commissioner has not answered the request. Id.

341. Id.

342. Study of Nahal Taninim, Nature Reserves Authority, August, 1973.

343. Portions of Nahal Soreq have been declared nature reserves. K.T. 1733 p. 2170 [northern portion]; K.T. 2996 p. 1194 [southern portion], while the city of Jerusalem is presently dumping, and under the National Sewerage Plan will dump two-thirds of the city's waste directly into Nahal Soreq.

344. The city has begun taking property from those who operated boats along the Yarqon, however. See Kroshovsky v. City of Tel-Aviv-Yafo, H.C.J. 45/71 25 P.D. I p. 792.

345. See M. Shechter & M. Barnea, The Expenditures on Nature & Landscape Conservation: The Case of Israel (1973). The relative share of revenue allocated to recreation declined between the years 1966-69. Id. at 19-20.

346. Such an amendment was recommended by the former legal adviser to the Water Commissioner several years ago. Interview with Shaul Aloni, supra note 319.

347. Cf. Dubinsky, Development of Surface Water Sources, Part B, Master Plan: 1973-1988, Tahal (1973).

348. See Hydrological Yearbook of Israel 1970/71 (1972).

349. Kt 2347, p. 883.

350. There is no question that the national sewerage council considered agricultural use as the prime use for municipal sewage, with the exception of Gush Dan, but it did not require the purified effluent to be directly applied to agricultural land. Furthermore the council did not plan for the contingency of more than one municipality discharging into a stream.

351. Kibbutz Gan Michael is using raw sewage mixed with Nahal Hadera for its fish ponds. Balasha-Yalon, supra note 118, at 26. Jerusalem's raw sewage in Nahal Soreq is used by a number of agricultural communities. See Collection, Purification & Exploitation at 82.

352. S. Hershkovitz, Utilization of Sewage for Crop Irrigation (1969).

353. The information was explained to the author in an interview with Hillel Helman, Environmental Health Section, Ministry of Health, December 18, 1973.

354. These special conditions are not published. With luck, one can find them in a district health office or in the public health section of the various local authorities.

355. Helman Interview, supra note 353

356. Telephone conservation with Dr. Eliyahu Richter, Head of Ministry of Labor's Dept of Occupational Hygiene, January 31, 1974.

357. Exploitation of Sewage, Principles & Data for the National Plan 14 (Tahal 1972).

358. This is the conclusion reached by Heukelakian in his report in 1956. Heukelakian supra note 69, at 10. Tahal's sewage plan is similar; sewage after secondary treatment is to be sent to irrigate crops in the Negev. See P. Dar, supra note 311. The trickle method for irrigation with raw sewage has proven successful in Eilat. Goldberg, etc., Study of Trickles Method for Irrigation of Vegetables by Sewage, Water Commission (1974).

359. Collection, Purification & Exploitation at 32.

360. Dalinsky, supra note 347.

361. To the tune of 11 million lirot (pounds). Report of the Investigation of Water Planning for Israel, Ltd. 25, State Comptroller (1959).

362. Every member of the Water Commission interviewed made this comment.

363. Heukelakian, supra note 69, at 3.

364. Divrei haKnesset 2745, 5719-1959, 4th Sess. p. 2861.

365. Efficient Use of Water in Industry and Disposal of Their Sewage, Organization of Architects & Engineers 14 (1964).

366. The opinion in the case was not published. The file is on record in the magistrates court of Hadera, D.F. 3215/63.

367. Interview with Rafael Teplitz, Health Inspector, Ministry of Health-Hadera, January 9, 1974.

368. Attorney General v. American-Israel Paper Industries Ltd., Cr.A. 268/65, District Court of Haifa.

369. Balasha-Yalon, Master Plan for Hadera Sewage 40 (1972).

370. From all accounts, the position of the Water Commission in the 1960's was that sewage should be dumped into streams rather than the ocean. Yet the Water Commission did nothing to prevent water pollution. See I. Prozinin, supra note 18 at 108.

371. See discussion in Prozinin, supra note 18, at 102, 103.

372. State of Israel v. "Yitzhar" Co., Cr. F. 1307/72, Magistrates Court, Tel-Aviv; Agmor v. Attorney General (case filed two months ago against firm for pollution of a spring. Settlement out of court expected.) Telephone conversation with Ora Tamir, September 12, 1974.

373. Tamra v. Tzvi Haimovitz, C.A. 316/67, 21 PD II 320. The opinion of the lower court appears in 50 P.M. 40(C.F. 685/66).

374. See Israel Electric Co. v. Oded Avissar, C.A. 196/69, 23 P.D. II 314, 317-318.

375. For a more elaborate discussion of the use of nuisance theory in environmental litigation in Israel, see Laster, Reading D: Planning & Building or Building & Then Planning, 8 Is. L. Rev. 481, 495, 497-99.

376. Civil Wrongs Ordinance [New Version] D.M.I. 1 p. 2 §42.

377. Id. at §44.

378. See generally, Hanks, The Law of Water in New Jersey, 621, 669 (1968); Krier, The Pollution Problem and Legal Institutes: A Conceptual Overview, 18 UCLA L. Rev. 429, 443 (1971).

379. In Israel, see Oded Avissar v. Israel Electric Co., C.A. 276/70, 75 P.M. 3. Elsewhere see Draft, Environmental Control, Nat'l Assoc. of Attorney's Gen'l 11 (1971) [U.S.]

380. See Krier, supra note 378, at 444.

381. The classic example in Israel is Knowitz v. Supervisor of Civil Aviation, 26 P.D. I 589.

382. Draft, Environmental Control, supra note 379, at 6-22; Comment, The Role of the Judiciary in the Confrontation with the Problem of Environmental Quality, 17 UCLA L. Rev. 1070 (1970).

383. The kovlana is a creature of statute, created in the Criminal Procedure Ordinance, 5725-1965, SH 458 p. 161 §62.

384. Stockholders in the General Motors Corporation requested that statements supporting social issues be offered at a stockholders meeting. The corporation notified the SEC that it would not include such statements in the agenda, claiming that they did not enhance corporate profitability. The SEC ordered GM to include the proposals which were later soundly defeated. See Schwartz, The Public Interest Proxy Contest: Reflections on Campaign GM, 69 Mich 419, 427 (1971).

385. Laughran, The Law & the Corporate Polluter: Flexibility & Adaptation in the Developing Law of the Environment, 23 Mercer L. Rev. 571, 596 (1972).

386. See Laughran, supra note 385, at 597; The Shareholder Derivative Suit -- A Solution to a Pollution Problem? 5 Val. L. Rev. 149 (1970).

387. For a discussion of director's breach of their fiduciary duties under corporate law in Israel, see Yoran, Insider Trading in Israel and England, 7 Is. L. Rev. 215 (1972).

388. Board of Review, on the Dan Region Sewage Reclamation Project, Record of Conference held in New York, 11-12th October, 1962 (Tahal 1962).

389. Id, at 10.

390. C.F. 1469/71 (1972).

391. Hillel Oppenheimer v. Ministers of Interior & Health, HCJ 295/65, 20 P.D. I 309.

392. Cr. A. 1030/72, Tel-Aviv District Court.

393. Cr. F. 1469/71 (1973).

394. Id. at 12.

395. City of Rishon le Zion v. Shalom Volonsky, C.A. 641/69, 24 P.D. I 741.

396. Id. at 743.

397. City of Kiryat Ata v. Chemicals & Phosphates, Ltd. C.A. 301/72, 27 P.D. I 617.

398. Weatherford, Legal Aspects & Interregional Water Division, 15 UCLA 1299, 1301 (1968)

399. Pardes Hana v. Minister of Agriculture, HCJ 221/64, 18 P.D. IV 533.

THE LAW AND LAKE KINNERET

Introduction

"And this Sea is called Genissar after the country bordering it; and its water is sweet and good to drink...and also pure, for this Sea is surrounded by sand and shore on all sides, and the quality of the water drawn is good, for it is superior to river or spring water, and yet always colder than the waters of lakes as large as this one."

Josephus Flavius.

In direct contrast to Israel's western flowing streams, Lake Kinneret is used for a multiplicity of beneficial uses. The lake supplies 45% of the country's total water supply[1], 6% of its fish catch[2], a vacation spot for 1½ million tourists a year[3], a purification plant for 3 million cubic meters of sewage yearly[4], an annual supply of tons of smooth, decorative pebbles[5], and a source of income for at least 70 scientists[6].

Again in contrast to Israel's streams and wadis, data are available to those interested in preventing pollution of the Kinneret. Scientific studies of the lake began as far back as 1847[7]. Beginning in the 1950's, Israel scientists concentrated their efforts on solving a myriad of problems in the lake and its watershed. In the 1950's, geographic surveys of the watershed were completed which described the type of land, its quality, texture and applicability to agricultural use[8]. By 1964[9], scientific studies included the quality of lake water for drinking, lake currents, salt concentrations in the lake, sources of radiation, the lake's temperature, phyto-

living at the bottom of the lake, the lake's water level, thematodes and nematodes in the lake, its fish, water birds, chiromed flies, pesticides, commercial fish, and, last but not least, the Tabgha blind prawn[10], the only unique species endemic to the lake's waters. By 1968, there were over 500 articles, books and reports on the nature of Lake Kinneret and its sources of pollution[11]. In 1968, a permanent staff of limnologists was assigned to study the lake; this in addition to simultaneous studies performed by Mekorot, Tahal and institutions of higher learning[12].

It would also be untrue to say that those governmental bodies responsible for protection of water sources from pollution have neglected the Kinneret to the extent that they have neglected streams and wadis. In 1971, Minhelet haKinneret (the Kinneret Directorate) was set up as a local appendage of the Water Commission to protect the Kinneret from pollution[13]. At the same time, the Ministry of Interior ordered a plan for the entire Kinneret basin, up to the year 2,000, which will concentrate on land use planning in the watershed and beneficial uses of the lake shore[14].

In spite of the efforts described above and marked differences between the Kinneret and other sources of water in Israel, it is argued in the succeeding chapter that nature has protected the Kinneret more rigorously than those charged by law to do so. This argument is put forward in the form of a case study on the Law and Lake Kinneret. The case study approach has been adopted because it has the ability to synthesize theory with fact. Here, it synthesizes legal knowledge gained in the previous chapters with facts

gathered on the Kinneret from extensive interviews, scientific articles and ministerial files. In so doing, the following case study comes to grip with a question central to this dissertation: How does the law preserve Israel's water sources for generations to come?

Description of Lake Kinneret and its Watershed

The Jordan River Valley

The entire Jordan River Valley[15], of which Lake Kinneret is a part, was shaped by the volcanic and earthquake activity that created the Afro-Syrian rift. The Jordan River Valley rests in the north-east corner of the rift. It covers an area of 13,000 square kilometers, and at one time was composed of a chain of rivers, streams and lakes, beginning in the hills of Israel, Syria and Lebanon and ending in the Dead Sea. The Upper Jordan Valley, which is the subject of this chapter, comprises an area of 2,727 square kilometers. At one time, it included within its boundaries the sources of the Jordan River, Lake Huleh and Lake Kinneret. Lake Huleh was drained in the 1950's and replaced by a series of channels which criss-cross their way across the Huleh Valley to bring the flow of the Jordan River to the Kinneret.

Lake Kinneret rests some 210 meters below sea level and acts as the ultimate sink of the Upper Jordan Valley. The Valley receives an erratic flow of rainfall, averaging some eight to nine hundred

million cubic meters (MCM) a year. Of this figure, only some 600 MCM reach the lake annually; the rest evaporates. The Kinneret holds some 4,300 MCM of water; its surface area is 167 square kilometers; its maximum depth is 42 meters, maximum length 22 kilometers and maximum width 12 kilometers.

Below Lake Kinneret begins the Lower Jordan Valley, which covers an area of 11,000 kilometers. The Valley is 105 kilometers long, and is composed of the Jordan River, its main tributary the Yarmuk, and the Dead Sea, Israel's largest lake. Except for passing references to its potential pollution, the Lower Jordan Valley is not discussed in this thesis because unsettled questions of international law would cloud any program of water pollution prevention and control[16].

If nothing else, the ecological crisis has revealed that twentieth century man treads with a heavy, technological foot. So, too, in the Upper Jordan Valley, where modern man's heavy foot has opened up a Pandora's box of pollutants to be absorbed by the Kinneret. In order to more clearly understand the cultural changes wrought by man in the Upper Jordan Valley during the last thirty years, a passage describing the Kinneret Watershed as it appeared in 1909 will be presented below.

> It is the Jordan and its tributaries which give the distinctive character to this region. Two of the sources of the Jordan must be considered as rising outside of Palestine proper. Of these, the more northerly is the picturesque 'Ain Fuwwar', below Hasbaya, in which the water bubbled up in a little pool and, descending under

> the name Nahr Hasbani, turns the Wady el Teim into a paradise of verdure...The second of the northerly sources of the Jordan is the little Nahr Bareighit which drains the fertile...'Meadow of Springs'...The most impressive sources of the Jordan are the two southerly ones at Banias and Tell-el-Kadi respectively. At the former site, 1,080 feet above sea level, the ice-cold water bursts forth in a river...and waters a corner of Palestine unequalled even today, in its neglect, for its picturesque beauty and for its handsome timbered glades...The source at Tell-el-Kadi...is in many respects a contrast to all this. Here the waters quietly bubble up...part to form a pool to the west, but the larger volume descends as a quiet millstream past one of the most impressive sacred groves in the land...Besides the four main streams, a great many rivulets burst up from the basalt, along the whole northern extremity of the valley...
> The Arabs...make great quantities of mats out of the papyrus reeds from the neighboring Huleh swamp, where flourishes the greatest solid mass of papyrus in the world...Lake Huleh itself is a shallow expanse of water three and one half miles long by three miles wide; its bottom is covered thick with water weeds whose swaying branches lie almost everywhere just below the surface, while at many spots the yellow, and here and there the white, water lily adorn the muddy waters...Fish abound...Among the many birds found here, the beautiful white pelican is particularly conspicuous...Along the northern edge of open water there floats a dense mass of papyrus--some six miles long and one and one half miles broad--supporting in its interstices many smaller plants... Below the Huleh, the Jordan rages and tumbles in a bed deep cut in lava, until, as the Betaiha is approached, its waters are diverted to many mill streams. There the much imporverished main stream makes a quiet passage seaward through low banks of alluvial deposit, overhung at many spots by beautiful trees. 17

The sources of the Jordan remain as picturesque today as they were in 1909. The rest of the Valley, however, has undergone tremendous change. Some of the more specific examples of man's acts and their effects on the lake will be discussed next.

Culturally Induced Pollution of Lake Kinneret

Eutrophication

Eutrophication is the term applied to a lake's biological response to an increase of nutrients[18]. In undisturbed lakes, eutrophication is a slow, natural, aging process, which over thousands of years terminates in the disappearance of the lake. Man can speed up this process to a few decades, however, if by his activities he increases the nutrient load of a lake. Based on the "law of the minimum"[19], this means increasing a lake's load of phosphorous and nitrogen. They are the two elements responsible for triggering accelerated eutrophication because of all the elements required for plant growth, carbon, vitamins, the sun's energy, nitrogen and phosphorous, the latter two are ~~most often in short~~ supply. When man supplies these two formerly limiting factors, he thereby accelerates the nutrient enrichment of a lake and the biological process of eutrophication.

The Kinneret evidences all of the symptoms of a eutrophic lake--progressive increase in algae, especially of the blue-green type, changes in the kinds of plants and animals living in the lake, and oxygen depletion in deep water during the summer stagnation[20]. Despite this fact, limnologists studying the Kinneret have not concluded that the Kinneret is eutrophic. There are several reasons for their hesitancy. First, tests for eutrophication applied to other lakes are not applicable to the Kinneret[21]. For example, the summer stagnation period may prevent the release of nutrients into the Kinneret;

thus, instead of symptomizing eutrophication, it may indeed prevent the process[22]. Second, no connection has been found between the amount of nitrogen and phosphorus reaching the lake during a particular year and the type of algal bloom produced[23]. Third the Kinneret is a highly productive lake due to the operation of the sun, lake currents and wind on the lake's waters.

With this said, however, it is not to be suggested that uncontrolled quantities of nutrients should be allowed to pour into the Lake. Not even the most adventurous scientist would defend such a proposition. Furthermore nutrient overload is only one form of pollution threatening the lake's waters. Modern man is taxing the lake's assimilative capacity with all the tools of technology available to him.

Thirty Years of Laissez-Faire

Introduction

Those, like Masterman quoted earlier, who visited the Upper Jordan Valley in the early part of the 20th centry talked about the potential of making the valley a horticulturalist's dream. Other early visionaries viewed the lakes and streams of the Upper Jordan Valley as the potential source of water for cultivation of the Negev[24]. When the visionaries became statesmen in 1948, the Government of Israel embarked on several vast, expensive projects to make reality out of these visions. Each project for the Kinneret and its watershed was

planned and carried out with a singleness of purpose that lacked a basic consideration of immediate and future effects of the project on the quality of Lake Kinneret[25]. Today, those studying the lake wish they could set back the hands of time thirty years[26] because feats of engineering skill dreamed up by visionaries have significantly affected the quality of the lake.

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The Deganya Dam

At the point where Lake Kinneret presently meets the southern Jordan, near Kibbutz Degania, is a concrete overfall. The dam was built in 1932 as part of the Ruttenberg hydro-electric project[27]. The project aimed at producing hydro-electric power from variations in height of the Jordan River. During the War of 1948, the hydro-electric plant was damaged and has not been rebuilt. The dam remains, however, and it acts to keep the level of the lake above a fixed point in coordination with pumping from the National Water Carrier. The dam prevents flow of water into the Jordan, except for a fixed amount during summer and winter overflow[28]. The result is that nutrients and sediments are captured in the lake. As discussed earlier, nutrients speed up the process of eutrophication; sediments can aid in this process.

Draining the Huleh

Prior to 1952, the upper Jordan and its tributary the Ivon, flowed into a large wetland area, part marshland, part lake, known as the Huleh swamps, some eighteen kilometers above the Kinneret.

Leaving Lake Huleh the Jordan slowly wends its way south until it flows into the Kinneret. In this fashion, nature prevented tons of nutrients and sediments from washing into Lake Kinneret annually. The Huleh acted as a filter for those sediments gathered by the Jordan during winter floods, and the zigzag motion of the river below the Huleh further purified the water before it entered Lake Kinneret[29]. The swamps, however, were a breeding ground for anopheles mosquitoes. Israel's early pioneers felt that draining the swamps would rid the Huleh Valley of malaria and simultaneously increase the size of cultivable land in the Upper Jordan Valley[30]. About the first proposition--control of malaria--they were correct; about the second--cultivable land--they were largely proven wrong; and the third--pollution of the Kinneret--they failed to consider.

The drainage project was begun by the Jewish National Fund in 1952, but due to engineering difficulties, parts of it are today incomplete. The aim of the project was to drain the entire 42,000 dunams of marshland except for 3,000 dumans which was set aside as a nature preserve. The project involved the building of channles from a point where the Jordan and Ivon streams emptied into the swamps, to a point in the middle of what was formerly Lake Huleh. At the same time, the channel of the Jordan was dredged and widened to prevent flooding and also hooked up to channels that criss-cross the Huleh Valley. This combination of engineering feats had the following effects on Lake Kinneret.

First it exposed 26,000 dunams of peat[31], rich in minerals and nutrients to the atmosphere. This exposure triggered nitrification of

of the peat and produced a wealth of organic nitrogen which, after winter rains, pours into the Jordan and Lake Kinneret. The nutrients thus produced feed the blue green algae, which pour into the Kinneret from the Jordan. Second, the Huleh no longer filters out the sediments gathered by the Jordan on its way south[32]. They continue on to the Kinneret and sink in its bottom. Third, by straightening out the channel of the Jordan[33] and diverting the river flow to concrete channels, sediments that used to filter out of the river in its former zigzag course now pour into the Kinneret. Fourth, draining the marshland increased the population in the Huleh Valley and increased cultivation of land[34]. Increase in population and farming activity have increased the amount of nutrients that reach the Kinneret from fertilizer use and sewage. For all these reasons, draining of the Huleh marsh and Lake Huleh is today credited with producing the largest contribution of nutrients to Lake Kinneret[35].

Once the Huleh swamp was drained, the visionaries turned to another pressing problem, the need for water in the Negev. Plans were drawn up by American engineers to draw water from the northern Jordan south to the Negev[36], but hostile activity on the Syrian border torpedoed this plan. Thus an alternate plan for drawing water directly from Lake Kinneret was formulated by Tahal and executed by Tahal and Mekorot between the years 1956-1964. The National Water Carrier[37], which has been in operation for ten years, is designed to withdraw a maximum 1.5 MCM of water a day from the Kinneret. The withdrawal rate is between 400 and 600 MCM a year. The water did not make the Negev bloom, as planned, however. Instead it essentially supplies the central part of Israel with water in summer and aquifer recharge in winter.

The effects of the National Carrier on the quality of the Kinneret are as follows. First, the carrier has replaced the Jordan as the point of outflow from the lake, with one exception. The carrier withdraws water low in nutrients from the top of the lake, an engineering feal with which the Jordan cannot compete. The result is that less nutrients are being removed from the lake, therefore more are adsorbed by lake water or settle in the lake's bottom[38]. Second, in order to lower chloride concentrations in water supplied to agriculture from the National Carrier, 50 of the 120 MCM flow from the lake's salt water springs were diverted in a channel to the lower Jordan[39]. The result has been a reduction in chloride concentrations, but an increase in phosphorus. Recent studies[40] show that the calcium found in the salt springs bind with phosphorus in the lake and cause it to settle in the lake bottom. With less calcium flowing into the lake, more phosphorus is available as nutrient to algae. Third, the flora and fauna endemic to salt water springs were destroyed. Fourth, the salt water channel reduces the available shore area and detracts from the natural landscape surrounding the lake.

The presence of the National Water Carrier in the Kinneret increases the value of the lake as a reservoir and diminishes its uniqueness as an ecosystem. Plans to increase the water supply in the lake, for example by cloud seeding, will probably take place over the objections of those who view cloud seeding as a further source of sediment and nutrients for an already fertile lake[41]. Plans to allow larger withdrawals from the lake, thus lowering its overall area, will probably take place, although reducing the lake's edge will harm the fish population and reduce the diffusion of oxygen into the lake from wind

Modern Farming Methods

Of the 2,727 square kilometers that comprise the Kinneret watershed, one million dunams, or 40% of the watershed is used for agricultural purposes[43]. Of this figure, 150,000 dunams are cultivated or used for fish ponds; the rest is grazing land. Some 14,000 Israel farmers live in the watershed, and most of the Lebanese population of the watershed, some 80,000 people, are farmers. It is estimated that there are 165,000 sheep and cows either penned or grazing in the watershed. A proportion of these animals drink directly from the Kinneret and bathe in its waters. Waste from these animals contains high concentrations of nitrogen and phosphorus. The animal population in the Kinneret watershed produces a significant amount of the total nitrogen and phosphorus reaching the lake, as well as bacterial pollution of the lake.

Modern agricultural methods involve the excessive use of chemical fertilizers high in phosphorus and nitrogen. The result, after rain or irrigation, is a horizontal flow of nutrients toward surface water or a vertical flow toward ground water. The presumption today is that the contribution of nutrients to the Kinneret from fertilizers indicates only that contributed by surface water[44]. Ground water moves very slowly, and intensive agricultural methods have not been in use in the Kinneret basin for more than 30 years. Even without the ground water contribution, it is estimated that fertilizers contribute between 30 and 38% of the available phosphorus and 30% of the available nitrogen which reach the Kinneret.[45]

Of the 150,000 dunams of developed agricultural land, 17,000 dunams are used for fishponds, 16,000 dunams of which are found in the Huleh Valley[46]. Fishponds act as nutrient sinks just as lakes. The difference between the two is that once each year, the fishpond is emptied and its accumulation of nutrients poured directly into a nearby stream or into the Kinneret. The annual contribution to Lake Kinneret from fishponds is an estimated 6-8% of the total available phosphorus and 6-9% of the total available nitrogen[47].

In addition to increasing the nutrient enrichment of the Kinneret, agriculture contributes to the pollution of the Kinneret in other ways. The quantities of pesticides used in the area are estimated to be 180 tons annually, or one kilogram per dunam of land[48]. There are 18 different pesticides in use, most of them in the organic phosphorus family, and 23 different herbicides, five of which do not break down easily in the environment. There are no data on the harmful effect of these pesticides on Lake Kinneret. There is some evidence that chiromed flies, a source of food for Kinneret fish, have been killed by pesticide sprays.[49] Direct applications of herbicides to kill algae in the lake has been discouraged by scientists[50].

