Hirsto I. & P. Vakkilainen (1973) Integrated water resources development plan for the lower part of the Kymi river. Aqua Fennica 1973, 103–117.

INTEGRATED WATER RESOURCES DEVELOPMENT PLAN FOR THE LOWER PARTS OF THE KYMI RIVER

Ilkka Hirsto and Pertti Vakkilainen

Arrangements for Planning

One of the main tasks of the National Board of Waters is the overall planning of water resources development. The country has been divided into 19 areas for each of which an integrated plan will be drawn up. The first plan to be compiled has been the water resources development plan for the lower parts of the Kymi River. It has been published by the National Board of Waters as Report 29 I—III and 25.

Water resources development plans strive to plan and coordinate different forms of water use so as to give the optimal solution for the society as a whole. The aim is to conserve or enhance the quality of the environment, secure favourable conditions for economic growth, increase social well-being, and improve the development of the area.

Planning must be based on good knowledge of hydrology, different forms of water use, and needs of the users. This has led to project type planning, where the responsible organ for each area is a working group set up by the National Board of Waters. Members of a working group represent different fields of expertize.

The working group for the Kymi River consisted of seven persons from the National Board of Waters and the Kymi Water District. Other staff members of the Board have also participated in the work, and engineering companies have served as consultants in problems related to industrial waste waters, municipal water supply, and fisheries.

Councils have been set up to represent the users of water in each area and to express their opinion during planning. Besides water authorities, the council for the Kymi River consisted of members representing:

— regional land use planning organizations,
— association for water pollution control (industry and communes),
— fisheries,
— land owners,
— timber floating,
— water traffic, and
— water power.

The national Board of Waters sends out the draft plan for statements to the dif-

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Hirsto, Ilkka
Civ.Eng.
Vakkilainen, Pertti
Civ.Eng.
National Board of Waters,
Helsinki