Two sources of pollution of Lake Kinneret, indirectly attributable to agriculture, are diversion of springs which feed the lake, and pumping directly from the lake. A run down of springs captured reads as follows.

> The springs on the eastern side of the Huleh watershed have been captured and the flow of water in their streams stopped... The springs on the eastern side, that enter the Kinneret, have been partly captured and their waters diverted to cover water needs in Ramat HaGolan...The springs on the western side that flow into the Kinneret were captured and their flow diverted

Diversion of spring water increases sewage flow in the streams reaching the Kinneret and therefore increases the bacterial pollution of the lake itself.

Pumping from the shores of the lake is a source of pollution of the lake by oil as well as aesthetic pollution of the lake shore. There are 120 water companies located in the Kinneret basin[52], 60 around the lake itself[53], mainly supplying water for agricultural needs.

Modern Living

An improved standard of living in the watershed of the lake has increased pollution in the lake in the following manner. The 190,000 residents in the watershed produce 7.5 MCM of sewage a year[34]. The greatest contributors per person are members of kibbutzim, while the lowest contributors are Druze and Lebanese villagers. Of the total sewage production, 4 MCM reaches the Kinneret, 1.5 of which untreated. No sewage is treated to reduce its nutrient load, nor is any sewage in the watershed chlorinated to prevent the spread of disease; this in light of the fact that sewage flows for the most part in open drainage channels, streams and wadis. It is estimated that sewage annually introduces 17% of the total nitrogen and 20% of the total phophorus load that reaches the Kinneret[55].

Industrial sewage makes up 8% of the total quantity of sewage produced in the basin[56]. In 1973, there were 210 industries in the watershed; most of which were light industries or trades. No industry

discharges its sewage directly into the Kinneret, although numerous industries discharge raw sewage into wadis or streams, which feed the Kinneret. To date, there is no heavy industry in the watershed, and no evidence that harmful metals or synthetic organic chemicals reach the lake.

Urban conditions surrounding the lake add to its pollutant load. Of note is street surface run-off from the town of Tiberias from the road encircling the Kinneret. Air pollution from automobiles contributes pollutants to the Kinneret airshed, which are washed into the lake. Building along the shores of the lake brings down sediments and "mining" the pebbles found on the shores of the lake exposes the shores to erosion.

Modern Recreation.

Modern man plays hard, and the estimated one and one-half million tourists who visit the Kinneret basin annually leave their mark on the lake. There are no figures on the exact number of tourists who visit the Kinneret, but it is estimated that during four months of the year, May through August, 5,000 people visit the lake daily[57].

Recreational activity consits of camping, swimming, boating and skiing. Of the forty kilometers of Kinneret coast, only 5.5 kilometers are presently used as beaches. In 1972 an estimated 150,000 people boated on the Kinneret in a total of 164 boats. It is estimated that in 1970, boats contributed some 7,000 tons of pollutants, including oils and phenols to the lake[58]. There are no data on the number of sport

fishermen and water skiers who annually visit the lake. In addition to water activity, camping activity on the shores of the lake adds pollutants and nutrients to the lake. There are no data on the quantity or quality of such pollutants.

All activity on the edge of the lake affects its fish population. Studies show that fish spend 80% of their lives in the land-water interface, or ecotone, of lakes[59]. It is in the lake's edge that the fish generally lay their eggs and catch their food. Therefore any activity concentrated at the edge of Lake Kinneret will have serious consequences on the fish population of the lake.

Modern Fishing

The Kinneret supplies Israel with 2,000 tons of commercial fish per year[60]. This represents an increase in the catch over the last fifteen years by 100%.[61] Yet fishing methods are so improved that the fish endemic to the lake's waters never get a chance to grow beyond a certain size before they are carted off to market[62]. To meet the challenge of the modern fisherman, the Ministry of Agriculture breeds fish in ponds near the lake and releases them during different times of the year to the lake[63]. Thus the Kinneret has been transformed into a large fish pond; instead of controlling the fishermen, the Ministry of Agriculture controls the fish. There is no evidence that such controls are either economically or ecologically sound.

Summary

Man's activities in the Kinneret basin have had an effect on the quality of the lake. There are those who argue, however, that the effect has been negligible and that the Kinneret has been essentially eutrophic for a thousand years[64]. The majority of scientists studying the lake, however, see increasing signs of eutrophication in the lake as a result of thirty years of intensive cultural activity in its watershed. In addition, all scientists studying the lake, even those skeptical of reports of eutrophication, argue for an immediate program of nutrient reduction and pollution prevention[65]. The program should aim at reducing nutrients and sediments reaching the lake and its sources. It should also include curtailing activities close to the lake's shore which directly pollute its waters and harm its plant and animal life. There is a general consensus that those responsible for protecting the Kinneret should execute a plan to limit discharges of raw sewage in the watershed, building on the lake's shore, mining of lake pebbles, overdoses of fertilizers and pesticides, and excessive, unorganized, recreational activity. The succeeding section analyzes to what extent present and past efforts to prevent pollution of Lake Kinneret have succeeded.

The Legal Framework for Prevention and Control of Pollution of Lake Kinneret

Israel's water code places the responsibility for prevention and control of water pollution in the Kinneret basin on four government ministries -- Agriculture, Health, Interior, and Transportation. The contribution of each of these ministries to protection of Lake Kinneret and its sources will be discussed below. The previous chapters have shown, however, that the Minister of Agriculture and the Water Commissioner have been given sufficient power by law to prevent and control water pollution in Israel, with a minimum of cooperation from local authorities and governmental ministries. In addition, the Water Commissioner maintains that he has never clashed with the Minister of Agriculture on any proposal relating to the improvement of water quality[66]. Therefore, it is to be assumed that essentially one body in Israel has the legal authority to protect the Kinneret from pollution.

The Knesset gave the Water Commissioner such extraordinary power in 1959 so that one office, with an overall view of water problems, and an unlimited arsenal of legal resources, could save Israel's water sources from twentieth century man's heavy technological foot. The renewed mandate granted the Water Commissioner by the Knesset in 1971 came in the wake of cries of doom over the impending death of the Kinneret. These prophecies of doom never materialized. The question raised by the following section is whether the Knesset's trust in the Water Commissioner has succumbed to the same fate.

Protecting the Kinneret: Ministry of Health, 1960-1974

The Ministry of Health maintains a district health office in Nazereth and branch offices throughout the watershed of Lake Kinneret[67]. Yet the Ministry has never formulated a uniform policy with regard to protection of water quality in the Kinneret basin. This is partly due to the Ministry's internal policy and partly to the legal framework in which it conducts its operations. General policy at the Ministry is to act on the receipt of complaints from the general public. This means that Health acts as a regulatory or control agency, not a planning body. Furthermore, the legal bases for the Ministry of Health's activities, the Public Health Ordinance and the Licensing of Businesses Law, do not provide a comprehensive legal framework for prevention and control of pollution of the Kinneret and its sources.

The Public Health Ordinance does not empower the Ministry of Health to prevent and control nuisances and health hazards[68], and to supervise standards for drinking water[69]. The Licensing of Businesses Law gives the Ministry tremendous leverage over day to day operations of most businesses in Israel. Yet it gives the Ministry little power to prevent pollution of a natural body of water from agricultural and industrial waste[70]. In addition, the Licensing of Businesses Law ties the Ministry of Health down to petty problems and local disputes[71]. In short, the legal framework under which the Ministry of Health operates does not lend itself to solution of water pollution problems by a watershed management approach.

Even with the reservations set out above, it still comes as a surprise to note that the Ministry of Health has never brought a single legal action against a community in the Kinneret for the discharge of its sewage into the Kinneret or its sources. Cases have been filed by the Ministry against three kibbutzim, whose sewage flowed into the Lower Jordan[72]. Yet the last of these cases was filed in 1964. One could argue that the size of the fines issued by the court discouraged the Ministry of Health from proceeding against other settlements in the basin. There is no evidence that the problem of unattended or problematic sewage purification plants disappeared in the 1960's. On the contrary, Health's files and Mekorot's files point to potential pollution of the Kinneret from community, industrial and hospital sewerage works[73]. Health resorted to threats, but no court action after 1964.

The Ministry of Health is also a significant polluter of the Kinneret basin, and an uncontrolled polluter because the Water Law does not cover governmental activities. Each year the Ministry sprays areas of the Kinneret basin to prevent the spread of malaria. In 1973, the Ministry of Health received seventy thousand lirot for extensive spraying operations in the Jordan delta above the Kinneret[74]. This section is especially sensitive to pesticide sprays because it comprises the spawning area for Kinneret fish. No ministry or other body has control over the choice of pesticide, the time and manner of spraying or the area chosen by the Ministry of Health[75].

In addition to the Ministry of Health's spraying activities, the Ministry has been seriously deficient in providing adequate sanitary

treatment for disposal of waste from its regulated facilities. The most blatant examples in the Kinneret basin are the Poriya and Tsfat hospitals[76]. The Tsfat hospital was built in 1973 and approved by the Ministry of Health without a sewerage treatment system[77]. The Poriya hospital above Tiberias has such a system, but its maintenance has been inadequate for several years[78].

Today the Ministry of Health is more aware of the problems in the Kinneret watershed, but it has not changed its mode of operations. It continues to supervise the quality of drinking water, and it makes continual checks of sewage purification facilities close to the lake's waters[79]. In addition, the Ministry of Health reviews plans for sewage and solid waste disposal in the watershed[80]. Yet the fact that not one community in the Kinneret basin has an adequate disposal system for its solid and liquid waste[81] is evidence of the Ministry of Health's past role in regulating this source of water pollution.

In summarizing the Ministry of Health's activities in preventing and controlling pollution of water sources in the Kinneret basin, two points should be kept in mind. The statutory basis for all of the Ministry's activities is the prevention and control of health hazards. There must be a clear showing of such a hazard before control measures can be taken. This, in essence, deprives the Ministry of a planning role in protecting the Kinneret. Moreover, it means that Lake Kinneret must reach a point where it is regarded as a health hazard before the Ministry can control those sources of pollution causing the hazardous condition. Second, the Ministry of Health has none of the comprehensive powers available to the Water Commissioner to prevent

and control pollution of a natural body of water. This means that the Knesset views the Ministry of Health in a support role to the Water Commissioner. Therefore the initiative for preventing and controlling pollution in the Kinneret basin must come from the Water Commissioner and not the Ministry of Health.

Protecting the Kinneret: The Ministry of Interior, 1965 - 1974

The Ministry of Interior works within a legal framework whose guiding principle is long range planning. With the passage of the Planning and Building Law in 1965, the District Planning and Building Commission for the northern district was given the authority to order a plan for the Kinneret watershed. Failure on the part of the District Commission to order a plan five years after the passage of the Act enabled the Minister of Interior to order such a plan[82].

In 1972, upon recommendation of the Secretary General's Committee for the Environment, the Minister of Interior set up an interministerial steering committee, whose job was to direct planning for the basin[83]. The steering committee chose a professor from the Technion to head two planning groups. The first, made up of Tahal engineers, is to describe the state of water pollution in the basin and the activities which influence the rate and type of pollution. The second group, composed of planners from the Technion, is to fashion two plans for the basin. One will be an outline plan for the entire watershed, and one a detailed plan for the area surrounding Lake Kinneret. Each of these plans will be submitted to either the National Planning Council or the

northern District Planning and Building Commission for approval. If the plans are submitted to the District Planning and Building Commission, the public will have an opportunity to criticize each plan prior to its final approval[84].

Serious criticism of the Tahal plan has already been voiced[85]. The Ministry of Interior, for its part, is to be commended for initiating an outline plan, and it is hoped that proper planning of the basin can prevent serious pollution of the Kinneret and its sources. Yet it must be noted that the Planning and Building Law is, as its name implies, a planning act. Once the plan has been submitted and approved, the Local and District Planning Commissions maintain control over building construction, but not over the operation of ongoing activities.

In addition to the Ministry of Interior's planning responsibilities, it, along with the local authorities situated around Lake Kinneret, are responsible for upkeep of beaches for bathing activities[86]. During the years 1960-1970, the Ministry of Interior and the local authorities under its supervision neglected the beaches of the Kinneret[87]. Over the years, the beaches were used as receptacles for solid waste, the lake's shores were eroded by lap-wave movement; pebbles were mined; and the touring public wrecked general havoc on the trees and greenery surrounding the lake. All this activity was permitted without the Ministry taking preventative measures until the early 1970's. Today, the Ministry has an inspector whose job is to patrol the beaches and arrest those parties found destroying the lake's shore[88].

In summarizing the Ministry of Interior's role in protecting the Kinneret, the following should be considered. First, Ministry of Interior directives for the protection of bathing places are to be enforced by local authorities, not the Ministry itself. The fact that the Ministry has had to send one of its own inspectors to patrol the lake's beaches is evidence of the protection afforded by the local authorities. Second, the District and Planning Commissions have the authority to prevent construction of potential sources of water pollution. Yet these Commissions, though chaired by a representative of the Minister of Interior, are not controlled by the Ministry. Third, the Local Planning Commissions in the Kinneret basin are composed of representatives of local authorities. Therefore, local, not national interests will predominate in their planning decisions. Finally, the Ministry of Interior has the power to initiate plans for the Kinneret basin, but it has little authority over ongoing polluting activities.

Protecting the Kinneret: Local Authorities

The local authorities situated in the Kinneret basin have no power to protect Lake Kinneret from pollution. Each community is responsible for the health and welfare of its inhabitants and the elimination of health hazards and nuisances[89]. This means, in essence, that removal of a health hazard to a point outside the local authority's boundaries is a proper function of local government. With regard to liquid waste, discharge of local authority sewage outside its boundaries is permitted with permission from the Minister of Agriculture[90]. With regard to solid waste, its discharge outside the community's boundaries is permitted for all local authorities,

under the supervision of the Ministry of Health and the Ministry of Interior[91].

There are no requirements, no standards and no directives in any law in Israel for the proper disposal of a communities' liquid or solid waste. Supervision of disposal methods by the central authority has never been strenuous because of the fear of increasing friction between the central and local branches of government[92]. In the Kinneret basin, this policy has allowed local interests to produce problems of national significance.

Protecting the Kinneret: Ministry of Transportation, 1964-1974

The Ministry of Transportation has authority under the Ports Ordinance to protect all port waters from pollution[93]. The port of Tiberias has been declared a port[94], and its waters are, therefore, protected by the Ministry of Transportation. The Ministry's powers are extensive. They include protection of Lake Kinneret from pollution from shore based operations as well as water craft[95]. Actually the Ministry has not executed its authority to prevent pollution of the Kinneret from shore based activities because such pollution does not interfere with the port's operations. At the same time, however, the Ministry keeps a careful eye on the number of boats licensed in the lake[96]. To date, however, the Ministry has not required a maximum limit on watercraft in Lake Kinneret. The Ministry has also not set motor specifications to prevent oil spills, leaks and exhaust into the lake.

The Ministry of Transportation is authorized by the Oil in Navigable Waters Ordinance to prevent oil spills in port waters, whether such spills actually pollute the water or not[97]. No cases for the abatement of oil spills in the Kinneret have been brought by the Ministry. Ministry officials maintain that pollution of the Kinneret from watercraft is meaningless[98]. There are no data to sustain or deny this position for all uses of the lake's water.

With the passage of the 1971 amendment to the Water Law, the Minister of Agriculture, with the consent of the Minister of Transportation, was authorized to promulgate regulations for controlling the means of transport on or near the lake to prevent water pollution. If translated into an amendment, such power would give the Water Commissioner the authority to control the number of boats, type of motors and means of refueling to prevent pollution of the Kinneret. At the same time, the Water Commissioner could use such regulatory power to prohibit trucks fully loaded with oil from traveling close to the Kinneret. To date, no regulations for transportation control in or near the Kinneret have been proposed by the Water Commissioner and adopted by the Minister of Agriculture.

Protecting Kinneret Fish: 1960-1974

The Department of Fisheries of the Ministry of Agriculture is charged with protecting Kinneret fish. The Fisheries Ordinance, 1937, under which the Department operates, forbids fishing in the Kinneret except by license of the Fish Department, and in a licensed

boat[99]. The Ordinance further prohibits the use of poisonous or explosive matter in fishing or in killing fish, and requires an intent to kill fish before becoming operational. Thus, the Fisheries Ordinance does not protect Kinneret fish from non-intentional destruction of fish by pollution. Fish kills resulting from a decrease in oxygen as a result of a nutrient overload would not be covered by the law.

In recognition of this fact, the Knesset authorized the Water Commissioner to protect all plant and animal life in Israel's water sources in the 1971 Amendment to the Water Law. In the three years since the passage of that amendment, the Water Commissioner has taken no steps to insure protection of animal and plant life in the Kinneret. In addition, only after repeated intentional poisoning of fish in the Kinneret by fishermen, did Minhelet haKinneret, in May, 1974, recommend a cooperative effort of the Ministry of Health, the Department of Fisheries and the Minhelet to protect the commercial fish population of the lake[100].

Protecting the Kinneret from Oil Pollution: 1969-1974

In 1969, Arab terrorists blew up the oil pipeline that runs across the northeast corner of Israel. Oil which escaped after the explosion reached the Kinneret but not in sufficient quantity to affect the quality of the lake. As a result, the oil companies who manage the tapline invested 20 million lirot in safety devices aimed at protecting the Kinneret from oil spills[101]. The investment included protecting the pipeline against explosions with an asphalt cover and protecting it against rust with a cathodic cover. In addition,

barriers and channels have been built along the route of a potential oil spill. Two men patrol the length of the pipe each day and maintain constant contact with Beirut to notify them of a spill. If a spill is detected, valves are quickly closed and the pressure reduced. In addition, in the eventuality that oil actually reaches the Kinneret, skimmers are available to suck up the oil and feed it into tankers. It is to be noted that the initiative for this plan, its cost and operation are to be credited to private oil companies. No government agency demanded such a plan nor are the oil companies' safety measures supervised by a governmental body.

Protecting the Kinneret: Mekorot, 1964-1974

With the completion of the National Water Carrier in 1963 and its operation in 1964, Mekorot, the National Water Company, turned to the Minister of Agriculture and the Water Commissioner with a request to create a Kinneret basin authority. In February 1965, the director general of Mekorot mailed a formal request to the Minister of Agriculture, suggesting the creation of a legislatively created watershed management authority for the Kinneret basin[102]. According to the request, the authority would be responsible for the following matters: care of water sources, proper drainage, water management, reduction in water loss, prevention of flood damage, shoreline protection, and the prevention of unwanted ecological changes in the

watershed. In July 1965, the Water Commissioner agreed to set up a legally constituted water basin authority for the Kinneret, with Mekorot represented on the authority[103]. In that same month it was decided that the legal advisers of Mekorot and the Water Commission would prepare the legislative basis for the basin authority. From that day, July 21, 1965, to this writing, April 1974, no legally constituted water management basin authority has been set up in the Kinneret basin. The reason for the Water Commissioner's intransigence are known only to him; operating free of a clear, legislative directive from the Knesset or the Minister of Agriculture, he has rejected all pleas to create a statutory body to prevent and control water pollution in the Kinneret basin.

The Water Commissioner's intransigence did not deter Mekorot's plans for a basin management study. Mekorot's staff, and particularly the Jordan Unit based in Nazereth, felt it their duty to prevent the pollution of Lake Kinneret to protect the National Water Carrier. To that end, the Jordan unit created a basin management research group which has operated from 1964 to the present[104].

From 1964 to 1966, Mekorot's research unit systematically studied the Kinneret basin to determine its sources of pollution. By 1966 scientific studies conducted by Mekorot and independent scientists hired by the company revealed the following[105]. Bacteriological pollution is not an immediate problem. Eutrophication due to the supply of nutrients to the lake must be checked. Sources of nutrients are household and industrial sewage, fishponds, the Huleh, trash, agricultural run-off.

A further potential source of pollution is pesticides. Studies must be carried out to determine the location and contribution of each nutrient source to the lake and its effect on the lake. In the meantime an expert from the United States was invited to study pesticide pollution of the lake. He found none. A second expert from Sweden was invited to determine needed limnological studies of Lake Kinneret. This expert recommended the creation of a limnological laboratory to be maintained near the lake's shore[106].

Mekorot's research efforts between the years 1964 and 1968 cost the corporation two and one half million lirot[107]. This powerful research effort, however, could bear little fruit if no legal framework was established to put scientific findings into fact. For this reason Mekorot fought for the creation of a watershed management authority, but her efforts were blunted by the Water Commissioner. A classic example of Mekorot's impotence in the face of a direct pollution threat to the National Water Carrier is evidenced by the following "case".

Why doesn't Mekorot buy them?

The Case of the O.K.(inneret) Corral

In April 1966, a study performed by Mekorot pointed to the fact that over 500 head of cattle and 1,300 sheep were using the Kinneret as their private watering hole[108]. Mekorot's fears were that animal waste near the National Water Carrier would pollute this important source of drinking water. Letters were written to the Ministry of Health requesting that immediate action be taken[109]. The Ministry took the matter under study, but took no action.

In all fairness to the Ministry of Health, it must be noted that the Public Health Ordinance was not the tool needed to stop the washing of animals in the Kinneret. Health would have been hard pressed in court to prove that small quantities of animal waste created a nuisance. The Ministry would have been harder pressed to prove that such waste actually harmed the public health, when in fact no one was harmed by the waste. The proper authority, whose duty is to prevent and control water pollution, was the Water Commissioner. The Commissioner had the power under the Water Law of 1959 to define protective strips around water sources to prevent pollution of the source. The section of the Water Law authorizing protective strips was tailored to this type of case. Yet it was not invoked by the Water Commissioner until 1972[110].

Another example of Mekorot's inability to solve a particular problem discovered by her research efforts was the problem of community sewage reaching the Kinneret and its sources. In 1965, Mekorot turned to the Ministry of Health and requested that action be taken against those communities dumping raw sewage into the Kinneret and its sources. The Ministry of Health referred the request to the Water Commissioner's legal adviser[111], who took no action. In this instance, however, Mekorot used the carrot when others failed to use the stick.

Beginning in 1965, Mekorot made grants and loans to small settlements in the Kinneret basin for sewage treatment centers[112]. In addition, in the case of Kiryat Shmona, Mekorot actually operated the town's treatment center when the city fathers, in their own wisdom, refused to do so[113]. Today, Mekorot has signed contractual agreements with most of the settlements close to the Kinneret including Tiberias,

markets can work

to receive their sewage into the salt water carrier[114]. Mekorot has demanded that the waste be purified before it reaches the carrier. Failure on the part of a community to purify its sewage prior to release into the salt water carrier means refusal on the part of Mekorot to accept the waste[115]. Since Mekorot has no power to force a community to treat its waste, all waste rejected by Mekorot will flow, untreated, into the Kinneret.

In summarizing Mekorot's activities in the Kinneret basin, the following points stand out. Mekorot's research and development efforts from 1964-1974 have had the following tangible results. The monitoring (1) stations set up in the basin provided the corporation with experience in monitoring sources of water pollution; experience unavailable to any other body in Israel. Mekorot's (2) Jordan unit is presently setting up an automatic monitoring system which can trace a water pollutant to its source[116]. Such a system could be used by a basin authority to prevent further nutrient loads from reaching the lake during specific times (3) of the year. In addition to this significant achievement, Mekorot provided the impetus and part of the capital for a limnological laboratory, which laboratory was set up in Tabgha in 1968. Yet Mekorot failed in its goal to set up a statutory body for water management in the basin. Its insistence on such a body as part of the National Water Company system raised the ire of the Water Commissioner to the point where he requested, in April 1974, that Mekorot desist from all activity in the basin unconnected with pumping for the National Water Carrier[117]. (-1)

Protecting the Kinneret: The Kinneret Limnological Laboratory, 1968-1974

With the founding of the Kinneret Limnological Laboratory in 1968, Mekorot transferred its funding and personnel to that laboratory to prevent overlapping in scientific research. The Kinneret Limnological Laboratory is an independent research organization originally set up by the Oceanographic and Limnological Research Company and Mekorot[118]. It is presently funded by these two organizations and the Water Commission. The laboratory conducts scientific investigations aimed at understanding the chemical composition of Lake Kinneret water, the phytoplankton, zooplankton, and bacteriology of the lake, the lake's currents and its productivity. Research is conducted by 20 scientists, each a specialist in the natural processes controlling the lake[119]. At the laboratory sits a scientist from Mekorot, who studies pollution and nutrient loads reaching the lake from the Kinneret watershed.

The Kinneret Limnological Laboratory is an essential part of any program of pollution prevention and control in the Kinneret basin. Yet for this thesis, the Kinneret Limnological Laboratory must be tested by a different standard than one of scientific excellence. How does the laboratory fit into the legal framework for protecting the Kinneret? Did the present legal framework have any role in the creation of the laboratory? Was the Water Law a necessary condition to its creation? Is the laboratory part of a larger plan for prevention and control of pollution of the Kinneret and its sources set up by the Water Commissioner? All of these questions must be answered in the negative. The laboratory was not set up by the Water Commissioner,

and it is not responsible to him. The Water Commissioner does not direct its policies nor set its goals. The laboratory is not part of a larger legal framework for water pollution prevention and control, and its data do not automatically trigger a reduction in the nutrient load reaching the Kinneret.

This is not to imply that the laboratory should be stripped of its independence. No doubt the independent nature of the laboratory is conducive to scientific research. Yet research alone, as was seen in the case of Mekorot, can identify but not prevent pollution of the Kinneret. The Water Commissioner should have created an authority to apply the laboratory's scientific findings to solve known problems. Failure on the part of the Water Commissioner to capitalize on the scientific research being performed in the Kinneret basin created the following situation. On the one hand, tremendous energy and capital were expended on producing scientific data on the causes of water pollution. While on the other hand, existing sources of pollution went unchecked and new sources were introduced. This failure on the part of the legal system to apply scientific data to correct known ills should have been remedied by the Knesset or the Minister of Agriculture. The Knesset's impotence is legend, however, and the Minister of Agriculture has other concerns, including a polluting constituency. With the legal system at a standstill, those living around the lake moved to stop what they saw was happening to the Kinneret before things got worse.

Protecting the Kinneret: The Kinneret Committee, 1969 -1971

Sometime in 1969, Rafi Kotzer of Kibbutz Shaar haGolan called his friend Avraham Yaffe, of the Nature Reserves Authority, and told him that it was high time someone kept an eye on the Kinneret[120]. Kotzer agreed to organize something if Yaffe would fund it. Yaffe contacted the Water Commissioner and the Israel Lands Authority and suggested that a committee to save the Kinneret be formed. All parties agreed for different reasons; and the Kinneret Committee was born, with Rafi Kotzer at its head.

There was no unified plan of action for the committee. Each participating member saw the committee as a vehicle for furthering his own interests. Kotzer saw the committee as a stepping stone to a statutorily created lake authority. He envisioned an authority which would not be bound by the Planning and Building Law, but would plan exclusively for the basin. He saw an independent authority with its own by-laws and its own "rangers" to protect the lake. Avraham Yaffe saw the committee as a vehicle for furthering conservation measures in the watershed of the Kinneret. The Israel Lands Authority saw it as a medium for developing the watershed's tourist potential. The Water Commissioner saw the committee as a means of protecting Israel's largest "reservoir".

Since the committee was formed by a gentleman's agreement and not by law, it had no statutory mandate and no legal responsibility. It existed at the grace of the participating parties and on the budget

of the Israel Lands Authority and the Water Commission. Each of the founding fathers gradually faded out of the committee as their interests clashed and their visions collided with political realities. The Israel Lands Authority dropped out when it discovered that its projects would be closely scrutinized to prevent pollution of the lake. Then Rafi Kotzer dropped out when all of his ideas met with opposition from the Water Commissioner. He never realized his lake authority. He suggested that he be given authority to clean up the lake, to shore up the lake's beaches, to prohibit non-returnable bottles in the watershed, to prohibit the use of chemical pesticides in the Beteiha, to define a protective strip around the lake and prevent the growth of cotton.

The Water Commissioner refused to give the committee independent legal status. He demanded that it be a part of the Jordan Valley Drainage Authority, clearly an interested party. He refused to adopt any of Kotzer's suggestions that would affect the agricultural sector. He did agree to fund projects related to cleaning up the lake's beaches and setting up basic sanitation facilities for tourists, even though the Water Commissioner has no power under the Water Law to protect a source of water for recreational uses.

Before continuing with the history of the Kinneret Committee, its birth must be scrutinized in the light of Israel's legal framework for prevention and control of water pollution. Was the Water Law a necessary condition to its birth and operation? Did the Water Commissioner set up the Kinneret Committee as part of a larger framework for protection of the Kinneret and its sources?

These questions must be answered in the negative. Initiative for creating the Kinneret Committee did not come from the Water Commissioner. Although the Kinneret Committee was set up to protect a unique source of water, it was created as one would establish a club or fraternity; without guidelines, without statutory authority and statutory responsibility; and without the public's knowledge, consent or input. Israel's water code and its comprehensive Water Law were not essential prerequisites to the committee's creation. Thus the Kinneret Committee could more appropriately be described as a group of buddies who joined together to protect their ol' swimmin hole -- with one difference. The buddies used one hundred thousand lirot of the taxpayers' money during the first year of operation[121], without asking the taxpayers how they wanted their money spent.

Rafi Kotzer left the Kinneret Committee in 1970. He was replaced by Haim Gofer of Kibbutz Ginnossaur[122]. Gofer never had the independence gained by Kotzer. While Kotzer received his salary from the Nature Reserves Authority, Gofer was paid by the Jordan Valley Drainage Authority. While Kotzer worked closely with Avraham Yaffe, Gofer was directed by the head of the Water Commission's Department for Drainage Affairs.

In 1971, Gofer was informed by the head of Drainage Affairs that a limnologist from South Africa had immigrated to Israel. Gofer was told that the limnologist, Bob Davis, would be attached to the Kinneret Committee as its scientific advisor. Davis studied the lake and produced a report, which concluded that Lake Kinneret was in an advanced eutrophic state[123]. He predicted that the lake would "die"

within a few years, if immediate measures were not taken to reduce its nutrient load.

There are conflicting stories as to publication of the report. The Water Commissioner maintains that Davis handed the report to the press without showing it to him[124]. Haim Gofer maintains that the Water Commissioner saw the report, refused to accept it, and therefore, Gofer leaked it to the press[125]. In either case, the report was given heavy coverage in the press[126], and it generated public ferment and political action. Haim Gofer did not stop with publication of the Davis report, however. Accompanied by Bob Davis and the head of the Kinneret Limnological Laboratory, Gofer met with Yigal Allon, then Minister responsible for environmental questions in the Government. As a result of this historic meeting, the Secretary-General's Committee for the Environment was created, and Haim Gofer was fired by the Water Commissioner[127].

The Secretary-General's Committee for the Environment immediately accomplished two important achievements. The first was an instruction to the District Planning & Building Commission to ban construction 50 meters from the lake's edge and to freeze the execution of approved outline plans[128]. The second was a recommendation to the Minister of Interior for regional planning of the Kinneret watershed[129]. The Minister of Interior accepted this recommendation and set up the planning commission previously described.

Protecting the Kinneret: The Water Commissioner, 1971-1974

It has already been noted that the Water Commissioner played no active role in prevention and control of pollution in the Kinneret basin until the establishment of the Kinneret Committee in 1970. It was actually not until the publication of the Bob Davis Report in 1971 and the subsequent newspaper splash that the Water Commissioner woke up to the political sex appeal of the Kinneret[130]. Only then did he move toward a water basin management authority; but in his own inimitable fashion. No law was passed; no regulations adopted; not even an official announcement published. The Water Commissioner replaced the head of the Kinneret Committee and changed its name to Minhelet haKinneret (the Kinneret Directorate).

Minhelet haKinneret differs from the Kinneret Committee in that it is not an interministerial body. The Minhelet is composed of representatives of the Jordan Valley Drainage Authority, the Upper Galil Drainage Authority, an employee of Mekorot and an employee of the Water Commission[131]. The Minhelet is advised by an interministerial committee and a committee of scientific advisors. The Minhelet is a loose organizational unit, neither locked in by rigid statutory lines nor demands by its "constituents". Its director is imaginative and energetic and its achievements will probably be above and beyond the money invested in its operations. Some of its achievements to date will be set out next.

Minhelet haKinneret inherited plans from its predecessor for the protection of the edge of the lake. The Minhelet funded a Tahal plan for shoring up the southeastern part of the lake[132]. The plan has been completed and, for the most part, approved by the Interior committee, which is planning for the entire watershed. Some of the projects have already been carried out. Although subjected to severe criticism[133], the projects executed to date are only phase one of an overall plan for terracing the slopes leading to the lake and shoring up its edge.

In addition to plans for shoring up the lake's edge, Minhelet ha-Kinneret has attempted to prevent erosion from "mining" Kinneret pebbles. Mining the pebbles of the Kinneret is an offence under the Water Law[134] and the Mining Ordinance[135]. Minhelet haKinneret's inspectors, together with the local police and an inspector from the Ministry of Interior, have succeeded in bringing to trial twenty-two persons during the last three years for unlawfully mining Kinneret pebbles[136]. Fines have ranged from one hundred lirot to two thousand lirot with sixty-five per cent of those caught convicted[137]. This effort has reduced organized stealing of the pebbles[138].

In addition to protecting Kinneret pebbles, Minhelet haKinneret has approved a plan to prevent alternate flooding and erosion in the Betaiha. The Betaiha is the lagoon area in the delta of the upper Jordan, which is the spawning area for Kinneret fish. The Minhelet, however, has no authority to set up a protective strip around the Betaiha, nor may it declare the area a nature preserve. Requests for such action directed to the Water Commissioner and the Minister of Agriculture have

fallen on deaf ears[139].

In addition to preventing erosion along the edge of the lake, Minhelet haKinneret has devised a long range plan for reducing the amount of sediments and nutrients that reach the lake from erosion in the watershed[140]. The plan calls for activity to reduce soil run-off from agricultural land by seventy percent, and erosion from the Huleh by fifty percent. A system for monitoring sediment and nutrient loads is being set up by Mekorot. This system will feed information to Minhelet haKinneret on the amount and type of pollutant reaching Lake Kinneret from run-off, sewage and fish ponds. At the point when a nutrient overload is reached, the Minhelet will order the over-loading party to store his run-off, sewage or fish pond flow. So much for the plan. In reality, Minhelet haKinneret has no authority to order any party to take any measures to reduce his pollutant contribution to the Kinneret.

The Minhelet also has plans to reduce nutrients from sewage produced in the watershed by eighty to one hundred percent[141]. The Minhelet's director has hopes that funds from the National Sewerage Plan will be used by local communities in the basin to purify their sewage. Aside from the fact that purification by primary and secondary treatment might increase the concentrations of nutrients in the purified effluent[142], there are other problems. No one is sure that the local communities will take the funds offered[143]. Second, local communities are notorious for their lack of maintenance capability and their lack of concern over discharge of purified effluents outside the community's jurisdiction[144]. Yet no central authority has been

set up to operate the sewage purification system, nor may Minhelet haKinneret operate local authority sewerage systems. Thus plans to reduce nutrient contributions from sewage produced in the basin will fail because they do not solve the problem of operation and maintenance of sewage purification plants.

Since its formation, Minhelet haKinneret has taken two steps to limit pollution of the lake and its watershed from pesticide use[145]. The first step was to require that empty pesticide containers be buried, not discarded in wadis and streams. The second step is continual supervision of dusting operations to prevent such operations less than fifty meters from the lake. These two steps are not enough. First, burying pesticide containers in the watershed may in itself be a pollutant time bomb, if there is seepage of a long lasting chemical substance into ground water. Second, limiting spraying operations fifty meters from the shore line does not provide sufficient protection of the lake from pesticide pollution. Depending on the make up of the pesticide, its component parts may reach the lake through ground water, run-off and dust particles. Furthermore, the steps taken by Minhelet haKinneret provide no protection of water sources against pesticide use in homesand businesses.

A major failure of Minhelet haKinneret is in protection of the lake from recreational activity. This type of protection is a new concept in law. It requires protection of a tourist attraction from the tourists for the tourists[147]; a difficult feat in any country, made more difficult in Israel with its limited water based recreational areas. Minhelet haKinneret has taken no steps in the direction of

limiting tourists activity close to Lake Kinneret. This includes no attempt to limit the number of tourists, regulate boat-related activity, or disperse the activity evenly around the lake.

In addition, Minhelet haKinneret has failed to recognize the seriousness of oil spills in the lake from speed boats, pumping stations and oil trucks. The Minhelet has devised no emergency plan for a clean up of quantities of oil spilled from these sources. Furthermore, the Minhelet has not pressed the Water Commissioner for restrictions on oil pumps near the Kinneret, oil tankers driving around the Kinneret and speed boats in the Kinneret.

In keeping with the leitmotif of this thesis, Minhelet haKinneret must also be tested by a standard of law. How does it fit into Israel's legal framework for prevention and control of water pollution? Was the Water Law a necessary condition to its creation? How does it further the aims of Israel's water code?

First of all, it must be reiterated that Minhelet haKinneret is not a statutory body. It is not an independent basin authority as that term is used in England and the United States[148]. This is its most serious weakness. The head of Minhelet haKinneret has none of the powers of a drainage board. He alone cannot control the use of pesticides near the lake and its sources; define protective strips around the lake; decree that certain crops, e.g. cotton, not be grown near the lake; control the operation of sewage purification plants; define standards for sewage, street surface, and agriculture run-off water reaching the lake. To control each of the pollutants mentioned, the

head of Minhelet haKinneret must turn to the Water Commissioner and request that such pollutant be reduced.

Had the Minhelet been declared a Lake Authority under the Rivers and Springs Authority Law, its director could resort to law, instead of persuasion to get his programs of pollution prevention and control off the ground. Furthermore, had the Minhelet been set up as a statutory body, not only would it have statutory authority it would gain statutory responsibility. As it now stands, the head of Minhelet haKinneret may improve or worsen water quality at his leisure. The Minhelet is not responsible to the Knesset, nor to a court for its activities. It is an organization without a legislative handle which can be grasped and twisted to make it responsible to the public. No one can require the Minhelet to disclose information, open its meetings to the public, disclose its budget, appear before a court. It is an organization based on the credibility of men not laws. Therefore, it has none of the qualities of stability, perpetuity and responsibility that the law brings to organizations.

Lawyers cannot deal with appendages to Water Commissioners, but they can deal with the Water Commissioner, himself. How has he exercised his statutory power for prevention and control of pollution of the Kinneret? It will be assumed that the Water Commissioner, according to his own statement, has never met with opposition from the Minister of Agriculture in carrying out the legislative demands of the Water Law. Thus, even though the Minister of Agriculture formally promulgates regulations under the Water Law, it will be assumed that any regulation suggested by the Water Commissioner for

the improvement of water quality and the furtherance of the Water Law's goals has met with no opposition from the Minister of Agriculture. If this is true, then the following observations are in order.

In the fifteen years since the passage of the Water Law, the Water Commissioner has exercised the powers granted him for protection of the Kinneret in the following fashion. He has instituted no legal action of any kind against any person for pollution of the Kinneret from any source. Pollution is not used here in any scientific sense. It is used in its legal sense because the Water Commissioner is bound to execute the Water Law. From 1959 to 1971, pollution meant any change in a water source that made it less fit for its purposes. After 1971, pollution was defined to mean any change in a water source. Under either definition, the Water Commissioner failed to uphold his statutory responsibility. When Bedouin cows defacated near the National Water Carrier in 1966, they made the water of Lake Kinneret less fit for its intended use. Today, the introduction of any substance into the Lake, without the Water Commissioner's permission is forbidden. In addition, the 1971 Amendment to the Water Law authorizes the Water Commissioner to control certain of man's cultural activities which by their nature pollute natural bodies of water.

Since 1971, the Water Commissioner has taken the following legal steps to prevent pollution in the Kinneret basin from cultural activities. He has not restricted the use and type of pesticides in the basin. He has not restricted the growth of cotton near the lake. He

has not forbidden the sale of Kinneret pebbles. He has not restricted the use of boats on the Kinneret. He has not required the submission of sewage disposal plans for his approval; or if he has so required, he has not issued any discharge permits as is required by the 1971 Amendment. He has not defined areas in which disposal of solid waste is forbidden. He has not restricted the number of diesal operated water pumps on the shores of the lake. He has not restricted building near the lake. He has not listed the factories whose location in the basin will pose a hazard to Lake Kinneret. He has not authorized either of the two drainage boards in the basin to control sewage disposal methods[149].

In the three years since the passage of the pollution control amendment to the Water Law. the Water Commissioner has proposed, and the Minister of Agriculture signed, one amendment relating to prevention of pollution of Lake Kinneret. The amendment forbids the use of the Kinneret as a watering hole for sheep and cows, except at designated points along it shores[150]. Since the amendment affects only neighboring Bedouins, it met with little opposition. Yet even the one amendment adopted since 1971 is not being executed because no points have been designated for bathing of sheep and cows near the lake[151].

Summary and Conclusion

Lake Kinneret is an ecosystem, not a reservoir, as the Water Commissioner would have one believe. It is Israel's only, natural, fresh water lake, world renowned for its spiritual significance and a source of water for household, industrial and agricultural use. The significance of the lake to Israel and the world suggests that extra special care should be taken to protect it from sources of pollution to insure the lake's viability for future generations. Such care can only be insured by proper planning of the watershed and proper control over activities in the watershed. It is therefore imperative that a lake authority be established, preferably under the Rivers and Springs Authorities Law (or if necessary under the Drainage & Flood Control Law) to protect the lake from natural and culturally related sources of pollution. It would be the duty of the lake authority to prevent and control water pollution from activities in the Kinneret basin. The powers of the authority would be as extensive as permitted under the Water Law. This would include control over any activity likely to cause a change in water quality in Lake Kinneret or its sources. Any step taken by the Water Commissioner short of this rigorous control mechanism should be interpreted by the Knesset as an unwillingness to clash with vested interests in the basin. Considering the political-social-environmental sensitivity of the Kinneret, the Knesset should require the Water Commissioner to set up a lake authority for the Kinneret basin.

Footnotes

1. D. Salik, Plan for Protection of Water Quality in the Watershed: Summary of Existing Situation 1 (1973) (Hebrew).

2. S. Sarig, Fisheries & Fishbreeding in Israel in 1972, 8 Fisheries & Fishbreeding in Israel 29, no. 2 (1973). This was a drop from eight per cent in 1971. Id.

3. Intermediary Report: Plan for the Kinneret Watershed 60 (May, 1973) (Hebrew).

4. N. Mintzker, G. Shaham, Treatment & Disposal of Waste Water: Masterplan for the Kinneret Watershed 56 (1973) (Hebrew).

5. Sporadic mining of Kinneret pebbles began before 1948. Organized mining began in the 1950's, and by 1965, Kibbutz haOn was mining 600 tons a year. R. Rodeh, Y. Levy, Survey of Decorative Stones in the Delta East of Lake Kinneret, Ministry of Development, Geological Institute 2 (1972) (Hebrew). Digging continued at this pace until 1971, when it was outlawed. Id.

6. Interview with Amos Harpaz, Director, Minhelet haKinneret, April 8, 1974.

7. Oren, Physical & Chemical Characteristics of Lake Tiberias, 116 Bull. of Research Council of Israel 1 (1972).

8. Interview with Ezra Hankin, Head, Dep't of Drainage Affairs, Water Commission, April 15, 1974.

9. In that year a meeting of scientists studying the lake produced the protocol from which the above list of subjects was taken. Protocol No. 2: Discussions of Studies on the Kinneret, Tahal (1964) (Hebrew).

10. The Tabgha Blind Prawn is endemic to a single warm spring near the lake. S. Lulav, The Kinneret Region, in Lake Kinneret, General Background, Nat'l Council for Research & Development 5 at 7 (1973).

11. Oren, Bibliography of Lake Kinneret (1968).

12. See Water Quality Research in Israel, 29, 46, 49, National Council for Research & Development (1972).

13. See A. Harpaz, Prevention of Pollution of the Kinneret: Organizational Aspects, in The Kinneret & its Watershed, Israel Nat'l Comm't for Biosphere & Environment 63 (1972).

14. Interview with Ehud Gavrieli, Coordinator of Steering Committee, Masterplan for the Kinneret Watershed, Ministry of Interior,

15. The description of the valley was taken from the following sources. A. Natif, Drainage & Erosion, Summary of Present Situation, Masterplan for Kinneret (1973)(Hebrew); Oren, supra note 7; I. Schattner, The Lower Jordan Valley, 11 Scripta Hieroslymitana (1962); The Kinneret & its Watershed, the Israel Nat'l Council for Biosphere & Environment (1972).

16. The Dead Sea is also not singled out for discussion, but Israel's water code applies equally well to this salty body of water.

17. E.W.G. Masterman, Studies in Galilee 20-28 (1909).

18. Facts for the discussion of eutrophication in the text were taken from the following sources. Pollution of Lake Erie, Lake Ontario & the International Section of the St. Lawrence River, Int'l Joint Comm. 35 (1970); Water Pollution Part III, Senate Subcomm. on Air & Water Pollution, 91st Cong., 2nd Sess. at 953 (1970); R.J. Davis, Investigation of the Pollution Problems of the Lake Kinneret, Part II (1971); A. Marcardo, Eutrophication of Lake Kinneret and Ways to Arrest It, Masterplan for Kinneret (1973) (Hebrew).

19. The law of the minimum holds "...that where more than one condition must be satisfied in order to produce a given event, that condition which is least abundant with reference to demand requirements will determine the magnitude of the consequent event...Because algae can normally satisfy carbon requirements from carbon dioxide in the atmosphere, and from the natural carbonate in water, efforts to control aquatic production settled very early upon nitrogen and phosphorus. Recognition of the fact that blue-green algae, and perhaps other types as well, can also draw nitrogen from the atmosphere, led to the conclusion that attempts to control growth solely by limiting availability of dissolved nitrogen in water would also be of little purpose. By process of elimination, then, attention has come to focus on phosphorus; and observations about the gross availability and the form of dissolved phosphorus strengthen the probability that it is the route to controlling the increased productivity problem." Cost of Clean Water, Annual Report of Administrator of the EPA to the Congress of the U.S., Vol. I at 31 (1971).

20. See R.J. Davis, supra note 18 at 1; A. Mercardo, supra note 18 at 39; C. Serruya, Signs of Eutrophication of the Kinneret, Man in an Antagonistic Environment 180 (Marinov ed. 1971) (Hebrew); H. Tsaban, Care of the Kinneret Watershed, Man in an Antagonistic Environment at 208.

21. Most tests for eutrophication have been theorized for cold lakes, and the Kinneret is a warm lake. Talk by Collette Serruya, Limnological Laboratory, to the Environmental Protection Service, May 5, 1974.

22. Id. For a contrasting view, see Salik, supra note 1 at 26, 27.

23. C. Serruya, supra note 20.

24. See, e.g. J. Hays, TVA on the Jordan (1948). See, also G. Stevens, Jordan River Partition (1965).

25. See discussion in A. Natif, supra note 15 at 5.

26. Interview with Colette Serruya, Head, Kinneret Limnological Laboratory, February 11, 1973.

27. S. Lulav, The Kinneret Region, in Lake Kinneret, General Background, Nat'l Council for Research & Development 9 (1973).

28. N. Mintzker, G. Cohen, Water Supply, Masterplan for the Kinneret Watershed 15 (1973).

29. Id.

30. For a full discussion of the project and its effect on the lake, see A. Natif, supra note 25, at 3, 5.

31. The soil of the Huleh has been inaccurately described as peat. Peat is that soil whose composition is 97-99% mineral and 1-3% organic material. the "peat" in the Huleh is 50-60% organic matter. Yoram Avnimelech, Lecture to Workshop on the Kinneret Watershed, March 28, 1974.

32. Although this theory has been challenged by scientists. Interview with Yoel Geifman, Kinneret Limnological Laboratory, April 18,1974. Geifman maintains that the sediment did not settle in Lake Huleh, but continued into the Jordan. Id.

33. Dredging the Jordan chennel took place in two stages. In 1963, the upper Jordan was dredged, and in 1967, the section of the Jordan between the Huleh and the Beit Yaacov bridge. Dredging activities poured sediment and nutrients into the lake, but once completed, they lessen the nutrient load to the lake. Interview with Ezra Hankin, Head, Dept. of Drainage Affairs, Water Commission, April 15, 1974.