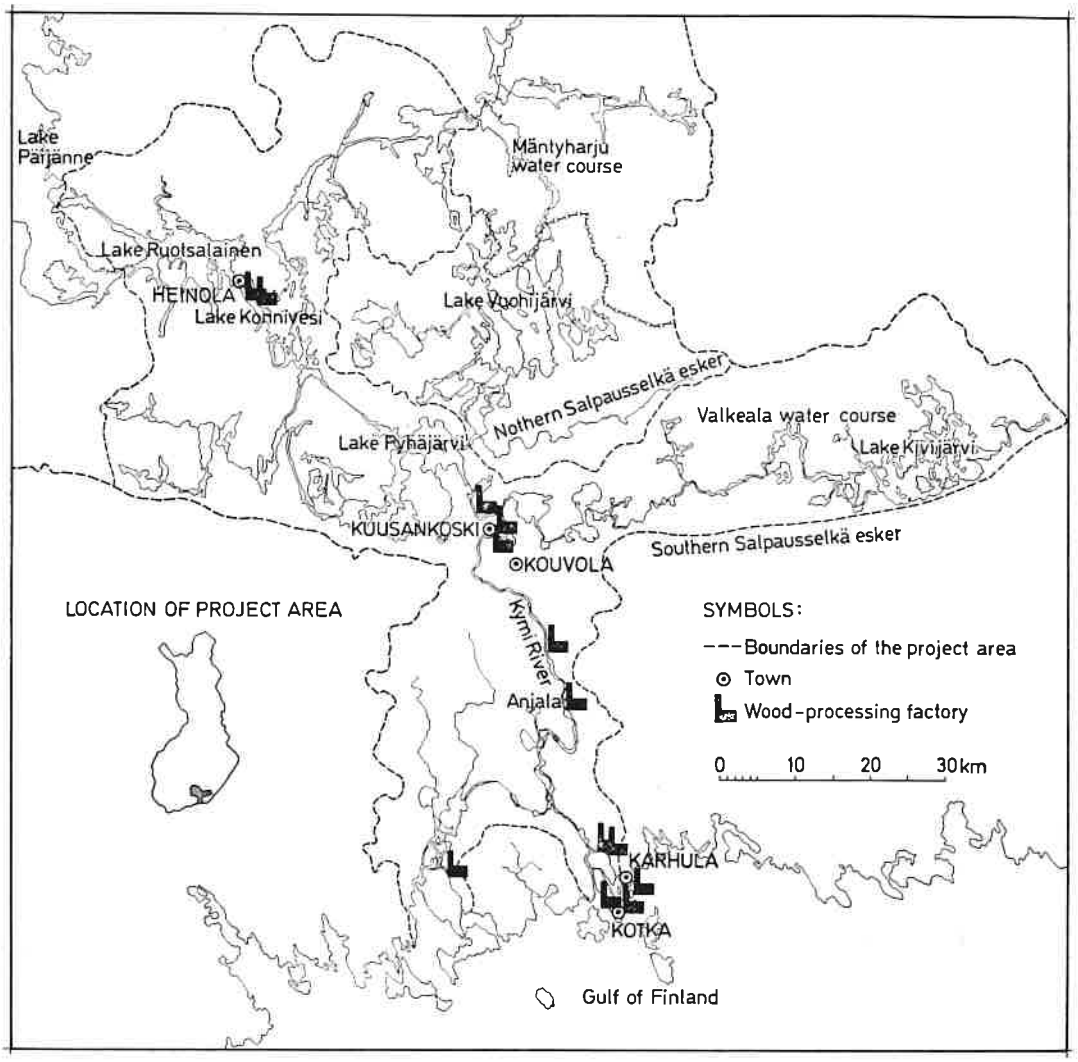

Fig. 1. The project area.

ferent parties concerned and then decides about approving it.

General Characteristics of the Project Area

The project area consists of the main course of the Kymi River south of Lake Päijänne, the water courses of Rääveli, Arrajoki and Valkeala, and the sea area by the Kymi River (Fig. 1). The Kymi River water system is one of the three great water systems of Finland. The catchment area of the water system is 37 170 sq.km, of this, 5 100 sq.km are within the scope of this plan.

Physical features of the area include the archipelago on the south coast, the Salpausselkä eskers that cut the area in the east-west direction, and the lake district north of the eskers.

The Kymi River is the main watercourse

to which the other watercourses flow as tributaries. From Lake Päijänne the river passes through Lakes Ruotsalainen, Konnivesi, Arrajärvi, Kirkkojärvi and Pyhäjärvi. After piercing the southern Salpausselkä esker the water course is practically without lakes. At Pernoo the river divides into two branches of equal size, which discharge into relatively shallow sea areas sheltered by islands.

Following figures characterize the hydrology of the area: Average annual precipitation is 700 mm of which 200 ... 230 mm comes down as snow. Average annual evaporation is about 350 mm or 50 per cent of the precipitation. Average annual runoff is 250 ... 300 mm.

Population and Economic Life

The population of the area is about 215 000, of these 75 per cent live in urban settlements. There are two gravity centers in the areal distribution of the population, one by the Gulf of Finland (Kotka—Karhula) and the other in the Salpausselkä area (Kouvola—Kuusankoski).

Population forecasts promise a 20 per cent rise of population by the year 2000. Due to concentration of population in urban areas, these will hold 90 per cent of the population by that time.

In economic development, the area has had a leading position; industrialization along the banks of the Kymi River has started earlier and developed more rapidly than in the country as a whole. Wood-processing industry has a leading position among the industries of the area. Thus, the amount of paper produced in the area is about 1 000 000 tons/year or 30 per cent of the country's total production, and of sulphate pulp about 460 000 tons/year or some 17 per cent of the total.

Surface Waters

The regulation of Lake Päijänne influences the water levels along the entire course — lakes as well as river stretches. Since 1964, when the regulation started, flood discharges which before occurred in summer now come reduced in April—May. Natural water levels can be found in the tributaries only. (Fig. 2).

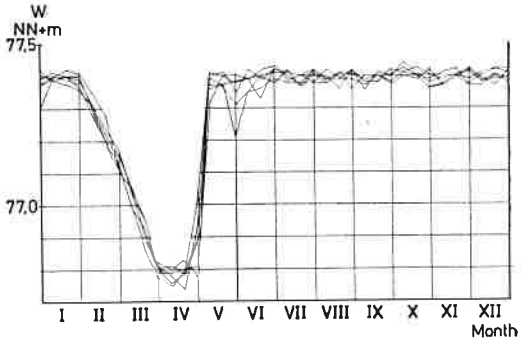

Fig. 2. The regulated water levels of Lake Konnivesi.