34. Natif, supra note 15, at 7, 8.

35. Admittedly rough figures place its nitrogen contribution between 50% and 75% of the total reaching the lake, and its phosphorus contribution between 45% and 85% of the total. Studies of Lake Kinneret & Its Watershed, Report: Summer 1973, Mekorot, at 6.

36. J. Hays, TVA on the Jordan (1948).

37. For a discussion of the plans leading to construction of the National Water Carrier, see N. Mintzker, G. Cohen, Water Supply, Masterplan for the Kinneret, at 5 (1973).

38. Id. at 16.

39. Id. at 14.

40. Salik, supra note 1, at 26. These studies have been ridiculed, however. Interview with Avraham Shem Tov, Head, Jordan Unit, Mekorot, April 5, 1974.

41. See Mintzker & Cohen, supra note 37, at 25. Increasing the rainfall will also increase the area of the lake. Increasing the lake's area will prevent the employment of barriers to pen in oil spills. I. Berg, Petroleum Institute, Lecture to Workshop on Kinneret Watershed, April 15, 1973.

42. R.J. Davis, supra note 18, at 5.

43. Unless otherwise indicated, the data presented in the text on farming methods are taken from N. Mintzker, G.Shaham, Agriculture in the Area, Masterplan for the Kinneret Watershed (1973)(Hebrew).

44. Marcardo, supra note 18, at 51.

45. Id. at 5.

46. Mintzker & Shaham, supra note 43, at 38.

47. Marcardo, supra note 18, at 51.

48. Data on pesticide use were taken from Mintzker & Shaham, supra note 43, at 40.

49. Protocol No. 2: Discussion of Studies of the Kinneret 2, Tahal (1964).

50. Marcardo, supra note 18, at 20.

51. D. Salik, supra note 1, at 21.

52. Mintzker & Cohen, supra note 37, at 2. The National Carrier and fifteen companies are controlled by Mekorot. The rest are private. Id.

53. R.J. Davis, supra note 18, at 8.

54. Data on sewage produced in the basin appear in Mintzker & Shaham, Treatment & Disposal of Sewage, Masterplan for the Kinneret (1973) (Hebrew).

55. Id. at 14.

56. Id. at 8.

57. Figures on tourism in the basin were taken from Intermediary Report, Masterplan for the Kinneret, at 60, 61 (May, 1973).

58. Report: The Blunders Continue in Activity Aimed at Protecting the Kinneret, Society for the Protection of Nature in Israel, at 4, (July, 1973).

59. L. Teclaff & E. Teclaff, Saving the Land-Water Edge from Recreation for Recreation, 14 Ariz. L. Rev. 39, 40 (1972).

60. Interview with Shmuel Sarig, Head, Laboratory for Fish Diseases, Ministry of Agriculture, April 4, 1974.

61. Id.

62. Interview with Shlomo Bahalul, Fisherman, Inspector, Nature Reserves Authority -- Minhelet haKinneret, April 18, 1974.

63. Telephone Conversation, Moshe Gino, Fish Officer, Ministry of Agriculture, April 19, 1974.

64. Marcardo, supra note 18, at 43.

65. Id. at 50.

66. Interview with Menahem Kantor, Water Commissioner, April 3, 1974.

67. Preparation of material for this section involved poring over ministry files in Tiberias and Nazereth, and interviews with the following persons. Haim Cohen, Health Inspector, Ministry of Health, Tiberias, December 23, 1973; Danial Frank, Health Inspector, Ministry of Health, Nazereth, March 20, 1974; Haim Livnat, Health Inspector, Ministry of Health, Tzefat, Telephone Conversation, April 17, 1974.

68. See, e.g. §53,54. Prior to 1973, the Ministry of Health was in effect limited to a supervisory role because it had to operate through local communities. Interview with Hillel Helman, Ministry of Health, Environmental Health Division, December 18, 1973. In 1973, the Public Health Ordinance was amended, allowing the Ministry to proceed against offenders without the help of local authorities. A Law to Amend the Public Health Ordinance (No.5) 5733-1973, SH 710 p. 232 §61A.

69. See § 52B and regulations for drinking water in KT 3117 p. 555 (1974).

70. The Licensing of Businesses Law simply does not prevent pollution of a natural body of water, unless such pollution creates a health hazard or creates a nuisance. See discussion, text, supra p. 142.

71. Interview with Dr. Eliyahu Matan, formerly District Doctor, Ministry of Health, Nazereth, March 4, 1974.

72. The cases, all brought by the Tiberias branch office of the Ministry of Health, are Attorney General v. Ashdod Yaacov, Ct. F. 1/62, Magis. Ct. Tiberias, Dec. 1963; Att'y Gen'l v. Kibbutz Massada, Ct.F. 3/63, Magis. Cr. Tiberias, December, 1963; Att'y Gen'l v. Kibbutz Deganya Bet, Ct. F. 1/64, Magistrate Ct. Tiberias, 1964. In all three cases, the charge was one in nuisance in violation of the Public Health Ordinance § 53, 54. Kibbutz Ashdod Yaadov was charged with improper maintenance of their aeration ponds. No verdict was ever issued in the case. The Ministry of Health's actions against Deganya Bet and Massada ended in the court levying fines of 10 and 25 pounds respectively.

Both cases involved improper maintenance of sewerage works and dumping of raw sewage into the lower Jordan.

73. See discussion, infra p. 290.

74. See letter from M. Horowitz, Public Health Dept., Ministry of Health, to Nazereth District Office, Ministry of Health, June 19, 1973 (File 20/3, Health -- Nazereth).

75. The planned spraying operations raised objections from the Nature Reserves Authority and from the District Doctor of the Ministry of Health, Nazereth. See letter from Dr. Matan to Shmuel Sarig, Dept. of Fisheries, April 5, 1973; letter from Dr. Matan to Dr. B. Hefer, Agricultural Research Station, May 17, 1973.

76. Section 29 of the Public Health Ordinance requires the Minister of Health to regulate sanitary conditions in hospitals.

77. Telephone conversation, Haim Livnat, Health Inspector, Ministry of Health, Tzefat, April 17, 1974.

78. See File 14/62, Ministry of Health, Nazereth.

79. Interview with Haim Cohen, Ministry of Health, Tiberias, Dec. 23, 1973.

80. File 14/17, Ministry of Health, Nazereth.

81. See N. Mintzker & G. Shehem, Treatment & Disposal of Sewage, Masterplan 5 (1973).

82. Planning & Building Law, 1965 §56.

83. Information on the composition of the groups planning the Kinneret basin was obtained from the coordinator of the Steering Committee. Interview with Ehud Gavrieli, Ministry of Interior, February 28, 1973. The following ministries are represented on the committee: Interior, Health, Justice, Tourism, Agriculture, as well as a representative of the Water Commission, the National Parks and Nature Reserves Authority, and the Northern District Planning and Building Commission. Id.

84. The Planning & Building Law allows an opportunity for public opposition after a district plan has been deposited. See §89, 100, as amended 710 SH 208 (1973). No opportunity is allowed for public objection to a national outline plan.

85. Interview with Yoel Geifman, Kinneret Limnological Laboratory, April 18, 1974. The deficiencies of the plan are obvious even to the eye of the non-expert. First, the plan adds little knowledge to what is known about the Kinneret watershed. Second, the investigators failed to validate most of the data they received. Third, personal viewpoints and bias are sprinkled throughout the reports, most notably in the report on agricultural pollution of the Kinneret. There the author states that there is no substitute for pesticides, instead of describing the effect of pesticide use on the lake. Mintzker & Shaham, supra note 43, at 40. Finally, some of the reports are not creditable. The solid

waste report is based on a questionnaire and a day's visit to some of the settlements in the watershed. Y. Brand, Survey of Solid Waste in the Watershed of the Kinneret,at 1,Masterplan (1973). As a "solution" to the problem of solid waste in the watershed, the author suggests part sanitary landfill and part burning of the waste, within the watershed. Id. at 7.

86. The Bathing Places (Regulation) Law 5724-1964, SH 434 p. 172.

87. Interview with Shlomo Bahalul, Minhelet haKinneret-Nature Reserves Authority, April 18, 1974. Mr. Bahalul, who supervised the cleaning of the Kinneret beaches in 1969-70 told the author that conditions were so bad in places, men vomited. Id. Mr. Bahalul's remarks about the neglect of the beaches were verified by the engineer for the northern district of the Ministry of Interior. Telephone conversation, Yitzhak Leibovitz, Chief Planner, Northern District, Ministry of Interior, April 19, 1974.

88. Bahalul Interview, supra note 87.

89. Cities Ordinance [New Version] Vol. 1 No. 8 p. 197; Local Authorities Ordinance [New Version] Vol. 1 No. 9, p. 256.

90. Local Authorities (Sewerage) Law 5722-1962, SH 376 p. 96; SH 666 p. 156.

91. See Report: Solid Waste Pollution in Israel, Israel Nat'l Council on Biosphere & Environment 87, 88, 93, 94 (1973) (Hebrew).

92. "Listen, the problem is basic to democracy. Do you want the heads of cities to be rubber stamps collecting tazes, when education, roads, sewerage etc. are in the hands of the central government?" Interview with Shaul Arlozeroff, Deputy Water Commissioner, December 27, 1973.

93. Ports Ordinance [New Version] No. 20 p. 443 §60.

94. Id. Supplement 1.

95. Id. at §160. Specific sections against pollution of port waters by dumping of waste in or near port waters appear in Ports Authority Law, 5721-1961, SH 344 p. 145 §15, 171-181.

96. The Ministry is empowered to license boats under the Boating Law, 5720-1960, SH 315 p. 70. Regulations prescribing the conditions for cleanliness on sightseeing boats and forbidding the dumping of trash from such boats appeared by authority of the Commodities and Services (Control) Law. See Order Concerning Commodities & Services (Control) Law (Small Vessels Carrying Paying Passengers), 5732-1972, KT 2824, p. 841.

97. Oil in Navigable Waters Ordinance, 1936, P.B. 612 Supp. I p. 234 §2(a).

98. Telephone Conversation, David Perry, Legal Advisor, Shipping Section - Ministry of Transportation, April 29, 1974.

99. Fisheries Ordinance, 1937, P.G. 637 Supp. I P. 157.

100. M. haReuvani, 'Nightly Ambushes Against Fisherman for Poisons in the Kinneret," Maariv, May 15, 1974 p. 6 col. 7.

101. Talk by I. Berg, Machon haNepht, to Workshop on the Kinneret, April 1, 1974. See also, Prevention of Pollution of Sea & Ground Water, Machon haNepht (1971).

102. Letter from I. Kariv, Director of Mekorot, to the Minister of Agriculture, February 19, 1965. File No. 121-8/1, Mekorot, Jordan Unit, Nazereth.

103. Meeting of M. Kantor, Water Commissioner, S. Kantor, Mekorot, Y. Goldshmidt, Mekorot, A. Barak, Head of Jordan Unit in File No. 121-8/1, Mekorot, Jordan Unit.

104. Interview with Avraham Shem Tov, Head of Jordan Unit, April 5, 1974.

105. Summaries of all reports are available in File No. 121-8/1, Mekorot, Jordan Unit.

106. Wilhelm Rhode, How to Study & Protect Lake Kinneret (1966).

107. Shem Tov Interview, supra note 104.

108. Study of Flocks of Sheep and Head of Cattle in the Kinneret Basin, Mekorot, Jordan Unit (1966).

109 Letter from Y. Goldshmidt, Mekorot to H. Shuval, Ministry of Health, September 22, 1966.

110. A protective strip was declared around the National Water Carrier in 1972. Y.P. 1794 p. 1884.

111. Letter from H. Shuval, Ministry of Health, to Northern District, Ministry of Health, October 13, 1965.

112. Interview with Avraham Shem Tov, supra note 104.

113. Geifman Interview, supra note 84.

114. Id.

115. "I wrote several letters to the mayor of Tiberias...and demanded that they unhook their sewerage pipes from the salt water carrier. On the good services of Minhelet haKinneret, I was asked to delay the unhooking until the city completed its expansion plan for purification of sewage." Letter from A. Shemtov, Mekorot, Jordan Unit to Dr. Uri Levy, Ministry of Health, Jan. 3, 1973.

116. Geifman Interview, supra note 85.

117. The party relaying this information asked that he remain anonymous.

118. Interview with Colette Serruya, Director, Kinneret Limnological Laboratory, February 11, 1973; Water Quality Research in Israel, Nat'l Council for Research & Development 29 (1972).

119. Dr. Colette Serruya, Personal Communication, May 5, 1974.

120. This and the following information on the Kinneret Committee was relayed to the author by Rafi Kotzer. Interview with Rafi Kotzer, Assistant to the Minister of Health, April 16, 1974.

121. Id.

122. This and the following information was relayed by Haim Gofer. Interview with Haim Gover, Kibbutz Ginnossaur, December 23, 1973.

123. R.J. Davis, Investigation of the Pollution Problems of Lake Kinneret 1 (1971).

124. Interview with Menahem Kantor, Water Commissioner, April 3, 1974.

125. Gofer Interview, supra note 122. Gofer's story is backed up by news reports of the period. See Y. Kotler, "A Lake is Dying: Secret Report on the Kinneret", Haaretz, Additional Section p. 15, December, 1971.

126. Y. Kotler, supra note 125.

127. Protocol No. 12, Kinneret Committee, p. 1, September 17, 1971.

128. Lecture by Ehud Gavrieli, Coordinator of the Masterplan for the Kinneret, to the Workshop on the Kinneret Watershed, May 13, 1974.

129. Interview with Ehud Gavrieli, supra note 14; Report: The Kinneret Has There Been an Improvement in the Situation?, Society for the Protection of Nature in Israel, September 30, 1972.

130. The Water Commissioner denies this. He maintains that he was aware of the problems in the Kinneret prior to 1971, and acted accordingly. Interview with Menahem Kantor, supra note 120. The facts do not support the Water Commissioner's argument, however. In researching numerous files, it became clear that the Water Commissioner acted as a stumbling block in protecting the Kinneret, rather than a guiding force. The fact that the Water Commissioner refused to set up a Lake Authority; the fact that the initiative for the Kinneret Committee did not come from him; the fact that not one community sewage purification system in the basin meets standards for protection of Lake Kinneret; the fact that the Water Commissioner stifled the Bob Davis report, all show that prevention of pollution of the Kinneret was not a top priority item for the Water Commissioner.

131. Interview with Amos Harpaz, Director, Minhelet haKinneret, April 8, 1971. See also Annual Report to the Knesset, Water Commission, at 1, Dec. 1972.

132. At a cost of 27,000 lirot. Harpaz Interview, supra note 131.

133. Report: The Kinneret, Has There Been an Improvement in the

134. §20B.

135. Mining Ordinance, II Drayton, Laws of Israel §8(1)(e) p. 338.

136. Letter from David Spiegel, Commanding Officer, Tiberias Police Department, to Water Commissioner, March 22, 1974.

137. Id.

138. Bahalul Interview, supra note 87.

139. Discussion with Adir Shapira, Deputy Director, Nature Reserves Authority, April 3, 1973.

140. Harpaz Interview, supra note 131.

141. Id.

142. "The relationship between the prevalence of secondary waste treatment and relative availability of phosphorus is well understood, but often ignored because of its embarrassing conflict with other water pollution control requirements and prevailing strategies of water pollution control." Cost of Clean Waters, supra note 19 at 31-32.

143. The city of Tzefat is not overly anxious. Discussion with Uri Marinov, Director, The Environmental Protection Service, April 26, 1974.

144. At that point the sewage becomes a national, not a local rpoblem. Interview with Gdalyahu Shelef, former advisor to the Ministry of Health, November 5, 1973. For years the town of Tzefat has poured raw sewage into Nahal Amud from where it flows into the Kinneret. Y. Zak. Survey of River Pollution in Israel, 16 Teva Vaaretz, no. 4, p. 192, 193 (1973).

145. Harpaz Interview, supra note 131.

146. See L. Teclaff & E. Teclaff, Saving the Land-Water Edge from Recreation for Recreation, 14 Ariz. L. Rev. 39 (1972).

147. For example, the Lake Tahoe Basin. Id. at 57. The concept of regional watershed planning is well established in England and France. See Environment and Regional planning, No. 17, Com't on the Challenges of Modern Society, NATO at 1.32, 1.36 (1973).

148. Yet plans for turning the Drainage Authorities in the Kinneret basin into Drainage & Sewerage Authorities are being prepared by the Drainage Section of the Water Commission. Interview with Ezra Hankin, Head of Dept. of Drainage Affairs, Water Commission, April 15, 1974.

149. Water Regulation (Prevention of Pollution of Lake Kinneret by Livestock) 5733-1973, KT 3020, p. 1490.

150. Bahalul Interview, supra note 87. One reason for the lack of designated points stems from the Water Commissioner's refusal to confront the agricultural sector of the economy. Minhelet haKinneret drew up plans for washing pens near Wadi Hamam, using Kibbutz Migdal to wash the animals. The Kibbutz refused, objecting to the use of "their" water to wash Bedouin cows. The Minhelet was, therefore forced to change its plans. Id. Bahalul said that he received no support from the Water Commissioner's legal staff in his fight against Kibbutz Migdal. Id. Yet the basic tenet of the Water Law, and its first sentence, declares that Israel's water sources are public property, to be controlled by the State for its inhabitants.

Conclusion

Prior to work on this dissertation, it was assumed by the author that an adequate legal code would be sufficient to protect Israel's water sources from pollution. Therefore it was asked at the opening of this thesis: If the law is so good, why are the water sources so polluted? At this point, the answer to this question should be obvious. The law has not been executed. Yet answering the question in this manner only raises a formidible "why?" to which this author has no clear cut answer.

The answer is convoluted because the legal framework for the protection of Israel's water sources is itself convoluted. The Knesset contemplated one body having sole control over conservation, supply, and distribution of Israel's meager water resources. But what the right hand gave, precedent and tradition took away. A Water Commission with tremendous legal authority was set up, but without appropriate administrative resources. Long range water planning remained the task of Tahal; distribution and supply of water remained the task of Mekorot. Therefore, the Water Commission became a regulatory agency, not directing water policy, but responding to it. At the same time, the Water Commission was subject to the will of the Minister of Agriculture. This, in essence, directed the Commission's policies away from national considerations toward agriculture's needs. Stream pollution went unchecked as long as it supplied agriculture with an inexpensive source of water. Overpumping went unchecked because agricultural withdrawals could not be controlled.

All of the points raised above lead one to conclude that a reorganization in the management of Israel's water resources is in order. The Knesset should strongly reconsider the position of the Water Commission tied to the Ministry of Agriculture. There is urgent need for thought being given to setting up a Ministry for Natural Resources or a Ministry for Protection of the Environment, of which the Water Commission would be an integral part. There is a desperate need for reducing the power of Tahal and Mekorot in the area of water policy formulation. Tahal's long range policy branch should be properly vested in the Water Commission, and Mekorot's powers should be closely circumscribed by the Water Commission.

There is need also for minor changes in legislation to give the Water Commission a more balanced view of the potential uses of water resources. This balanced view would include aesthetic, recreational and amenity uses of water. Legitimizing these uses would reduce pressures for over-exploitation of the Kinneret. At the same time, it would give the Water Commission a stronger hand in the future development of the Kinneret for reasonable recreational uses.

Even without the above fundamental administrative and minor legislative changes in the existing legal framework, there is need for immediate action by the Water Commission on the following fronts. First a ground water pumping policy should be openly declared and stringently maintained. This policy would include limits on ground water withdrawals, at one end of the spectrum, and restrictions on building on Israel's sand dunes, at the other. Second, serious consideration of ways to reduce the heavy use of chemical fertilizers on loamy soil

should be formulated and executed. Third, there must be a more serious attempt to unite the disjointed approaches to creating a surface water policy. As a first step in achieving this goal, fundamental questions on water use and reuse must be raised and answered. There must be a definite policy on the question of reuse of sewage, on the use of streams, wadis and reservoirs for recreational use, and on the cost of these various uses to the public. Following the delineation of these policies, there can be a definition of stream and sewage quality, and the formulation of the proper mechanism for achieving the defined qualities. This mechanism can be national or regional in character, but it cannot be local.

It is understood that the policies suggested above take time, and their reformulation will take more time. Therefore there is little need to stress the urgency of beginning these programs at the legislative and administrative levels of government. Water pollution has a dynamism of its own which, over time, makes solutions more difficult and more costly. In 1971, the Knesset recognized the dynamic quality of water pollution and attempted to fortify the Water Commission to confront this new plague on society. Unfortunately, the tools for change have rusted in the Water Commissioner's hands, and if past action is any indication of future policy, Israel is now headed for a fresh water crisis of major proportions.

W A T E R Q U A L I T Y

Table of Contents

INTRODUCTION

Even the eye of one inexperienced in the area of water pollution control legislation will mark the power given to Israel governmental authorities to prevent and control water pollution. The tone as set by the Water Law is that Israel's water sources are scarce and every effort should be made to preserve their quality and quantity. This tone is continued in laws for the prevention of soil erosion and the prohibition of uncontrolled digging of wells.

Israel's health legislation also gives a free hand to health authorities in the development of criteria for drinking water and sewage used for a commercial purpose. The diffusion of authority, however, between the sanitary quality of water and methods of its protection and conservation has not been resolved by legislation.

Also presented in these legislative materials on water pollution prevention and control are control mechanisms for the prevention of water pollution from industrial effluent and protection of Israel's shoreline and bathing areas. A concluding section presents miscellaneous criminal and civil legislation aimed at the prevention and control of pollution of Israel's water sources.

WATER LAW, 5719 - 1959*

Chapter One: Preliminary

1. The water resources in the State are public property; they are subject to the control of the State and are intended for the use of its inhabitants and for the development of the country.

2. For the purposes of this Law, "water sources" means springs, streams, rivers, lakes and other currents and accumulations of water, whether above ground or under ground, whether natural, regulated or man made, and whether water rises, flows or stands therein at all times or intermittently, and includes drainage water and sewage.

3. Every person is entitled to receive and use water, subject to the provisions of this Law.

4. A person's right in any land does not confer on him a right in a water source situated therein or crossing it or abutting thereon; but the provisions of this section shall not derogate from the right of any person under section 3.

5. A person's right to receive water from a water source is valid so long as the receipt of water from that water source does not lead to the salination or depletion thereof.

6. Every right to water is linked to one of the purposes enumerated hereunder; the right to water ceases upon the cessation of said purpose. The purposes are -

(1) household;
(2) agriculture;
(3) industry;
(4) handicraft, commerce and services;
(5) public services.

7. For the purposes of this Law, it shall be immaterial whether a right to water was created by law -- including this Law -- or by agreement or custom or in any other manner, or whether it was created before or after the effective date of this Law.

Chapter Two: Regulation of Use of Water

Article 1: Preservation of Water

8. In this chapter -

"depletion of a water source" includes the lowering of the level of water, whether above ground or under ground, and the impairment of the possibility of raising water to the surface or of conveying water from place to place.

* Passed by the Knesset on the 28th Tammuz, 5719 (August 3, 1959) and published in 13 LSI 173; as amended in 15 LSI 193, 216 (1961); 19 LSI 196 (1965); 26 LSI - (1972).

9. A person shall -

(1) deal efficiently and sparingly with water coming under his control;

(2) keep any water installations under his control in proper condition so as to prevent waste of water;

(3) refrain from blocking up or depleting any water source;

(4) prevent the blocking up and depletion of the water source from which he draws water.

(. . .)

11. Where the Water Commissioner, appointed under section 138, (hereinafter the "Water Commissioner") is satisfied that any of the provisions of section 9 is not being complied with, he may -

(1) order such person bound to comply with the provision to rectify the wrong in accordance with the order and, if the wrong is not rectified within a reasonable time, do whatever is necessary to rectify it, and order the discontinuance or restriction of the extraction, supply or consumption of water, as the circumstances may require, pending rectification of the wrong;

(2) take steps to prevent immediate serious damage to a water source if such damage cannot be prevented in any other way.

12. The Water Commissioner may, by order, charge the expenses incurred by him for the purposes of action under section 11 to the person who was bound to comply with the provisions of section 9, and upon his so doing, such expenses shall be recovered as if it were a tax to which the Taxes (Collection) Ordinance[1]) except section 12 thereof, applies.

13. A person who considers himslf aggrieved by an order under section 11 or by a charge for expenses under section 12 may appeal therefrom before the Tribunal established under section 140 (hereinafter -- "the Tribunal"). The appeal shall not stay the enforcement of the order unless the Tribunal orders the stay thereof; but expenses shall not be recovered under section 12 until the Tribunal has decided the appeal.

14. The Minister of Agriculture may, after consultation with the Water Board appointed under section 125, (hereinafter "the Water Board") prescribe rules concerning the width and area of protective strips, and upon his doing so, the Water Commissioner shall not prescribe a protective strip save within the scope of those rules and not beyond what is necessary for the achievement of the purpose for which the protective strip was prescribed.

15. Where the Water Commissioner deems it necessary so to do, for the purpose of preserving any water, water source, water works or any installation for the extraction, storage or conveyance of water, he may, by order, prescribe

1) 2 LSI 1898 (1949).

around or on the sides of the water source or installation a protective strip, entry to and passage through which shall be prohibited except under a permit from the Water Commissioner and in accordance with its conditions.

16. A person who considers himself aggrieved by the prescribing of a protective strip, by the refusal of the Water Commissioner to grant a permit under section 15, or by the conditions of such a permit, may appeal therefrom before the Tribunal.

17. The Water Commissioner, or any person authorised by him in writing to act on his behalf, may enter any place upon written advance notice to the occupier thereof, and do therein any act required for the supervision of a water source or for the preservation of water; he may also act to discover water sources, measure the yield and properties of water sources, or inspect land, vegetation and other local conditions for the purpose of determining water requirements.

(. . .)

Article 1A: Prevention of Water Pollution

20A. In this article -

"water pollution" means a change in the properties of water in a water source from a physical, chemical, organoloptical, biological, bacteriological, radioactive or other standpoint, or a change which results in water dangerous to public health or likely to harm animal or plant life or less suitable for the purpose for which it is used or intended to be used;

"water source" as defined in section 2 including water carriers, both open and closed, water reservoirs and drainage channels.

"polluter" means an industrial or agricultural undertaking, building within the meaning of the Planning and Building Law, 5725 - 1965[1], installation (including sewerage installation), machine or means of transportation, the location, establishment, operation, maintenance or use of which causes or may cause water pollution.

20B. (a) A person shall refrain from any act which directly or indirectly, immediately or later, causes or may cause water pollution; and it shall be immaterial whether or not the water resource was polluted before the act.

(b) A person shall not throw, nor discharge, into or near a water source liquid, solid or gaseous substances nor deposit any such substances in or near a water source.

1) 19 LSI 330.

20C. A person who has under his control any installation for the extraction, supply, conveyance or storage of water or for recharging ground water sources shall take all reasonable measures to prevent such installation or its operation from causing water pollution.

20D. (a) To prevent water pollution and protect water sources from pollution, the Minister of Agriculture may, after consultation with the Water Board, make regulations prescribing, inter-alia, restrictions, prohibitions, conditions and other provisions as to -

(1) the location and establishment of specified polluters; such regulations shall require the approval of the Economics Committee of the Knesset;

(2) the use of certain substances or methods during production processes, operation and use of a polluter including soil cultivation, fertilizer application and crop spraying; such regulations shall be made in consultation with the Minister of Health;

(3) the manufacture, importation, distribution and marketing of certain substances and products; such regulations shall be made in consultation with the Minister of Commerce and Industry and prior notice thereof shall be given to the Economics Committee of the Knesset;

(4) the regulation of the movement, stoppage and use of means of transport on or near water resources; any such regulations shall be made with the consent of the Minister of Transport.

(b) Regulations under this section shall not derogate from the obligations imposed by sections 20B and 20C.

20E. (a) A person who has under his control any polluter the operation or use of which requires the disposal of sewage therefrom shall, upon the order of the Water Commissioner, submit for his approval a scheme detailing the mode of sewage disposal, nature and quantity and its chemical, physical and biological composition and any other particular demanded by the Water Commissioner for this purpose. The Water commissioner may refuse to approve the scheme, vary it or attach such conditions to it as he may think fit.

(b) Where a person has been ordered to submit a scheme as referred to in subsection (a), sewage shall not be disposed of as long as the scheme has not been approved: Provided that the Water Commissioner may issue directions for a temporary mode of disposal pending the approval of the scheme.

(c) Where a scheme for the disposal of sewage has been approved, sewage may only be disposed of in accordance therewith.

(d) Where a person has been ordered to submit a scheme as referred to in subsection (a) and he has not done so within the time prescribed in the order or the scheme has not been approved or he has not carried out the changes in the scheme that have been required of him or he has not fulfilled the conditions attached to the scheme, the Water Commissioner may prepare a sewage disposal scheme for him, and upon his doing so, the

person shall bear the cost of preparing the scheme; the Taxes (Collection) Ordinance[1]), except section 12 thereof, shall apply to the collection of such cost.

(e) The Water Commissioner shall not exercise his power under subsection (d) before the expiration of one month from the date prescribed for the submission of the scheme, the carrying out of the changes or the fulfillment of the conditions, as the case may be.

(f) A person for whom the Water Commissioner has prepared a scheme under subsection (d) may not dispose of sewage from a polluter save in accordance with such scheme.

(g) Prior to exercising his powers under this section, the Water Commissioner shall consult with a person empowered in that behalf by the Minister of Health.

20F. In approvals, licences, and permits granted under this Law or the Drainage and Flood Control Law, 5718 - 1957[2]), the Minister of Agriculture or the Water Commissioner, as the case may be, may set conditions for the prevention of water pollution.

20G. (a) Where the Water Commissioner is satisfied that water pollution has been caused, he may order the person who caused it to do everything necessary to stop it, to restore the position which existed before it was caused and to prevent its recurrence, all as specified in the order.

(b) If within a reasonable time prescribed in an order under subsection (a) the provisions hereof are not complied with, the Water Commissioner may do everything specified in the order, and upon his so doing, the person who has failed to comply with the order shall bear the cost involved; the provisions of the Taxes (Collection) Ordinance, except section 12 thereof, shall apply to the collection of such cost.

20H. (a) Where, after being warned a person causes water pollution or disregards a direction issued to him under the provisions of this article or contravenes any of the provisions hereof or any regulation or order made thereunder, the Water Commissioner may order the discontinuance or restriction of the extraction, supply or consumption of water or may refrain from allocating water (such measure hereinafter referred to as a "stop order"): Provided that a person shall not thereby be deprived of drinking water.

(b) The stop order shall be in force so long as pollution has not stopped, the position which existed before it was caused restored and measures to prevent its recurrence adopted: Provided that the Water Commissioner may cancel the order, subject to conditions or unconditionally, if it is proved to him that the person to whom the order is addressed is doing everything

1) 2 LSI 1898 (1949)
2) 12 LSI 5 (1957)

necessary to stop the water pollution, to restore the former position and to prevent a recurrence of water pollution or if the person to whom the order is addressed has given him security, to his satisfaction, for the carrying out of said operations within a reasonable time.

(c) Where a stop order may affect the consumers of a supplier to whom it is addressed, it shall not be made until the Water Commissioner has arranged for a proper supply of water to those consumers so long as the order is in force and on conditions prescribed by him.

20I. Where the Water Commissioner finds that water pollution has been or is likely to be caused by circumstances beyond the control of any person and that the situation requires, inter alia, the making of a stop order, the stop order shall not be made until the Water Commissioner has, as far as possible, arranged for a normal supply of water, on conditions prescribed by him and so long as the order is in force, to all those whose water supply has been discontinued or restricted as a result of the order.

20J. Where the Water Commissioner is satisfied that serious water pollution has been or is likely to be caused and that the situation requires inter alia, the immediate discontinuance or restriction of the extraction, supply or consumption of water from a particular water source, he may take all measures deemed appropriate by him in the circumstances of the case in order to stop or prevent water pollution or its effects and for this purpose may use force to the extent necessary.

20K. (a) Where the Water Commissioner, after consultation with a person empowered in that behalf by the Minister of Health, is satisfied -

(1) that a particular operation is intended for the melioration, improvement of the quality, disinfection or mixing of water, for the prevention of danger to the public or the like or for conveyance of substances in water for a purpose approved by him in advance; or

(2) that the circumstances of the case leave no choice but to enable the disposal of sewage into a particular water source for a fixed period which shall be specified,

such operation or disposal shall not be regarded as water pollution within the meaning of this article if it is carried out in accordance with an authorising order made by the Water Commissioner for this purpose.

(b) In an authorising order, the Water Commissioner may prescribe conditions, restrictions and limitations, either at the time of making the order or at a later date, and upon his doing so, the person to whom the order has been granted shall act in accordance with such conditions restrictions and limitations.

(c) An authorising order under subsection (a)(2) shall be personal and set out the reasons therefore and shall be in force for one year: Provided that the Water commissioner from time to time may extend it for reasons which shall be specified.

(d) The Water Commissioner may, after consultation with a person empowered in that behalf by the Minister of Health, cancel an authorising order or vary the conditions, restrictions and limitations prescribed therein if the circumstances of the case have changed or he finds that the public interest so requires or it appears to him that the order or the conditions, restrictions or limitations prescribed therein have been infringed.

(e) The Water Commissioner shall deliver to the Economics Committee of the Knesset, at the times prescribed by it, but at least once a year, a report on the authorising orders made by him.

(f) A list of the authorising orders made by the Water Commissioner shall be open for inspection by the public free of charge.

20L. (a) The Minister of Agriculture or the Water Commissioner, as the case may be, may confer powers under this article or any part thereof, except the power to make regulations having legislative effect and the power to make stop orders or authorising orders, upon a water authority, a drainage authority, a local authority, or an association of towns (each hereinafter referred to as an "authority") in respect to anything relating to the prevention of water pollution in its area.

(b) Authorities as referred to in subsection (a) which have a common interest in the prevention of water pollution in their areas may combine into a body corporate with a view to its being granted powers for the prevention of water pollution in such areas.

(c) A conferment of powers under subsection (a) or (b) will be made with the consent of the authority on which they are conferred and, in the case of a confirment of powers on a local authority or association of towns or on a body corporate as referred to in subsection (b) which includes a local authority or association of towns, also with the consent of the Minister of the Interior.

(d) At the time of conferring powers under subsection (a) or (b), the Minister of Agriculture or the Water Commissioner, as the case may be, shall prescribe by order the powers so conferred.

(e) Where any power has been conferred on an authority under subsection (a) or on a body corporate under subsection (b) the authority or body corporate shall be competent to exercise such power notwithstanding any limitation existing under law or otherwise.

20M. (a) The Minister of Agriculture may, after consultation with the Water Board, enact by regulations provisions as to the quality of water for different purposes, including flood-water and sewage, but not including the sanitary quality of drinking water, within the meaning of Part VI of the Public Health Ordinance, 1940[1].

1) p. 6 of 1940 Supp. I p. 39, as amended by 4 LSI 107 (1971).

(b) Regulations under subsection (a) shall, in so far as they relate to public health, be made after consultation with the Minister of Health.

(c) Where regulations under subsection (a) have been made, the Water Commissioner shall not permit the extraction, supply or comsumption of water for the different purposes and uses save in accordance with the said regulations; and he may prohibit the extraction, supply or consumption of water which does not conform to those regulations, or may change the purpose of such water, provided that it is suitable for the new purpose.

20N. The provisions of this article shall be in addition to, and not in derogation of, the provisions of any other enactment relating to water pollution.

20 O. Save as otherwise provided in this article, an order thereunder may be general or to a particular person or class of persons or in respect of a particular polluter or class of polluters or in respect of part of a polluter.

20P. Regulations and orders under this article may apply in the whole area of the State or in any part thereof or in respect of a particular water source, as may be specified in the regulations or orders; advance notice shall be given to the Economics Committee of the Knesset of any order applied to part of the area of the State.

20Q. The provisions of this article shall not derogate from the provisions of Part VI of the Public Health Ordinance, 1940, with regard to drinking water.

20R. (a) A person who considers himself aggrieved by the exercise of the powers of the Minister of Agriculture or the Water Commissioner under the provisions of this article or by refusal to exercise their powers as aforesaid or by the exercise of a power conferred on an authority or body corporate within the meaning of section 20L or by a refusal to exercise any such power may appeal before the Tribunal within twenty-one days from the day on which the fact of the exercise or refusal came to his knowledge.

(b) Lodging an appeal under this article shall not stay the execution of the act appealed from unless the Tribunal so directs; however, where collection of the cost is permitted under the provisions of this article, it may only be collected after the Tribunal has decided the appeal and in accordance with the results of the decision.

(c) The provisions of subsection (b) shall not derogate from the provisions of section 152.

20S. (a) In exercising their powers under this article, the Minister of Agriculture or the Water Commissioner, as the case may be, may have regard to the period of time which in their opinion, in the circumstances of the case, is required in order to enable any person, including a person who has a polluter under his control, to adapt his activities or the polluter under his control to the cirucmstances created by the publication of the article.

(b) The period of time referred to in subsection (a) shall not exceed six months from the day on which this article comes into force.

20T. The Water Commissioner shall once a year deliver to the Economics Committee of the Knesset a report on the situation regarding water pollution and on the action taken to prevent it.

(. . .)

Article : Norms and Rules for the Use of Water

21. The Minister of Agriculture may, after consultation with the Water Board, prescribe norms for the quantity, quality, price, conditions of supply and use of water within the scope of the purpose thereof, and rules for the efficient and economic utlization of water, and upon his doing so, a person shall not supply or use water otherwise than in accordance with such norms and rules.

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Article 3: Control of Extraction and Supply of Water

3. A person shall not extract water from a water source whether for his own consumption or for supply to others, and shall not supply water, whether extracted by him from a water source or received by him from another supplier, otherwise than by a license from the Water Commissioner and in accordance with the conditions of that license (such a license hereinafter referred to as a "production license").

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Article 4: Rationing Areas

36. Where the Minister of Agriculture is satisfied that the water sources in a particular area are not sufficient for the maintenance of existing consumption of water in that area, he may, after consultation with the Water Board and the supply committee, declare, in Reshumot, such area to be an area in which the consumption of water shall be rationed (hereinafter referred to as "rationing area").

37. (a) Where the Minister of Agriculture has declared a rationing area and it appears to him that there is no reasonable possibility of ensuring to the area a supply of water sufficient for the maintenance of the consumption which existed therein immediately before the declaration, he may after consultation with the Water Board and the supply committee

the supply and consumption in the rationing area by regulations prescribing --

(1) quantities of consumption, standards for the quality of water and conditions for the supply thereof; and he may classify the allotted quantities, the standards of quality and the conditions of supply according to the use of the water within the scope of a particular water purpose, to the seasons of the year, to the hours of the day, to the quality and category of the land and to geographical, health, or other data.

(2) water purposes, which, in the event of a water shortage, shall have priority over other purposes or uses, including different uses within a particular purpose.

(b) Regulations under subsection (a) (1) shall insofar as the hydrological situation permits, ensure that the reduction of the quantities of water applies to the affected consumers in the area proportionately and with due regard to their water rights recognized by the competent authorities, whether or not those rights have yet been exercized.

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Article 5: Recharge

44A. "Recharge" means the planned introduction into the subsoil of water from any water source, including flood-water, drainage water and sewage, and in any manner, whether by the direct recharging of wells, cisterns or borings or by causing water to percolate from the surface into the subsoil.

44B. Recharge shall only be carried out for one of the purposes set out in section 44C, under a license from the Water Commissioner and in accordance with the conditions of the license (hereinafter referred to as a "recharge license").

44C. The purposes of recharge are -

(1) artificial replenishment in addition to natural replenishment, with a view to the proper extraction of water from a particular water source;

(2) seasonal and perennial storage of water;

(3) any other purpose determined by the Minister of Agriculture, after consultation with the Water Board and with the approval of the Economics Committee of the Knesset.

44D. A person applying for a recharge license shall submit to the Water Commissioner a recharge scheme, setting out, inter alia -

(1) the purpose of the proposed recharge;

(2) the location of the proposed recharge;

(3) the estimated boundaries of the area in which the effect of the recharge on the existing hydrological situation will be felt, either directly or indirectly (hereinafter referred to as the "recharge area") and a list of the suppliers and extractors in the recharge area;

(4) the estimated quantity and quality of the water to be introduced and the quantity of water which it will be possible to produce, in consequence of the recharge, from the water sources in the recharge area;

(5) the estimated expenditure involved in the recharge operations;

(6) a forecast of the effect of the recharge on the water sources as a result of the mixing of water of different qualities;

(7) a technical description of the recharge operations;

(8) the follow-up measures for the periodical testing of the effect of the recharge on the water sources in the area.

(b) The Water Commissioner may request the recharger to furnish him with particulars additional to those enumerated in subsection (a) where it appears to him that the additional particulars are necessary for the examination and approval of the recharge scheme; the additional particulars shall include alternative schemes for increasing the quantity of water in the area if the Water Commissioner considers that such is necessary in the interest of improving the water supply situation therein.

44E. (a) A copy of the recharge scheme shall be exhibited for sixty days at the office of the local authority in whose area the recharge is to be carried out, or, in the absence of such an office, at the office of the District Commissioner, and in such other places as the Water Commissioner may prescribe. The local authority shall notify the settlements incorporated in it of the exhibition.

(b) The Water Commissioner shall not approve a recharge scheme, or grant a recharge license, unless, within the aforesaid period, he has given every extractor, supplier and consumer of water in the recharge area an opportunity to state his proposals, arguments or opposition in regard to the scheme in such manner as shall be prescribed by regulations.

44F. The Water Commissioner shall not approve a recharge scheme likely so to impair the quality of the water in the recharge area as to make it unfit for the use for which it is intended, unless the recharger satisfies the Water Commissioner that he will place at the disposal of the supplier or consumer the quality of whose water is impaired as aforesaid water from an alternative water source of a quality appropriate to the use for which the water in the area is intended.

44G. (a) A recharge license shall state, inter alia, the following particulars:

(1) the purpose of the recharge;

(2) the quantities of water to be introduced;

(3) the water systems from which the water is to be taken;

(4) the technical conditions for carrying out recharge in the manner proposed;

(5) the places and times of recharge;

(6) the quality of the water to be introduced.

(b) The recharge license shall indicate the suppliers and producers intended to benefit from, or likely to be adversely affected by, the operation either directly or indirectly, and the quantities of water likely to accrue to each of them out of the quantity introduced.

44H. A copy of the recharge license shall be exhibited at the office of the local authority in whose area the recharge is carried out or, in the absence of such an office, at the office of the District Commissioner, and in such other places as may be prescribed by the Water Commissioner. The local authority shall notify the settlements incorporated in it of the exhibition. Any person may inspect the copy of the recharge license free of charge. Notice of the exhibition of the license shall be published in daily newspapers read locally, in addition to any such other means of publications as the Water Commissioner may direct.

44I. A person who considers himself aggrieved by a decision of the Water Commissioner granting or refusing to grant a recharge license, or by any particular prescribed or indicated in such a license, may lodge objection with the Tribunal within 30 days from the day on which notice of the Water Commissioner's decision granting or refusing to grant the license was given.

44J. (a) The recharger shall carry out all the operations prescribed by the Water Commissioner -- in the recharge license or otherwise -- with a view to a periodical examination of the effect of the recharge operations on the water sources in the area and on the quality of the water therein.

(b) The results of the examination shall be set down in writing and shall be open for inspection by the public at the places prescribed by the Water Commissioner.

44K. (a) Where it appears from the periodical examinations carried out under section 44J that the recharge has rendered the water unfit for the use for which it was intended, or where a reasonable apprehension exists that the water will become unfit for such use, the Water Commissioner may, on his own motion or on the application of a person who considers himself affected, direct that the recharge be discontinued or that the quantity of water introduced be diminished or that the number of places of recharge be reduced, all in accordance with the directions of the Water Commissioner. The decision of the Water Commissioner to direct the discontinuance or reduction of the recharge or his refusal so to direct may be appealed before the Tribunal.

(b) The appeal shall not stay the recharge unless the Tribunal otherwise decides.

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Chapter Three: Water Supply Systems

Article 1: Water Supply Systems and Authorities

46. The Minister of Agriculture may, with the approval of the Government, authorize a corporation to be the National Water Authority, provided that a majority of the controlling shares of such corporation shall be held by the State and by the World Zionist Organization or its institutions; the authorization shall require the approval of the Knesset. Notice of the authorization shall be published in Reshumot.

47. (a) The memorandum of association, articles and rules of the National Water Authority shall ensure the Minister of Agriculture, or a person appointed by him the right to decide on every matter relating to the management and the conduct of affairs of the National Water Authority; to ensure this right, a company may vary its memorandum of association notwithstanding the provisions of any other law.

(b) The right of decision referred to in subsection (a) cannot be affected by any variation of the memorandum of association, articles or rules of the National Water Authority.

(c) The memorandum of association, articles and rules of the National Water Authority shall be published in Reshumot, and any variation thereof shall require the approval of the Government and publication in Reshumot.

100. A Water authority may, with the approval of the Water Commissioner, and subject to the provisions of any enactment, prescribe general provisions as to the following:

(1) measuring the quantity of water which the water authority is to supply to its consumers;

(2) technical conditions connected with the supply of water.

(3) measures which consumers are to adopt in order to ensure the efficient and economical use of water supplied to them and in order to prevent any waste or pollution of water;

(4) the procedure for the collection of water charges.

(. . .)

Chapter Five: Organisation

Article 1: The Water Board and Other Bodies

125. The Government shall appoint a national board to advise the Minister of Agriculture on questions of water policy and to carry out the functions assigned to it by this Law (in this Law referred to as "the Water Board"); notice of the appointment and composition of, and of any change in the Board shall be published in Reshumot.

126. (a) The Water Board shall consist of not less than 27 and not more than 39 members, including the Minister of Agriculture, who shall be the chairman of the Board, the Water Commissioner, who shall be the vice-chairman of the Board, representatives of the public, representatives of the Government and a representative of the World Zionist Organisation and its institutions.

(b) The number of the representatives of the public on the Water Board shall be not less than two thirds of the membership of the Board, and the number of the representatives of the Government, together with the representative of the World Zionist Organisation, shall not exceed one third of the membership of the Board.

(c) The representatives of the public shall include representatives of the consumers, appointed with reference to the volume of consumption for the various water purposes, and representatives of the suppliers; the number of the representatives of the consumers shall not be less than one-half of the total number of the members of the Board.

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Article 2: The Water Commissioner

138. The Government shall appoint a Water Commissioner to manage the water affairs of the State. Notice of the appointment shall be published in Reshumot.

139. At least once a year, the Water Commissioner shall submit to the Water Board a report on its activities.

Article 3: Tribunal for Water Affairs

140. (a) The Minister of Justice shall establish by order, a Tribunal, or Tribunals, for Water Affairs, and shall prescribe its or their place or places of sitting and area or areas of jurisdiction.

(b) In addition to the matters assigned to it by this Law, a Tribunal shall be competent to deal with all the matters assigned to the jurisdiction and determination of a Judical Committee under the Drainage and Flood Control Law, 5718 - 1957[1]).

(. . .)

156. (a) Any person who -

(1) contravenes any of the provisions of section 9, 15, or 21 after a warning from the Water Commissioner has been served upon him; or

(2) contravenes a general provision enacted by a water authority under section 100 after a warning from the water authority has been served upon him; or

(3) contravenes any of the provisions of section 84, 85, 96, 110, 114(a) or 122; or

(4) contravenes any order or direction of the Water Commissioner made or issued to him under any of the provisions of this Law; or

(5) obstructs the Water Commissioner, the water authority or a person acting in his or its name in carrying out his or its activities under this Law; or

(6) contravenes any of the provisions of Article 1A of Chapter 2

is liable to a fine of 3000 pounds and, in the case of a continuing offence, to an additional fine of 100 pounds with respect to every day on which the offence continues.

(b) A person who, after being convicted of an offence under subsection (a), commits such offence again is liable to a fine of 6000 pounds, and, in the case of a continuing offence, to an additional fine of 200 pounds with respect to every day on which the offence continues.

(c) A person who has contravened any of the provisions of section 23 or 35, or any regulations made under section 37, is liable to imprisonment for a term of three months or to a fine of 6000 pounds and, in the case of a continuing offence, to a fine of 200 pounds with respect to every day on which the offence continues.

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1) 12 LSI 5.

WATER DRILLING CONTROL LAW, 5715-1955*

(Consolidated Version)

1. In this Law -

"well" includes any excavation, drill-hole or structure, whether completed or not completed, intended for the purpose of raising ground water to the surface;

"installation of a well" includes any alteration to any installation, structure or equipment installed at a well if such alteration is intended to increase the output of water thereof;

"Commissioner" has the same meaning as in the Water Law, 5719-1959 (hereinafter referred to as "the Water Law");

"Tribunal" means the Tribunal for Water affairs as established under the Water Law.

(. . .)

4. A person shall not install a well except under a license (hereinafter referred to as a "drilling license") from the Commissioner and in accordance with the conditions of such license.

5. (a) The Commissioner may refuse to grant a drilling license on the ground that circumstances exist under which he may refuse to grant an extraction license under the Water Law; these circumstances shall be set out in the Commissioner's decision on such license.

(b) Where the Commissioner is of the opinion that it is necessary in order to prevent the depletion or salination of water sources, or in order to ensure a supply of water for household purposes, he may -

(1) refuse to grant a drilling license;

or

(2) specify in the license conditions as to the diameter, depth, or equipment of the well or the quantity of water permitted to be extracted from such well or as to the period of extraction, or the purpose for which, the water extracted may be used;

or

(3) cancel a license or make the continued validity of a license subject to conditions or additional conditions, but not later than 60 days after the receipt of a report on a test pumping as shall be prescribed by regulations.

(. . .)

* 9 LSI 88; as amended in 16 LSI 20.

7. (a) Where an application for a drilling license has been submitted, the Commissioner shall publish a written notice specifying the name of the applicant and the nature and place of the proposed installation.

(b) The notice shall be deposited for seven days at the office of the local authority, or, where there is no local authority, with the District Commissioner in whose area the well is to be dug and any person shall be permitted to inspect the notice.

(c) Any person opposing the grant of a drilling license may, within seven days from the day of publication of the notice, lodge an objection in writing with the Commissioner specifying the reasons for such objection.

8. If the Commissioner decides to grant a license, whether unconditionally or subject to conditions, he shall so notify, in writing, the applicant and any person who has lodged an objection thereto. Where the Commissioner decides not to grant a license, he shall so notify the applicant, in writing.

9. (a) An applicant or any other person required to be notified under section 8 who considers himself aggrieved by the decision of the Commissioner, may, within 21 days from the day on which the notification was delivered to such person, lodge an objection to the decision with the Tribunal.

(b) The Tribunal shall be competent to hear all matters assigned to its jurisdiction by this Law, in addition to matters assigned to it by section 140 of the Water Law, and the provisions of section 141 to 147 of the Water Law shall apply to such hearings.

10. The Commissioner or a person empowered by him to act on his behalf, may -

(1) enter any place, where a well is situated, for the purpose of supervising compliance with the provisions of this Law or the regulations made thereunder or with the conditions attached to a drilling license;

(2) inspect any well, carry out measurements and conduct a pumping test thereon, take samples of the water therein, and do any such other act of investigation with respect thereto as the Minister of Agriculture by regulations prescribes.

11. (a) Where a well has been installed without a license or otherwise than in accordance with the conditions of a license, a magistrate may, on the application of the Commissioner, order the person who has installed the well or the owner of the land on which it is situated, or any such other person as the magistrate may deem appropriate, to block up the well or to restore any alteration made therein to its former condition, as the case may be.

(b) Where a well is being installed otherwise than under a drilling license or otherwise than in accordance with the conditions of such a license, a magistrate may, on the application of the Commissioner, order that the installation be discontinued within such time as may be prescribed in the order.

(c) The Minister of Justice shall prescribe, by regulations, the procedure for hearing applications under this section.

(d) A magistrate who makes an order under this section may entrust the Commissioner or his representative with the enforcement of the order, and when the Commissioner or his representative has enforced such order, the cost of the enforcement and of the judical proceeding shall be collected from the person against whom the order was made as if it were a tax to which the Tax (Collection) Ordinance[1] except section 12 thereof - applies.

(e) A person to whom an order under this section has been issued, or a person entrusted with the enforcement of an order as aforesaid, may enter the place where the well is situated and conduct the acts required for the enforcement of the order.

(. . .)

16. The Minister of Agriculture is charged with the implementation of this Law and may make regulations as to any matter relating to such implementation, including regulations as to -

(1) The registration of wells and of installation operations carried out at well-drilling sites, and the furnishing of particulars relating thereto;

(. . .)

(6) The blocking up of wells.

1) 2 LSI 1398/1949.

DRAINAGE AND FLOOD CONTROL LAW, 5718-1957*

(Consolidated Version)

Chapter One: Preliminary

1. In this Law -

"drainage" means any operation aimed at concentrating, storing, conveying, or removing surface or other water harmful or likely to be harmful to agriculture, public health, the development of the country or the maintenance of regular services in the State, and includes the drying of marshes and protection from and the prevention of flooding, but does not include the treatment of sewage;

"artery" means a river, stream, gully, canal, depression or any other channel, whether natural artificial or regulated, in which water runs or stands either permanently or intermittently;

"sewage" includes the waste water of industrial and handicraft enterprises and of structures on an agricultural farm;

"protective strips" means strips of land along two banks of an artery;

"drainage project" means a drainage project established in a drainage district under Chapter Four;

"Water Tribunal" means a tribunal for water affairs established under the Water Law, 5719-1959;

"the Commissioner" means the Water Commissioner within the meaning of the Water Law, 5719-1959;

2. (a) For the purpose of this Law, there shall be a National Board for Drainage Affairs (hereinafter referred to as "the Board") to advise the Minister of Agriculture on -

(1) the declaration of a drainage district;

(2) the approval of drainage schemes submitted by drainage authorities;

(3) any such other matter of general policy as is concerned with the implementation of this Law..

(. . .)

Chapter Two: Control of Arteries

4. (a) A person shall not divert water from or to, or change the flow of water in, any artery, drainage installation or drainage pipe, or suffer another person so to do except under a permit from the Commissioner and in accordance with the conditions of the permit.

(. . .)

* 12 LSI 5; as amended in 18 LSI 203;15 LSI 89.

5. A person shall not erect any structure or establish any installation in or over any artery, or any protective strip, or cultivate land in any artery or on any protective strip in any manner whatsoever, or pasture or take any herds of small cattle, bovines or other animals in or across any artery or on or across protective strips, except under a permit from the Commissioner and in accordance with the conditions of such permit.

6. (a) If protective strips have not been designated for any artery in a scheme under section 18, the Minister of Agriculture may determine such protective strips; however - -

(1) the aggregate width of two protective strips shall not exceed one-half the width of the artery, as measured from the sides of its channel;

(2) If in consequence of the limitation imposed by paragraph (1) the width of either of the two protective strips is less than five metres, the Minister of Agriculture may fix a greater width for such protective strip, but such greater width shall not exceed five metres.

(b) A person who in consequence of the designation of a protective strip by the Minister of Agriculture is compelled to discontinue the cultivation of the whole part of the strip or any part of the strip is entitled to compensation by Treasury funds for the damage caused to his crops situated on the protective strip by such discontinuance.

(c) A person who claims compensation under this section shall submit his claim to the Commissioner; if the Commissioner does not accept the whole or any part of the claim, the Water Tribunal shall determine such claim.

7. (a) If structures have been erected or installations established or trees planted or crops sown in contravention of section 5, or if water has been diverted from or to, or the flow of water changed in, any artery in contravention of section 4, the Commissioner may, if he deems it necessary in order to obviate a danger of soil erosion, flooding, inundation or damage to public health or to agriculture, order the person who has done the act in question, or who has possession of the structures, installations, trees or crops in question, to remove them or otherwise to restore the land to its former condition, as may be prescribed in the order; if the provisions of the order are not complied with, the Commissioner may carry out the required for its implementation and collect the expense thereof from the person bound to implement the order.

(b) Compliance with the order or the carrying out of the works by the Commissioner shall not relieve the person who has done the act in consequence of which the order was given from criminal responsibility under this law or any other enactment.

(. . .)

Chapter Three: Drainage Districts and Drainage Authorities

10. The Minister of Agriculture may, after consultation with the Board declare in Reshumot, a particular area to be a drainage district.

11. (a) The Minister of Agriculture may, by order in Reshumot and after consultation with the Minister of the Interior, establish a drainage authority and assign an area to it, which shall comprise a drainage district or part of a drainage district or several drainage districts (an order as aforesaid is hereinafter referred to as an "establishing order").

(b) The Minister of Agriculture may establish a drainage authority only if the majority of the local authorities in whose area of jurisdiction the greater part of the area proposed to be included in the area of the drainage authority is situated have agreed thereto or pursuant to a decision of the Government.

(c) A drainage authority shall consist of a majority of representatives of the local authorities within its area and a minority, not exceeding three, of representatives of the Government; the Minister of Agriculture shall, after consultation with the Minister of the Interior, specify in the establishing order or a subsequest order the extent of the representation of each local authority in the drainage authority.

(. . .)

12. The functions of a drainage authority are to attend to the proper drainage of the area assigned to it in the establishing order and for that purpose to establish, alter, maintain and develop drainage projects in that area; in carrying out these functions, the drainage authority shall also concern itself with the prevention of sanitary nuisances.

(. . .)

Chapter Four: Establishment of Drainage Projects

17. A drainage authority shall not establish or alter any drainage project except under a scheme prepared and approved in accordance with the provisions of this Law (such a scheme being hereinafter referred to as a "scheme).

18. (a) A scheme of operation of the project;

(1) the area of operation of the projects;

(2) the works required for the establishment and operation of the project;

(3) the estimated cost and proposals for financing;

(4) the land to be permanently acquired, and the land in which pipes are to be laid or temporary operations for the establishment of the project carried out, without permanent acquisition of land being required;

(5) the width of the protective strips within the area of the project;

(6) the arteries within the area of the project.

(b) A scheme shall be accompanied by plans of the area to which it relates.

(. . .)

23. (a) The Minister of Agriculture shall not approve a scheme before he has brought it before every district Building and Town - Planning Commission in whose district any part of the area to which the scheme relates is situated and notwithstanding anything provided in the Town Planning Ordinance, 1963[1] concerning the modes of approving town-planning schemes, the commission may or may not approve the scheme.

(b) A District Commission shall not refuse to approve a scheme except for reason for which it may refuse to approve a town-planning scheme under the Town-Planning Ordinance, 1936.

(c) A scheme not approved by the commission as aforesaid shall be brought before the Government which may approve it, with or without modifications, or reject it.

(. . .)

26. (a) As soon as notice of the deposit of a scheme has been published as provided in section 19, the erection and enlargement of buildings, and any planting on land intended under the scheme, for permanent acquisition shall require a permit from the Commissioner so long as the scheme has not been rejected, or the land excluded from the scheme as a result of variations therein, but such permit shall not be required after two years from the day of publication of notice of the deposit as aforesaid.

(. . .)

27. (a) A drainage authority shall implement the scheme as approved, and shall establish, maintain and operate the drainage project subject to the provision of this Law.

(b) In carrying out said functions, the drainage authority and its agents may enter any place, other than a dwelling-house, and may, in accordance with the scheme, drill, dig, erect structures and installations and lay pipes in any place, and may also remove structures, plantations and crops from any place to the estent required for the establishment of the drainage project.

1) P.G. of 1936, Suppl. I No. 589, p. 157

29. (a) If any structure or other immovable property is intended, under any scheme, for permanent acquisition, or where the area on which any structure stands is required under a scheme for the establishment of a drainage project, the drainage authority may demand the vacation of such structures or other property upon ninety day's advance notice in writing to the occupier.

(b) For the purpose of this section, an approved scheme shall be deemed to be a court judgement for eviction which is no longer appealable and may be enforced by any execution office of the District Court area in which the structure or other property is situated; however, if the structure is a dwelling, within the meaning of the Tenant's Protection Law, 5715-1955[1] and the occupier is protected against eviction by that Law, he shall not be evicted until alternative accommodation has been placed at his disposal, or compensation sufficient to secure alternative accommodation paid to him, to the satisfaction of the Chief Execution Officer.

(c) If a dwelling has been erected in contravention of a prohibition of building imposed by this Law, or after publication in Reshumot of a notice of the deposit of a scheme under section 19, and the drainage authority has placed alternative accommodation at the disposal of the tenant, or paid him compensation under this section, the person who authorised the tenant to occupy the dwelling shall compensate the drainage authority for the expenditure incurred by it with respect to the alternative accommodation or for the compensation it has paid.

30. Land intended, under any scheme, for permanent acquisition may be acquired by the drainage authority forthwith, and shall thereupon be entered in the Land Register in the name of the drainage authority free from any charge, attachment or other real property right, on the strength of a confirmation given for that purpose by the Minister of Agriculture.

(. . .)

44. (a) A drainage authority may, with the approval of the Minister of Agriculture, make byelaws as to any matter relating to the exercise of its functions, and in such byelaws may, inter alia -

(1) regulate the digging of canals, the erection of structures and the establishment of installations, with a view toward preventing interference with the establishment or proper functioning of a drainage project;

(2) restrict or regulate the access or passage of persons, animals or vehicles to or through any arteries.

47. A drainage authority shall submit to the Commissioner once each year a report on its activities and shall include therein such particulars as shall be prescribed by regulations, and shall furnish to the Commissioner, or a person empowered by him to act on his behalf any information he may request with respect to its activities.

(. . .)

1) 9 LSI 172.

49. If a drainage authority does not exercise any of its functions, the Minister of Agriculture may order it to do whatever may be necessary to so excercise such functions in such manner as shall be prescribed in the order; and, if a drainage authority does not comply with the provision of an order as aforesaid, the Minister of Agriculture may require the Commissioner to effect the order and may collect any expenditures incurred in that connection from the drainage authority.

Chapter Five: General Provisions

52. (a) The Commissioner or any drainage authority, or his or its agents, may, at any reasonable time, enter any land or building and do thereon or therein any act required in order to ascertain the possibilities or necessity of carrying out any function, or of exercising any power, under this Law, or to carry out a measurement of water or land or any digging or drilling operations on land.

(. . .)

58. A person who contravenes section 4 or 5 or an order under section 6 or 53 or a provision of any regulation under this Law or who obstructs the Commissioner or a drainage authority or a person acting on his or its behalf from carrying out his or its functions or from exercising his or its powers shall be liable to imprisonment for a term of one year or to a fine or 1,000 pounds and, in the case of a continuing offence, to additional imprisonment for a term of one week or to an additional fine of 50 pounds or both with respect to each day on which the offence continues after conviction resulting from such contravention.

(. . .)

STREAMS AND SPRINGS AUTHORITIES LAW, 5725 - 1965*

1. In this Law -

"the Ministers" means the Minister of the Interior and the Minister of Agriculture;

2. The Ministers may, by order, after consultation with the local authorities concerned, establish an authority for a particular stream or part thereof, a spring or any other water source (such an authority hereinafter referred to as a "stream authority") and define its area, or assign to a drainage authority, within the meaning of the Drainage Law, all or part of the functions of a stream authority under this Law. A stream authority shall only be established if, in the opinion of the Ministers, there is no justification for assigning its functions to an existing drainage authority.

3. (a) The function of a stream authority shall be to plan and carry out all or part of the following operations, as may be prescribed in an order under section 2:

(1) the regulation of the flow of water in the stream, with a view to maintaining a suitable water level throughout the year;

(2) the regular drainage of the area of the authority;

(3) the fixing of an alignment for the stream, or the transfer of the water of the stream or water source to another bed;

(4) the abatement of sanitary nuisances connected with pollution of the stream or water resource or with the changing flow of its water;

(5) the preservation of the landscape and amenities of nature along the stream, on both banks, or about the spring, except a stream or spring in a national park or nature reserve, within the meaning of the Natural Parks and Nature Reserves Law, 5723-1963 and the preparation of those areas for the purposes of gardens, recreation and sports;

(6) the regulation of the distribution of the water among those interested in it.

(7) the regulation of the manner in which the stream or water source is used by those interested.

(b) Drainage functions shall only be assigned to a stream authority together with some other function.

4. Save as otherwise expressly provided in this Law, a stream authority shall act subject to the Water Law, the regulations and determinations made thereunder and the powers of a national or regional water authority established thereunder and subject to the provisions of every other enactment.

5. Members of a stream authority shall be -

(1) representatives of the Government;

(2) representatives of local authorities the area or part of the area of which is within the area of the stream authority; each kind of local authority shall have at least one representative;

(3) representatives of bodies corporate in the carrying out of whose functions or the exercise of whose powers the stream or water resource plays a part;

(4) representatives of the owners and occupiers of land abutting on the stream or water source and of the persons using water of the stream or water source for the purposes of their employment, the land or employment not being situated or carried on within the area of a local authority and the owner, occupier or person carrying on the employment not being a body corporate as referred to in paragraph (3).

However, where the only function of a stream authority is the regulation of the distribution of the water among those interested in it and the regulation of the manner in which the stream or water source is used by them, the authority may consist of representatives of the Government and representatives of the interested persons only.

. . .

Public Health Ordinance, 1940 *

...

2. In this Ordinance ...
Local Sanitary Authority in a City means the City Council and in an area governed by a Local Council it means a local council, and in those areas with neither a City nor a Local Council it means the representatives of the Ministry of Health.
...

3A. The Minister of Health and the Minister of the Interior in consultation with the local authorities concerned, may, by the regulations jointly enact provisions as to the organization, functions, and sources of financing of the sanitary service or of local sanitary authorities.

3B. The Minister of Health may by regulations prescribe the qualifications of sanitation workers and other health workers in local sanitary authorities and the State Service, according to different categories and functions; and no person shall be appointed to a post in a local sanitary authority or in the State Service for which qualifications have been prescribed under this section unless he possesses these qualifications.
...

52A. In this part -

"sanitary quality" means biological, physical, chemical, radioactive and organoleptic properties:
"drinking water" means water intended for drinking and the cooking of food, and in the food industry, water intended to enter into the composition of food or coming or likely to come into contact with any of the substances of which food consists;
"drinking water installation" means any installation or accessory used for the production, supply, transportation or consumption of drinking water;
"supplier" means any person who supplies water to another;
"health authority" means whoever has been appointed by the Minister of Health to be a health authority for the purposes of this part.

52B. (a) The Minister of Health may make regulations-

(1) prescribing the sanitary quality of drinking water either generally or in respect of a particular place or use;

* P.G. 1065, Supp. I p. 39. The two most recent amendments to this Ordinance appear in 24 LSI 107 (1970); 27 LSI___(1973).

(2) prescribing sanitary conditions for a water source intended to be used as a source of drinking water and for drinking water installations;

(3) requiring, or granting power to require, owners of installations for the production, supply, transportation or consumption of water from water sources unfit for drinking to put up, at their expense, notices warning against the use of such water as drinking water;

(4) concerning the sanitary aspect of the planning, establishment and operation of drinking water systems;

(5) concerning the sanitary standard of drinking water installations.

(b) Regulations for the purpose of paragraph (5) of subsection (a) shall be made after consultation with the Minister of Agriculture.

52C. (a) A supplier shall not supply drinking water other than of the prescribed sanitary quality.

(b) A person shall not maintain a drinking water installation not conforming with a regulation concerning its sanitary standard.

52D. A person authorized for that purpose on behalf of the Minister of Health may, at any reasonable time, enter any place where a water source or drinking water installation-whether in use or not -is situated, take samples of water free of charge, in the quantities necessary for the examination of its sanitary quality and verify the sanitary standard of a drinking water installation: Provided that such person shall not without the occupier's permission enter premises used solely for residential purposes.

52E. (a) Every supplier shall at his expense, at a laboratory recognised for that purpose on behalf of the Minister of Health, carry out examinations of the sanitary quality of drinking water under such conditions, by such methods and with such frequency as have been prescribed by regulations and shall bring the results of the examinations to the knowledge of a health authority whenever required to do so.

(b) The provisions of subsection (a) shall apply also to a local authority in respect of drinking water supplied by it: Provided that a local authority shall not be required to pay for examinations save with the consent of the Minister of the Interior.

(c) The records relating to the carrying out and findings of the examinations shall, at any reasonable time, be available at the recognised laboratory for inspection by a health authority, a Government physician and any person empowered in that behalf by the Minister of Justice.

52F. If a health authority finds that any drinking water is not of the prescribed sanitary quality, it may declare such water to be unfit for use as drinking water, and upon being so declared, such water shall not be produced or supplied for use as drinking water: Provided that the health authority may permit the production or supply of water declared unfit as aforesaid for any particular one of the uses of drinking water on condition that such measures are taken as he may direct to prevent a health hazard.

52G. (a) Where the water of a water source or drinking water installation has been declared unfit as specified in section 52F, a health authority may issue directions to the possessor thereof as to measures to be taken and operations to be carried out by him to prevent a health hazard or make the water fit for use as drinking water.
(b) If the possessor does not within a reasonable time comply with directions issued to him under subsection (a), the health authority may instruct an employee of the Ministry of Health to take the measures or carry out the operations required and to collect the expenses involved from the owner of the water source or drinking water installation.

52H. Where a water source or drinking installation is in an area under the control of the Israel Defense Forces, no person shall be authorised or instructed to carry out an operation under this part or any regulations made thereunder unless he is serving in the Medical Corps of the Israel Defense Forces or has been empowered in that behalf by the Ministry of Defense.

52I. (a) Wherever a direction of a health authority under this part affects a production license issued by the Water Commissioner under the Water Law, 5719-1959, or a direction issued by him under the said Law or any regulations made thereunder, with regard to the operational regime of a water resource from a quantitative point of view, the direction shall be issued to the supplier by the Water Commissioner at the request of the health authority.
(b) If the supplier does not comply with the direction within the time specified therein, the Water Commissioner or a person empowered by him in that behalf shall take the measures and carry out the operations required in order to ensure the implementation of the direction and shall collect the expenses involved from the supplier.
(c) Where any operation is necessary to prevent immediate serious damage, a health authority shall carry it out and shall give notice thereof to the Water Commissioner.

52J. Where a health authority has declared water to be unfit for use as drinking water, the Water Commissioner may direct a change in the destination of such water and the supply of water from another source instead.

52K. A person who contravenes any of the provisions of this part or any regulation thereof is liable to imprisonment for a term of six months or to a fine of 5,000 pounds and, in the case of a continueing offence, to an additional fine of 100 pounds for every day that the offence continues.

...

53. For purposes of this Section of this Ordinance, the following are considered nuisances;

...

(b)...channel, water course, septic tanks...sewer, drainage channel, cesspool...that gives off foul orders or are in such circumstances or in such places that they are harmful to public health or hazardous to health.

...

61A. (1) When it is proven to the satisfaction of a District Physician that a local sanitary authority within his district has not exercised the power vested in it by this part or has refrained from carrying out any function assigned to it thereby, he may after warning the local sanitary authority and affording it an opportunity to be heard, exercise that power or carry out that function instead of the authority and at its expense.
(2) A District Physician shall not exercise a power under this section until after the Minister of Health, in consultation with the Minister of the Interior has made regulations for the implementation of this section and in accordance with such regulations.

...

64A. (1) An inspector appointed in that behalf by a District Physician may at any reasonable time enter any premises, inspect them with regard to compliance with the provisions of this Ordinance and the regulations made thereunder, examine anything situated therein and take samples for laboratory examination.

64C. The Minister of Police will empower an inspector under this part, by general or special order for a period not exceeding twelve months at any one time, to conduct investigations, on premises entered by him by virtue of his power under this part, for the purpose of preventing and discovering contraventions of this Ordinance and of the regulations made thereunder; and upon being so empowered, the inspector shall have all the powers vested in a police officer of or above the rank of inspector under section 2 of the Criminal Procedure (Evidence) Ordinance and section 3 of the aforesaid Ordinance shall apply to a statement taken by him by virtue of such power.

...

65A. The Minister of Health may, in consultation with the Minister of Agriculture, prescribe rules for the purification of sewage intended for irrigation or other economic purposes. Where such rules have been prescribed, no person shall use sewage for a purpose as aforesaid save under a permit from the Minister of Health and in accordance with the conditions of the permit, and a permit may only be granted when it has been proved to the satisfaction of the Minister that the water has been purified sufficiently, as prescribed in these rules.

71. A person who contravenes any of the provisions of this Ordinance or of any regulations made thereunder shall be liable to imprisonment for a term of six months or a fine of 5,000 pounds and in the case of a continuing offence, to an additional fine of 100 pounds in respect of every day on which the offence continues.

PUBLIC HEALTH ORDINANCE 1940
Regulations Concerning the Sanitary Quality of Drinking Water*

As authorized by Section 5 of the Public Health Ordinance, 1940;
I do hereby establish the following regulations:

1. In these regulations:

"Area A" - The jurisdiction of the Jordan Valley Area Council, the Bet Shean Valley Area Council, the Tamar Area Council, the Ramat Hanegev Area Council, and the Hevel Eilat Area Council - as described in Appendix A of the Order of Local Council (Area Councils) 5719-1958, Bet Shean Local Council - as described in the order of Local Councils (B), 5713-1953, and the Municipality of Tiberias and the Municipality of Eilat - as described in the Appendix A of the Municipalities Ordinance;

"Area B" - Any area within the territory of the State of Israel not included in Area A;

"Re-examination" - Microbial examination to reveal Coliform bacteria accompanying the examination to reveal fecal coliform, prepared during a period of time as fixed by Section 3 from the time of the previous examination;

"Chemical Examination" - A chemical, physical or organic examination undertaken in a laboratory recognized by the Ministry of Health according to the method determined in the Book or any other method determined by the Health Authority;

"Complete Microbial Examination" - Microbial examination which includes examination of coliform, fecal coliform, enterococcus and Salmonella bacteria.

"The Book" - The Examination Book of the American Public Health Association in the U.S.A. (Standard Methods for the Examination of Water and Waste Water-13th Edition 1971, APHA) a copy of which is available in every District Health Office, during office reception hours, for all interested parties;

"Water After Treatment" - Water that has been disinfected and any process intended to improve its sanitary quality;

"Recognized Laboratory" - Including a person authorized by the Minister of Health to perform the examination of the sanitary quality of drinking water and the preparation of a sanitary survey corresponding to these regulations;

"Water Sources" - As defined in Section 2 of the Water Law, 5719-1959, to be used or designated for use for the supply of drinking water, including dual purpose pumping, according to Section 14;

* KT 8117, 5734, p. 556

"Points of Entry to the Water Supply System" - Including a point on the water line which supplies direct flow of water to those communities in which the population does not exceed 5,000 persons;

"Sanitation Survey" - Examinations to reveal the cause of the pollution of drinking water, preparations in a recognized laboratory and including chemical examination, field examinations, any other examination and all means or methods that appear necessary to a recognized laboratory, to reveal the cause of the pollution;

2. Water is not fit to be used as drinking water if one of the following exists;

(1) A microbial examination reveals fecal coliform bacteria:

(2) A microbial re-examination of the water, in which was found more than 10 coliform bacteria in 100 milliliters of water, reveals more than 10 coliform bacteria in 100 milliliters of water;

(3) A chemical examination reveals that the water contains the elements and compounds as detailed in Column A of Appendix A in addition to concentrations as detailed adjacent in Column B;

(4) A chemical examination reveals an element, compound or characteristic as detailed in Column A of Appendix B which deviates from the adjacent value detailed in Column C;

(5) A chemical examination reveals a concentration of fluoride in the area detailed in Column A of Appendix C, in excess of the concentration detailed adjacent in Column D;

(6) A Sanitation Survey shows, in the opinion of the Health Authority, that the use of water as drinking water may be harmful to public health.

3. (A) Drinking water, in which is revealed, through a microbial examination to contain between 3 and 10 coliform bacteria in 100 milliliters of water, should be re-examined within 7 days of the receipt of results of the first examination.

(B) If revealed in the re-examination, as described in Sub-section (A), between 3 and 10 coliform bacteria in 100 milliliters of water, a Sanitation Survey should be done within 7 days of the receipt of the results of the re-examination.

(C) Drinking water in which was found, through the microbial examination, more than 10 coliform bacteria in 100 milliliters of water, should be re-examined within 72 hours from the time of the receipt of results of the first examination.

(D) If revealed in the re-examination, as described in Sub-section (C) between 3 and 10 coliform bacteria in 100 milliliters of water, a Sanitation Survey should be done within 7 days of the receipt of the results of the first examination.

4. If revealed in a basic chemical examination, a compound or quality, as detailed in Column A of Appendix B, in excess or a deviation from those concentrations detailed adjacent in Column B, the supplier should take the

(1) Inform the Health Authority without delay;

(2) Prepare a Sanitation Survey or do any other action, as determined by the Health Authority, in order to reveal the causes of deviation:

(3) Carry out instructions of the Health Authority in order to remove the causes of deviation.

5. (A) If found, in a chemical examination, that the amount of fluoride in drinking water in those areas appearing in Column A of Appendix A, in smaller concentration than those specified adjacent in Column B, a supplier may add fluoride to the water, subject to Sub-Section (B), making sure that the fluoride concentration in the water does not exceed that specified in Column D.

(B) The supplier will not add fluoride to drinking water except under these conditions:

(1) Installation of a fluoridation system with the permission of the Health Authority including an automatic meter to determine the amount of fluoride in the water;

(2) The supplier will conduct continuous monitoring of the amount of fluoride in the water, which will be available at all reasonable times for examination by a Health Authority, a government doctor and whomever the Minister of Health so authorizes.

6. (A) If, in the opinion of the Health Authority or supplier, there exists a reasonable apprehension that the water supply might endanger the public health, because of its form or sanitary quality, the water is to be considered unfit for drinking.

(B) If, in the opinion of the Health Authority or supplier, a chemical examination reveals that the drinking water contains poisonous materials not detailed in Appendix A in concentrations that might endanger public health, the water will be considered unfit for drinking.

(C) For water unfit for drinking, according to these regulations, the supplier should do the following:

(1) Stop the supply immediately;

(2) Inform the Health Authority without delay;

(3) Refuse to renew the supply of this drinking water until permission has been received from the Health Authority, and after implementation of conditions determined by the Health Authority.

7. (A) Water from a source specified for use as a drinking water source (hereinafter - a new source) will be fit for use as drinking water if the sanitary authority find the following:

(1) Chemical examination reveals that the water does not include the elements or compounds detailed in Column A of Appendix A, in excess of the concentrations detailed adjacent to them in Column B;

(2) Microbial examination reveals not more than 2 coliform bacteria in 100 milliliters of water;

(3) No Enterococcus bacteria are found;

(4) A general bacteria count does not exceed 1,000 bacteria in one milliliter of water;

(5) According to the requirements of the Health Authority, a chemical examination of the water is performed which points to the fact that no element, compound or characteristic detailed in Column A of Appendix A exists in deviation from the value adjacent in Column B;

(6) According to the requirements of the Health Authority a chemical examination of the fluoride concentration of the water reveals that fluoride concentration in those areas detailed in Column A of Appendix C, is not in excess of those concentrations detailed adjacent in Column D.

(B) If water from a new source is determined fit for drinking water usage, microbial examination will be carried out at intervals determined by the Health Authority;

8. (A) Water from a water source not examined by the day on which these regulations come into effect and drinking water in a water supply system that has been corrected, will be fit for drinking water usage if the Health Authority finds the following:

(1) Chemical examination reveals that the water does not contain the elements or compounds detailed in Column A of Appendix A in excess of the concentrations detailed adjacent in Column B;

(2) Microbial examination reveals not more than 2 coliform bacteria in 1 milliliter of water;

(3) No Enterococcus bacteria are found;

(4) A general bacterial count does not reveal more than 1,000 bacteria in 100 milliliters of water;

(5) According to the requirements of the Health Authority a chemical examination of the water is performed which points to the fact that no element, compound or characteristic detailed in Column A of Appendix B exists in deviation from the value detailed adjacent in Column B;

(6) According to the requirements of the Health Authority, a chemical examination of the fluoride concentration in water reveals that the fluoride concentration in the water, in the area detailed in Column A of Appendix C, does not exceed the concentration detailed adjacent in Column D.

(B) If water from a previously untreated or from a water supply system

examination will be carried out at intervals fixed by the Health Authority.

(C) Results of the chemical examination, as stated in Sub Section (A)(1), will be passed on to the Health Authority within 2 years from the first day these regulations take effect.

9. Drinking water that has been disinfected in order to adjust it to the quality determined in these regulations, will be tested by microbial examination, according to Section 3.

10. Drinking water that has been disinfected in order to adjust it to the quality determined in these regulations, will be tested by microbial examination at least once a week, and disinfection process will be examined a number of times each day.

11. Drinking water in a water supply system will be microbially examined in accordance with the size of the population as specified in Column A of Table 1 in Appendix 4, during a period of time specified adjacent to it in Column B, making sure that the number of examinations carried out each month will not be less than the number of examinations specified in Column C of Table 1 in accordance with the size of the population as specified adjacent in Column A.

12. (A) Drinking water that has not been treated will be tested by microbial examination at the points of entry of the water supply system according to the size of the population as specified in Column A of Table 2 in Appendix D, during the period of time specified adjacent in Column B.

(B) Drinking water that has been treated will be tested by microbial examination at the points of entry of the water supply system according to the size of the population specified in Column A of Table 3 in Appendix D during the period of time specified adjacent in Column B.

13. In the case of danger of epidemic, or apprehension as to pollution of a water source, arrangements will be made for exmination of the water at intervals fixed by the Health Authority.

14. Drinking water extracted from a water source into which drinking water is also recharged (hereinafter - dual purpose pumping) will be considered for drinking water usage if the following exist:

(1) A complete microbial examination does not reveal fecal coliform, Entrococcus and Salmonella bacteria;

(2) Less than 2 coliform bacteria in 100 milliliters of water were revealed;

(3) Water was disinfected.

15. For taking samples of drinking water for microbial examination the instructions in Appendix E will be followed.

16. (A) A microbial examination will be performed within 6 hours from the time of taking the drinking water sample, but under exceptional conditions as determined by the Health Authority, the examination will be performed later but under no circumstances later than 24 hours from the period of taking the sample.

(B) If more than 6 hours have elapsed between the time of taking the sample and the time of examination, it will be so described in the report of a recognized laboratory that performed the examination.

(C) The sample should be kept at a temperature not exceeding 10^{o} centigrade.

17. (A) The sampler should fill out the form in Appendix F.

(B) The form and the instruments used in taking the sample will carry identical markings.

18. (A) With the exception of Section 2(4) and (5), these regulations take effect 90 days from the date of publication in those communities listed in Appendix B.

(B) Regulation 2(4) and (5) with regard to the communities specified hereafter, take effect 18 months from their date of publication:

(1) Area Council Hevel Eilot, Yutbatah, Grofite, Katura and Beer-Menuha;

(2) Area councils Tamar - Ein Yahav, Hetzeba and Naot La Kikar.

19. These regulations will be called Public Health Regulations (Sanitary Quality of Drinking Water) 5734-1974.

APPENDIX A

(Sections 2(3), 6(B), and 8(A))*

Column A The Basic or Compound	Column B The Maximum Permissable Level
Arsenic - As	0.05 mg/1
Cadmium - Cd	0.01 mg/1
Cyanide - Cn	0.05 mg/1
Lead - Pb	0.05 mg/1
Mercury - Hg	0.01 mg/1
Salinium - Sn	0.01 mg/1
Chrome - Cr	0.05 mg/1
Barium - Ba	1 mg/1

* Also Section 7 (A) (ed.)

APPENDIX B

(Section 2(4) and 4)*

Column A	Column B	Column C
Characteristic or Compound	Requirement A: Recommended Level (Maximum)	Requirement B: Maximum Allowance Level
Color	5 units (according to Platinum Cobalt Method)	50 units (according to Platinum Colbalt method)
Taste and Color	3 units (according to Threshold odor Method)	Unobjectionable as determined by Health Authority
Turbity	5 units (according to Jackson Method)	25 units (according to Jackson Method)
Total Solids	800 mg/1	1500 mg/1
pH	From 7.0 to 8.5 pH	From 6.5 pH to 9.5 pH
Detergents	0.1 mg/1	1.0 mg/1
Mineral Oil	0.01 mg/1	0.3 mg/1
Phenol Elements as phenol	0.001 mg/1	0.002 mg/1 if there is any objectionable odor
Hardness	200 mg/1 - $CaCO_2$	----
Chloride (as Cl)	250 mg/1	600 mg/1
Calcium (as Ca)	80 mg/1	----
Copper (as Cu)	0.05 mg/1	1.4 mg/1
Iron (as Fe)	0.1 mg/1	1.0 mg/1
Magnesium (as Mg)	Not more than 30 mg/1 in the presence of 250 mg/1 sulfates in the case of sulfate concentration being less - 150 mg/1 is permissible	150 mg/1
Magnesium (as Mn)	0.05 mg/1	0.5 mg/1
Sulfates (as SO_4)	250 mg/1	400 mg/1
Zinc (as Zn)	5.0 mg/1	15 mg/1
Nitrates (as NO_3)	45 mg/1	90 mg/1
Carbon Chloroform Extract (as CCE)	0.2 mg/1	----

* Also Section 7(A) and Section 3(A)

APPENDIX B (Continued)

(Section 2(4) and 4)

Column A	Column B	Column C
Characteristic or Compound	Requirement A: Recommended Level (Maximum)	Requirement B: Maximum Allowance Level
Radioactive Alpha		
Gross activity		3pCi/1
Gross activity		3pCi/1

APPENDIX C

(Section 2(5) 5(A), and 7(A))

Flouride Concentration According to Climatalogical Areas

Column A	Column B	Column C	Column D
Areas	Minimal Level	Maximum Supervisory Level	Maximum Allowable Level
Area A	0.6 mg/1	0.8	1.4
Area B	0.7 mg/1	1.0	1.7

APPENDIX D

(Sections 11 and 12)

TABLE 1

Column A	Column B	Column C
Size of Population	Maximum Period of Time Between Two Consective Examinations	Maximum number of Examination Periods
Up to 1,000	1 month	2
1,000 to 20,000	1 month	6
20,000 to 50,000	2 weeks	12
50,000 to 100,000	1 week	24
100,000 to 200,000	2 days	48
Over 200,000	1 day	100

TABLE 2

Column A	Column B
Size of Population	Maximum Period of Time Between Two Consecutive Examinations
Less than 20,000	1 month
20,000 to 50,000	2 weeks
50,000 to 100,000	4 days
Over 100,000	1 day

TABLE 3

Column A	Column B
Size of Population	Maximum Period of Time Between Two Consecutive Examinations
Up to 5,000	1 month
5,000 to 20,000	1 week
Over 20,000	4 days

APPENDIX E

(Section 15)

Taking Samples for Examination

1. Size of Sample:

Size of sample will not be less than 100 milliliters of water for a regular examination and 200 milliliters of water for a re-examination.

2. The Container for Taking the Sample for Microbial and Chemical Examination and Its Preparation:

(a) The container will be made of glass or transparent material which will not change the quality of the water and which will not be ruined after sterilization.

(b) The container will hold 0.1 milliliters (2 drops) of 2% Sodium Thiosulfate for all 100 milliliters of water.

(c) The container will be sterilized close to the time of sampling and will not be opened until sampling.

(d) On the container will be a lock.

(e) No beeswax or wax, will be used to seal the lock.

(f) For chemical examination a sample will be taken in a container as detailed in (a) which is clean and should be closed after use.

3. Manner of Sample Taking:

(a) The container and the lock will be thoroughly cleaned.

(b) The container will be half filled with the examined water, shaken thoroughly and emptied; this is to be repeated three times.

(c) The container will be filled completely and closed thoroughly.

4. Sample Taking from a Pipe:

(a) No sample water will be taken except after the washing of the mouth of the pipe, inside and out, and its sterilization by heat from a burner which does not produce soot.

(b) In all cases, the water should run 2-3 minutes after the faucet is opened.

(c) In a new water source, the water should run until the water flowing out is not water that remained in the pipe.

(d) When the water sample is taken close to a pump and 24 hours or more after the time the pump was stopped, the water should run for enough time to prevent changes in the composition of the water; changes that could have been caused during moving of the pump or afterwards.

(e) If the sun's rays have heated up the pipe, the water should be allowed to run until this hot water has flown out.

5. Sample taking from a well without a pump, from a canal, or open reservoir:

(a) The container should be cleaned and dipped until it is covered by no less than 30 centimeters of water.

(b) The container is to be opened by a rope connected to the lock and it should be carefully filled in order to prevent sediment from entering it.

6. Sample taking from a stream:

(a) The container is to be dipped 30 centimeters into the water.

(b) The container is to be filled by moving it against the direction of the flow of water.

(c) The container is to be filled carefully to prevent sediments from entering.

7. Closing the Container:

The container should be closed with a lock, tied thoroughly to the container, in order to prevent it from leaking during moving.

8. Marking the sample:

A sticker, prepared beforehand, is to be glued to the container and should contain the following information:

Name of the sampler and his duties;

Source of the sample;

Date and time of sampling;

Signs and characteristics as specified, if these exist;

Serial Number

9. Time of the examination:

If the examination and the sample taking do not take place in the same place, the sample should be brought to a recognized laboratory, without delay, and should be kept in a cool place during the transportation according to Section 16.

APPENDIX F

(Section 17)

Form for the Sampling of drinking water in a recognized laboratory

Serial Number

NAME	ADDRESS
PLACE OF SAMPLING	DATE AND TIME OF TAKING SAMPLE
REASON FOR EXAMINATION	(ROUTINE OR OTHER)

Required examination (Microbial, Chemical or other) etc._____

Description or the Source of Sample, to enable exact identification of the Source_____

Description of Treatment of Water Source_____

Concentration of Active Chlorine at the Time Sample was taken_____

Name of Sampler_____ Signature of Sampler_____

LOCAL AUTHORITIES (SEWERAGE) LAW, 5722-1962*

1. In this Law-

"sewage" means waste matter removed from properties by a stream of water, and any subsoil water or rainwater which may be in that water.

(. . .)

2. A local authority may, and upon the demand of the Minister of the Interior shall, install a sewer-system within its area or within any part thereof.

(. . .)

5. The local authority may, with the approval of the Minister of the Interior, exercise its powers under Section 3 outside its area in so far as it is necessary so to do in order to remove sewage from its area or otherwise to dispose of sewage. In respect of the excercise of powers as aforesaid within the area of another local authority and not agreed to by that authority, the Minister of the Interior shall not give his approval before a committee appointed by him for that purpose has investigated the matter and submitted its findings to him.

(. . .)

10. A local authority shall maintain its sewer-system in proper condition, to the satisfaction of the health authority.

(. . .)

12. A local authority may permit the owner or occupier of any property situated outside its area to connect a private sewer situated on his property to the sewer-system of the local authority on conditions agreed upon with it and if the property is situated within the area of another local authority, with that local authority.

13. (a) A scheme for the installation of a sewer-system shall require the approval of the District Building and Town Planning Commission and of the Minister of Health or a person appointed by him in that behalf.

(b) A scheme for the installation of a plant for the purification of waste-water or for the removal of waste-water from the area of the local authority shall require also the approval of the Minister of Agriculture or a person appointed by him in that behalf.

(. . .)

15. Subject to the Provisions of the Water Law, 5719-1959, and the directions issued thereunder, a local authority may sell its sewage-water on such conditions as it may think fit, provided that it is ensured, to the satisfaction of the health authority, that the sewage-water will not become a public nuisance.

CHAPTER THREE: SEWER-SYSTEM CHARGE AND SEWER-SYSTEM FEE

16. Where a local authority has decided to install or purchase a sewer-system, it shall deliver to the owner of every property which the

sewer-system is to serve a notice of every stage about to be installed or purchased, viz. public sewer, main sewer, a purification plant, which is not designed to produce drinking water and other installations; the contention that a notice as aforesaid has not been delivered to the person liable to payment in consequence of the notice shall be heard only from the person liable himself.

17. The owner of any property to whom a notice of the installation or purchase of a sewer-system which is to serve that property has been duly delivered shall be liable to a sewerage installation charge (hereinafter referred to as "the charge") at the rate fixed by byelaw in respect of each stage mentioned in Section 16; the charge shall be levied for the purpose of covering the expense of installing or purchasing the sewer-system.

18. The byelaw shall fix the rates of the charge in accordance with the following rules:

(1) The rates shall be fixed per square metre of land and per square metre or cubic metre of building;

(2) The number of square metres or cubic metres of building shall, for the present purpose, be determined according to what has actually been built in all the stories of the building or according to what it is permitted to build on the property under any town-planning scheme in force in respect of that locality or under a building permit under the Planning & Building Law, 1965, whichever is the larger area or volume;

(3) Not withstanding the provision of Paragraph (2), a local authority may prescribe, by byelaw, that the number of square metres or cubic metres of building shall be determined according to what has actually been built in all the stories of the building, and upon its doing so, the owner of the property shall be liable to a charge on each additional square metre or cubic metre of building added to the property after the delivery of the notice under Section 16, at the rate in force at the time when the construction of the addition is completed.

(. . .)

37. A local authority may, by byelaw, impose on the occupiers of properties connected to a sewer-system a fee to cover the cost of maintaing it (such fee being hereinafter referred to as a "sewerage fee"); and if the rate of the charge has not been fixed, the cost of installing the sewer-system may be included in the cost of maintenance.

38. In a local authority which, by virtue of a byelaw, collects a fee for water supply, the sewerage fee shall be paid as an addition to the water fee and shall, as regards arrears in payment, be dealth with like the water fee.

39. (a) The sewerage fee may be graded and shall be levied according to a criterion prescribed by the local authority by byelaw.

(b) In the case of property used for industry or handicraft, the criteria prescribed by the local authority, under SubSection (a), for the sewerage fee shall be the nature and quantity of the waste water and its effect on the sewer-system, and the local authority may add other reasonable cirteria.

40. (a) The chairman of the council may, if he deems it necessary so to do for the proper discharge of waste water from any property, or in order to prevent damage to the dewer-system or to ensure its proper functioning, or in order to prevent or remove a sanitary nuisance, demand in writing of the owner of the property to carry out, to the satisfaction of the Health Authority, within the time and on the conditions prescribed in the demand, the following works;

(1) the installation of a private sewer for his property;

(2) the connection of a private sewer situated on his property to a public sewer or the repair of a connection deemed unsatisfactory by the Health Authority;

(3) the alteration or repair of a private sewer situated on his property.

(. . .)

CHAPTER FIVE: OFFENCES AND PENALTIES

43. A person who knowingly suffers any solid or liquid matter to pass from any property owned, controlled or occupied by him into a sewer-system in a manner likely to obstruct the proper flow of the sewage or to damage the sewer-system shall be liable to a fine of five hundred pounds and to an additional fine of fifty pounds in respect of each day that the offence continues after delivery of a warning from the chairman of the council, and shall compensate the local authority for any damage caused to it by his offence.

44. A person who knowingly suffers rainwater to be discharged into a sewer without prior written permission from the chairman of the council shall be liable to a fine of three hundred pounds and to an additional fine of thirty pounds in respect of each day that the offence continues after delivery of warning from the chairman of the council.

(. . .)

CHAPTER SIX: GENERAL PROVISIONS

(. . .)

48. A person generally empowered in that behalf by the local authority or by the Health Authority may, at any reasonable time, enter

any property with a view to doing thereon any work necessary for the carrying out of their functions under this Law or with a view to otherwise ensuring compliance with the provisions of this Law or with the regulations made thereunder; but a person as aforesaid shall not enter any structure save with the consent of the occupier thereof or after giving the occupier thereof reasonable advance notice (unless the urgency of the manner necessitates his entry without advance notice as aforesaid); however, in the case of property occupied by the Defence Army of Israel or otherwise used for a security purpose certified on behalf of the Minister of Defence, the power conferred by this section shall not be exercised save with the consent of a person appointed in that behalf by the Minister of Defence.

49. For the purposes of this Law, the State shall have the status of any other owner or occupier of property.

(. . .)

55. (a) The Minister of the Interior is charged with the implementation of this Law and may, after consultation with the Minister of Health, make regulations as to any matter relating to such implementation and, inter alia, regulations as to -

(1) materials to be used for spare parts and accessories of sewers;

(2) the obligation to install appliances for the purification of waste water as part of a private sewer;

(3) the composition of committees and the qualifications of their members.

(b) The Minister of the Interior, after consultation with the Minister of Agriculture and the Minister of Health, may make regulations concerning the fixing of times for the use of a sewer-system and concerning the modes of submitting and approving plans for the purification installations of a main sewer network.

LICENSING OF BUSINESSES LAW 5728-1968*

1. (a) The Minister of the Interior may, in consultation with the Minister of Health, designate and define by order business requiring a license, in order to ensure therein all or part of the following purposes:

(1) environmental quality, including appropriate sanitary conditions, the prevention of nuisances and annoyances and compliance with the laws relating to planning and building;

(2) . . .

(3) . . . .

(4) the prevention of the risk of animal diseases and the prevention of the pollution of water resources by pesticides, fertilisers or medicines.

(b) Where the purpose of licensing is also one of the purposes mentioned in paragraph . . . (4) of subsection (a), the order shall also require consultation with. . . the Minister of Agriculture, as the case may be.

(. . .)

4. No persons shall carry on a business requiring a license unless he holds a license under this Law and in accordance with the conditions of the license. No person shall carry on a business, other than a mobile business, unless the license he holds describes the premises on which he carries it.

5. (a) The licensing authority for a business requiring a license is -

(1) in the area of a municipality of local council (each hereinafter referred to as a "local authority") - the head of the local authority or a person empowered by him in that behalf;

(2) otherwise than in the area of a local authority - a person empowered in that behalf by the Minister of the Interior.

. . .

* 22 LSI 232; 26 LSI 177

6. (a) A license under this Law shall not be issued unless its issue has been approved by a person empowered in that behalf by the Minister of Health; and if the business is one designated a business requiring a license made in consultation with another Minister, as provided in Section 1, a license for it shall not be issued unless its issue has also been approved by a person empowered in that behalf by such other Minister.

(b) An application for a license shall be submitted to the licensing authority, which shall, unless it decides to reject the application, forward it to whomever must approve the issue of the license under Subsection (a).

7. The grant of approval under Section 6 may be subject to special conditions, to be fulfilled before the license is issued of thereafter and calculated to further the object of licensing. Upon the demand of the applicant for the license, the reason for each condition shall be stated.

(. . .)

10. The Minister of Health may, in respect of businesses requiring a license or of particular classes thereof, make regulations to ensure appropriate sanitary conditions.

(. . .)

13. The period of validity of licenses under this Law, the procedure for renewing them, the fees payable for licenses and the renewal thereof, and exemption from such fees, shall be prescribed by regulations. Such regulations may be general or for particular classes of businesses.

BATHING PLACES (REGULATION) LAW 5724-1964*

1. The Minister of the Interior may prohibit, by order, bathing off a part of the shore of the sea, a river or a lake the boundaries of which are indicated in the order if bathing off that part, is, in his opinion, likely to endanger the lives of persons, and he also may, after consultation with the Minister of Health, prohibit bathing as aforesaid if it is likely to impair the health of persons.

. . . .

4. (a) The Minister of the Interior shall issue, by order, directions as to -

(1) means to ensure safety and sanitation in a bathing place, including installations and structures necessary for that purpose;

(2) rules for the use of a bathing place, including the prohibition of bathing therein at times or in circumstances involving danger to the safety or health of bathers;

(3) the prohibitions or restrictions of an activity which in his opinion may interfere with bathing;

(4) modes of supervising the observance of rules and prohibition as aforesaid;

(5) the qualifications, powers, duties and work procedure of ushers, wardens, life-savers and first-aiders, appointed for the implementation of this Law or of any order, by-law or other direction issued thereunder;

(6) the complement of ushers, wardens, life-savers and first-aiders to be posted at a bathing place.

(b) An order under subsection (a) may be made either generally or for a particular local authority or for a particular declared bathing place or for particular classes of declared bathing places.

* 18 LSI 170

156. (a) . . .

(b) A person shall not do in territorial waters anything that requires a permit under this Chapter, save in accordance with provisions of the Second Schedule.

. . .

SECOND SCHEDULE

(Section 156 (b))

1. A "Territorial Waters Committee" of five members shall be established with the National Board.

2. (a) The Minister of Interior shall appoint two members of the Territorial Waters Committee, one of whom shall be a person with professional training in planning and building and one of whom shall be a representative of the local authorities. The Minister of Transport shall appoint two representatives, one of whom shall be a person with professional training in maritime matters. The Minister of Defence shall appoint one representative.

(b) Where a matter is pending before the Committee, any member of the Committee may bring it before the National Board for decision in accordance - mutatis mutandis - with the provisions of Section 114.

3. The Territorial Waters Committee may, at any time, prepare an Outline Scheme for the territorial waters or part thereof, and it also may initiate the amendent, suspension or cancellation of such a Scheme or entrust its preparation to a District or Local Commission.

4. A Scheme relating to the territorial waters or part thereof shall not be approved unless it has first been approved by the Territorial Waters Committee or is a Detailed Scheme complying with all the provisions of an Outline Scheme approved by the Committee.

5. A Local or District Commission shall not grant a permit for building or any other operation requiring a permit under this Law in respect of territorial waters save under a Scheme fulfilling the requirements of Section 4 or with the consent of the Territorial Waters Committee.

6. A person who considers himself aggrieved by a decision of the Territorial Waters Committee under Section 4 or 5, or a member of the Committee, may lodge objection with a "Territorial Waters Objections Committee" within thirty days from the day the decision was notified to him.

7. The Territorial Waters Objections Committee shall consist of five members, viz. one representative each of the Minister of the Interior, the Minister of Transport and the Minister of Defence, and two other members appointed by the National Board. A member of the Territorial Waters Committee shall not be a member of the Objections Committee.

8. The Objections Committee may approve the decision of the Territorial Waters Committee, with or without changes, or dismiss the objection, or return the matter to the Territorial Waters Committee for reconsideration.

Criminal Code Ordinance, 1936

This Law makes it a misdemenor to do any act which causes the spread of disease. It makes a felony any act which "...corrupts for fouls a spring, stream, well, tank, or reservoir so as to render it less fit for the purpose for which it is ordinarily used".

Fisheries Ordinance, 1937; P.G. 667, Supp I, p. 157.

This Ordinance requires fishing licenses for all fishermen except those fishing from shore. It forbids the use of any noxious or poisonous matter for destroying fish. The Ministry of Agriculture is authorized to publish regulations under the Fisheries Ordinance for the protection of certain specimens of fish.

National Parks and Nature Reserves Law, 1963; 17 LSI 184; LSI 167; 22 LSI 61.

This Law sets up the legal mechanism for designating parks and nature reserves. The Ministry of Interior can designate areas to be parks or nature reserves. Once designated, the regulations for conduct in nature reserves and parks apply. The regulations prevent the pollution of streams within a nature reserve or park and limit activities which could affect the quality of water in a park or nature reserve.

Oil in Navigable Waters Ordinance, 1936.

This Ordinance forbids the intentional or unintentional discharge of oil from land and from any vessel in the territorial waters of Israel. Fines for the spilling of oil cannot exceed 150,000 lirot. A court may order that a portion of the fine be allocated to cover the costs of cleaning up the spill.

Ports Authority Law, 1961; 15 LSI 152, 26 LSI

This Law specifically prohibits the disposal of waste and damaged goods in port.

Ports Ordinance (New Version) DMI 20, p. 443.

The Ministry of Transportation can make regulations prohibiting pollution of a port, water channel or river used for transportation.

Water Order (Setting Permissible Level); KT 2188, 5727, p. 883.

This Order sets the minimum deviation of the Kinneret at 212 below sea level and the maximum at -209 and -208.9 (between the months of February and June).

Water Regulations (Regulating Level of the Kinneret); KT 2144, 5727, p. 355.

The regulation enables the Water Commissioner to regulate the level of the Kinneret.

Water Regulation (Use of Water in Industry); KT 1642, 5725, pp. 284, 1200.

This Regulation requires all industry, with water consumption over 5,000 cubic meters, to file a sewerage plan with the Water Commission for his approval.

Order: Association of Towns (Dan Region) (Sewage), KT 617, 5716, p. 995.

This Order created the Gush Dan Association of Towns for the purpose of area wide treatment of sewage.

By-laws for the Gush Dan Association of Towns (Sewage) (Charge); KT 5721, p. 1643.

This by-law enables the Gush Dan Sewerage Association to charge for the cost of building and maintaining their sewerage system by the quality of water consumed.

By-law for the Tel Aviv City Council Concerning Protection of the Park of the Yarqon, the Ocean Beach, and Regulating Boating on the Yarqon; KT 5, 5709, p. 125.

This by-law forbids boating on the Yarqon without a license from the City of Tel Aviv and forbids pollution of the stream and its banks.

Appendix B

Persons Interviewed

Shaul Aloni, Judge Traffic Court, formerly legal adviser to Water Commission.

Shlomo Alphi, District Sanitation Engineer, Ministry of Health, Jerusalem.

Saul Arlozoroff, Deputy Water Commissioner.

Shmuel Avarbach, Hydrological Section, Tahal.

Shlomo Bahalul, Minhelet haKinneret -- Nature Reserves Authority.

Haim Cohen, District Health Inspector, Tiberias.

Seymore Cohen, Applied Hydrology, Hydrological Service, Jerusalem.

Peretz Dar, Future Planning, Tahal.

David Boaz, Ministry of Finance.

Benny Doron, Head of Physics Laboratory, Ministry of Commerce & Industry.

Badri Fatal, Environmental Science Laboratory, Hebrew University.

Akiva Feinmesser, Head, Section on Water for Agriculture and Sewage, Water Commission.

Mordechai Fleisher, Chief Medical Officer, Ministry of Health, Central District, Ramla.

Esther Foa, Head of Applied Hydrology Department, Hydrological Service, Water Commission, Jerusalem.

Ehud Gavrieli, Coordinator of the Steering Committee for the Nat'l Plan for the Watershed of the Kinneret, Ministry of Interior.

Yoel Geifman, Mekorot, Tabgha Station.

Moshe Gino, Fish Inspector, Dept. of Fisheries, Ministry of Agriculture, Tiberias.

Shalom Goldberger, Hydrological Service, Section on Applied Hydrology.

Yehuda Goldshmidt, Head of Pollution Control Unit, Water Commission.

Haim Gopher, member Kibbutz Ginaussar, formerly head of Kinneret Committee.

Amos Harpaz, Head, Minhelet haKinneret, Tzemach.

Hillel Helman, Environmental Health Dept., Ministry of Health.

Ezra Henkin, Head of Section of Drainage & Erosion, Water Commission.

Martin Jacobs, Head, Hydrological Service, Water Commission, Jerusalem.

Elisha Kalley, Head of Long Range Planning Projects, Tahal.

Menahem Kantor, Water Commissioner.

Rafi Kotzer, Aid to Minister of Health, formerly head of Kinneret Committee.

Haim Levy, Deputy Legal Adviser, Responsible for Drainage Affairs, Water Commission, Tel-Aviv.

Zvi Neuman, Sewage & Purification Plant Co. Jerusalem.

Danny Ronen, Water Commission.

Efraim Perry, Head of Sewage Department, City of Jerusalem.

Shimon Ronen, Engineer, Gush Dan Sewage Plant.

Simcha Rozenthal, Former Legal Adviser to Ministry of Health.

Shmuel Sarig, Director, Station for the Study of Fish Diseases, Nir David.

Collette Serruya, Head Kinneret Limnological Laboratory.

Moshe Sheintoch, Assistant Engineer (Sanitary), Central District, Ministry of Health, Ramla.

Gdaliyahu Shelef, High Instructor at the Technion, advisor to the Ministry of Health's Dept. of Environmental Health.

Avraham Shem Tov, Head of Jordan District, Mekorot.

Hillel Shuval, Head Environmental Science Laboratory, Hebrew University.

Raphael Teplitz, Sanitation Engineer, Ministry of Health.

Mair Vikinski, Dept. of Agriculture and Sewage, Water Commission.

Mordecai Virshuvski, Former Legal Adviser to Water Commission.

Yaacov Yanai, Head of Section on Industrial Wastes, Water Commission.

Yaacov Zak, Head of Section on Monitoring Pollution of Streams, Rshut Shmurot haTeva.

Yitzhak Zamir, Hebrew University, Faculty of Law.

Soreq (8 Mcm) (intermittent 5-6 mo.)

Lakhish (7 Mcm) (intermittent)

Shigma (8 Mcm) (")

Besor (20 Mcm) (intermittent 3-4 mo.)

Notes on Ref. #3921

Mostly used for waste disposal

Total 150 Mcm, 45 used, 35 for agr.

1971 21% city sewage + 38% agr. sewage used in agr.

Israel has abnormally high death rate from gastroenteritis, bacillary dysentery, hepatitis

Cholera epidemic in 1978

---

need permit to discharge waste

Sewage quality regulation goes to WC + :
MOH, MOI, local authorities

MOI lists businesses that need licenses to operate b/c they might pollute. local auth give licenses on approval of MOH. Standards set by MOA (Licensing of Businesses Act)

Local Authorities (Sewerage) Laws —

Must abide by conditions set by LA, before hooking up w/ municipal sewer system. MOI promulgates construction regulations of private purification systems. LA determines charges. MOH defines training for LA sanitary personnel, not WC (MOH has not exploited this) [1973 Amdmt to Public Health Ordinance]

MOH eroding MOA's power in re-use of mun. Sewage.

1973 Amdt. gave MOH power to create rules for purification of sewage for re-use. "Sewage" not defined, so can conflict w/ MOA

—— [Jerusalem cholera in 1967]

Sewage water is not centrally controlled. ~~LAs & MOH~~ More under control of MOH than WC.

Drainage Law (1957)

Drainage authority "has practically unlimited power" in regulating runoff H_2O in IS. (p. 153)

Runoff from agric. land could be less harmful by MOA regulating means of production (fertilizer, etc.), but this would not be favored by MOA's constituency

LA's + MoH have control over industrial waste

LA want to protect industry + would prefer not to have its waste in its sewage system (prefer dumping in streams)

MoH isn't to concerned w/ ind waste b/c it's not biological health hazard + can destroy pipes so it prefers Dumping in streams + MOH just supervises). MOH not concerned w/ conservation

---

National Sewerage Council
created in 1963 + again in 1969
MOH, MOI, MOhousing, WC + Tahal reps.
-advisory committee — Tahal, WC, Nature Reserves A, World Bank reps.

National Sewerage Plan encompassing 79 LAs + 3 assoc. of towns. 70% of cost split 60/40 by WB + IS (rest, 30% by local banks to be repaid by LA's to serve 3.5 million by 1992 (of est. 5 million)

It is not "national" byt funding of local LA sewage

Areawide treatment might be cheaper + better
Doesn't deal w/ sewage use, only treatment

Sewer charges still determined by quantity, not quality

Council has no statutory powers or standing.
Public not informed, has no power to actually approve.
Public can't object till it gets to Building Commission already fully developed + approved

WC + MIA avoid blaming agr. for pollution.

Drainage Auth. has not been allowed to deal w/ pollu, just flood control & runoff

Standards for sewage quality for agr. have not been set by WC

MDH has power to regulate sewage use for "economic gain"

3 Plans: Nat. Sewerage Plan, Storm categorization, (use)
+ Capturing fluctuations in reservoirs,
these 3 have not been coordinated

1) Plan also is study of storm quality. Should've been done by agr.

~~Wastewater~~ Storms not protected from becoming sewers b/c its OK for agr. Wastr only protected for agr., not other uses. Wastr seen as nutrient input, not part of ecosystem.

Sewage Plan execution continues despite standards for effluent reuse still being set.

2400 wells in IS

580 Mekorot
500 local auth.
rest private

b/c one-pipe system all water in system must be of drinking quality

Supply of > 90 mg/l nitrates is forbidden (1974)
45-90 considered unhealthy
rise in coastal aquifer 2 mg/l/yr since 1955

1965 Amendment WC from control of all recharge.

1971 Amendment ~~didn't~~ attempt to ~~define~~ defines "polluters" to be controlled. But seepage basins don't count as recharge & haven't been included in "polluters"

Thesis — failure to protect sources not from lack of authority, but from lack of effort

---

1971 A. — MoA can regulate agr. means of prod. to protect DW (like fertilizers), but to date hasn't.

Not all sources of pollution are covered in "Water Law's regulatory provisions"

MoH — power to set standards for well constr. (basalt to date)
MoA has (p. 66) sacrificed gw quality for immediate gains for constituency.
→ what "sources" MoH has control over (natural or in pipe) is unclear

Major use in streams is waste disposal. This requires WC permits, none of which have been issued, therefore all against the law. (1971 Amend.)
— unless "no choice".

MOH to prevent dangers from water sources, P.175

No section of Water Law authorizes monitoring of IS's streams.

MOH has only immediate concern of health + doesn't consider sewage a national resource

---

no systematic monitoring of ind. waste yet WC claims ind. is largest polluter, embarking on 5-yr. plan to prevent it.

WC lax in enforcing ind. poll control, doesn't issue discharge permits which inform public of dumping

---

MOA could list polluters & require adequate sewage, but he hasn't, so it's up to WC to guess. There is no cooperation from MOT & I, who could announce when an industry is starting up, or Planning & Building Commissions, which MOP + MOH sit on, who could demand to approve sewage stuff. WC can only demand adequate sewage upon request for water supply after MOH + local Auth. have approved everything & it's all been built.

There is "gentleman's agreement" w/ MOH that WC be notified + approve sewage plans for plants licensed by MOH.

MOH can't act until a health hazard shown

MOI in dev't planning
Planning & Building Law (1965)

(MOH - Public Health Ordinance, Licensing + Business Law)

Mekorot asked for a Kinneret Basin authority to manage the lake. WC agreed in 7/65, but still, as of writing hasn't been done.
Mekorot did comprehensive studies of Kin. any way
But what could it do?
Set up a Limnological Lab
WC, MOA, Yeasset failed to put scientific studies to use.

WC created Kinneret Directorate after news of Lake's imminent demise — (not statutory)
reps of: JV Drainage Auth
Upper Galil DA
Mekorot
WC

WC – not dept. for GW protection.
Lots of studies on effects are done by those who will do projects

1971 amendment passed by Knesset gives authority for protection, but not used.
Author also finds Knesset at fault for not giving the authority to implement possible broad anti-pollution regulations.
But as of writing, not one regulation had been passed regulating GW pollution.

West flowing streams:
Betset (1 Mcm)
Keziv (3.27 Mcm)
Gaaton (11.52 Mcm)
Bet ha'Emek (2.64 Mcm) (intermittent)
Na'aman (20 Mcm)
Hilazon (trib.) (5 Mcm)

Qishon (27 Mcm)

Daliyot (7 Mcm) (intermittent for 4 mo.)

Taninim (28 Mcm)
Hadera (10 Mcm) (intermittent 3-4 mo.)
Alexander (10 Mcm) (")
Yarqon (27 Mcm)

1955 - Water Drilling Cntrl Law
1955 - Water Metering Law
1957 - Drainage + Flood Control Law

#3921

Recommendations —

Remove WC to a Min of Environment

Put Tahal in WC (now can recommend + executive)

Reduce Mekorot's policy power to WC

Include aesthetic + recreational uses along w agri, ind, waste transport, uses...

Reduce GW pumping + limit building on sand dunes

Reduce some fertilizer use

Define surface water + sewage water use standards.

166.66
~~166~~ 2

166.66
15) 2500
15
100
90
10

WC can't shut off supply to municipality, can't charge municipality for sewage plant, local authorities set effluent charges.

WC – 3 tech depts, 4 adm. depts..
1) efficient use
2) hydrology
3) drainage
(a pollution control section created in 1973)

WC is regulatory agency (no planning dept.)
Commissioner is v-chair of Water Board + on Nat. Water Planning Committee.
Issue rules for filling of water laws, brings violators to trial, permits, can demand sewerage plans.
Comes up w/ rules + MOA signs them. (Never clashed on water pollution)

Mekorot
founded 1937 by Keren haYsod, JNF, Palestine Land Dev't Co., Nir Co. Gov't + JA now own majority shares + MOA sits on board.
Operates NWC, water supply cos., has labs for testing H_2O, research in Kinneret, + operates sewage purification (incl. Gush Dan plant.)

Tahal
founded in 1952 by Gov't, JA, JNF
before – MOA, JA, + Mekorot planned
now – Tahal plans, Mekorot executes
(p. 28) WC uses both Tahal, + Nat. Planning Board
Planning mostly regional upon request. Tahal not accountable, author thinks WC should have planning arm.

(#3921)

Tahal -

- sits on National Sewerage Council and its advisory committee
- founded in 1952 by gov't, JA, JNF
- plans for WC; Mekorot executes. Planning done on request, Tahal not accountable, but can execute its own plans

Drainage Authorities -

- JV + Upper Galil represented on Kinneret Directorate
- have not been allowed to deal with pollution under their jurisdiction even though they are best equipped to deal with it on a regional basis.
- created by Drainage Law in 1957; have "practically unlimited power" in regulating flood + runoff

Kinneret Directorate -

- created after public furor to protect Lake Kinneret (in 1973) (not statutory); reps. of: JV Drainage Auth., Upper Galil DA, Mekorot, WC.

National Sewerage Council -

- created in 1963 + again in 1969; reps. of: MoH, MoI, Mohousing, WC, + Tahal. Advisory Committee reps.: Tahal, WC, NRA*, World Bank.

Miscellaneous -

- Jerusalem cholera epidemic 1967
- Statewide cholera epidemic 1970
- abnormally high death rate from:
  1) gastroenteritis
  2) bacillary dysentery
  3) hepatitis

(#3921)

WC –

- took control of GW recharge in 1915 (Law amendment).
- no Dept. for GW protection; studies done are usually by those who will execute projects. Not required to monitor stream quality.
- not one law passed regulating GW pollution.
- issues permits for industries to dispose of waste in streams; so far not one permit issued, though this disposal is widespread; public therefore not informed of pollution. Despite no monitoring, WC claims industry is worst polluter, + has embarked on 5-yr plan to monitor industrial waste.
- can only demand adequate sewage practices upon a request for water supply, after everything has been approved; not enough clout to enforce if objections arise.
- has a "gentlemen's agreement" with MOH who will notify WC when he is contacted for a license to operate.
- sits on National Sewerage Council and its advisory committee
- avoids blaming agr. for pollution. Streams are allowed to become sewers b/c this water is OK for agriculture.
- plans include:
  1) National Sewerage Plan (undertaken despite lack of standards or planning on effluent reuse)
  2) stream categorization
  3) capturing floodwaters in reservoirs
  4) study of stream quality
- can't shut off supply to municipality, can't charge a municipality for sewage plant.
- has 3 technical depts:
  1) efficient use; 2) hydrology; 3) drainage
  (a pollution control section added in 1973)
  no planning dept. (left to Tahal)
- vice-chair of Water Council and on National Water Planning Committee. Issues rules for fulfilling Water Law, brings violators to trial, permits + demands sewage plans. MOA signs rules WC comes up with. (Never clash on pollution)
- created + represented on Kinneret Directorate (not statutory)

(#3921)

MoA -

- sacrificed GW quality for gains of constituency
- Sets sewage standards, (Lic. + Bus. Act 1968)
- could regulate agr. means of production to reduce pollutants like fertilizer (not done, b/c of constituency.)
- could list polluters (not done).
- Streams allowed to become sewers b/c this water is Ok for agr. uses, water only protected for one use (actually 2) not all 5 (① agr., ind., dom., life-support, ② waste disposal).
- Sits on board of Mekorot
- signs WC regulations

MoI -

- sits on National Sewerage Council
- sets construction standards for private purification systems.
- lists businesses that need licenses b/c they might pollute.

LAs -

- sets conditions for municipal sewer systems
- determines sewerage charges
- sanitation personnel trained by MoH (not done).
- wants to protect industry constituency & prefers waste dumping in streams to its sewage system
- National Sewerage Plan provides funding for local sewage, not regional or national plan. 30% financed by banks to be repaid by LAs.

Mekorot -

- founded in 1937 by Keren haYesod, JNF, Palestine Land Dev't Co., Nir Co.; gov't & JA now own majority; MoA sits on board.
- operates NWC, water supply cos., labs for testing, labs for research in Kinneret, & sewage purification plants
- executes Tahal plans
- sits on Kinneret Directorate; scientific studies have not resulted in actions from gov't

(#3921)

MOH -

- can't act until a legitimate threat to health can be shown
- derives power from Public Health Ordinance (1940), Licensing and Business Law (1968)
- has power to regulate sewage use for "economic gain". (1973 Amend. to WL)
- supervises local authorities' licensing of industrial waste disposal. Not too concerned b/c ind. waste isn't usually a biological health hazard, so prefers dumping in streams b/c this won't destroy sewage pipes. Not concerned w/ water conservation
- sits on National Sewerage Council!
- Concern is to protect health; doesn't see sewage as a national resource.
- interested in protecting public, not water.
- sits on District Planning + Building Commissions
- has "gentlemen's agreement" w/ WC to inform him when an industry applies to MOH for a license to operate.
- defines training for local authority sanitation personnel (not used).
- potential polluting industries must get approval from MOH before getting license to operate from LA
- power to set standards for well construction (not used).

Technion
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Alternatives for water policy in Israel

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April 1985

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