At the outlet of Lake Päijänne the average discharge of the years 1941··· 1970 is 209 cu.m/sec and at Kuusankoski, after all the tributaries have emptied into the river, it is 281 cu.m/sec. Figure 3 shows the discharge duration curve at Kuusankoski. Discharge, which usually varies between 202 and 392 cu.m/sec, can go down to 68 cu.m/sec during severe drought and, during flood, can rise as up as 600 cu.m/sec. At Pernoo the flow is divided equally among the two branches.

Continuous water quality data exist of the water course since the beginning of the 1960s. Water bodies are classified into five cathegories according to their present state. Waters belonging to class 1 can be used for community water supply without chemical treatment and those of class 5 suit practically no form of use.

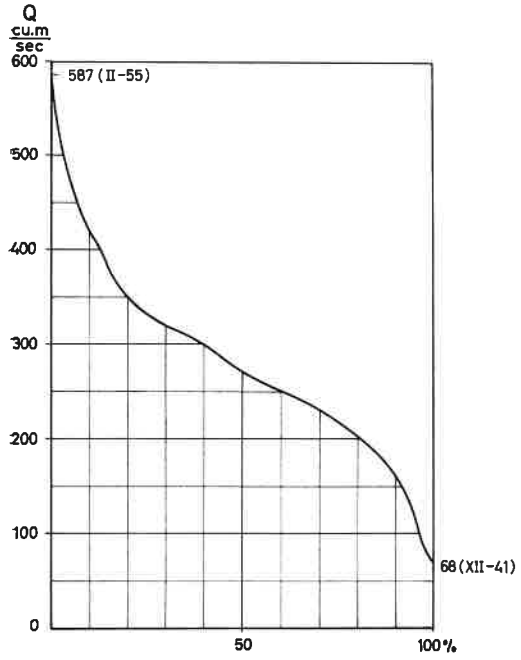

Fig. 3. The discharge duration curve of the Kymi River at Kuusankoski.

In general, the lake district of the area concerned belongs to class 2, »good», and the lakes are, with a few exceptions, unpolluted. The natural color of water, however, exceeds the value accorded to class 1, »excellent». The main course of the Kymi river is, on the contrary, badly polluted and belongs to class 4, »passing». Some areas by sewer outlets and the harbour area of Kotka do not even fit into class 4, but fall into class 5 »very bad».

The dominant factor in the pollution of the Kymi River is the fiber that escapes from pulp and paper mills. Such a waste material which forms sediments and, as an organic material, consumes oxygen, affects an increase — from Lake Pyhäjärvi to the mouth of the river — of 5 mg/liter in suspended solids content (Fig. 4), of 20 mg/liter in $KMnO_4$-demand or about 50 per cent, and of 1,5 mg/liter in BOD_7 or about 100 per cent.

Oxygen content (Fig. 5) remains relatively high thanks to short detention time and aeration due to flow, but at the end of summer the saturation degree may drop below 50 per cent at downstream reaches.

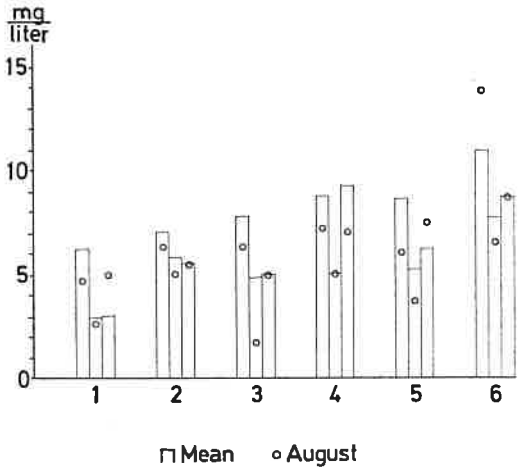

Fig. 4. The suspended solids content in the Kymi River in the years 1969···71. 1 = outlet of Lake Pyhäjärvi, 2···5 = downstream observation points, 6 = mouth of the river, Karhula.

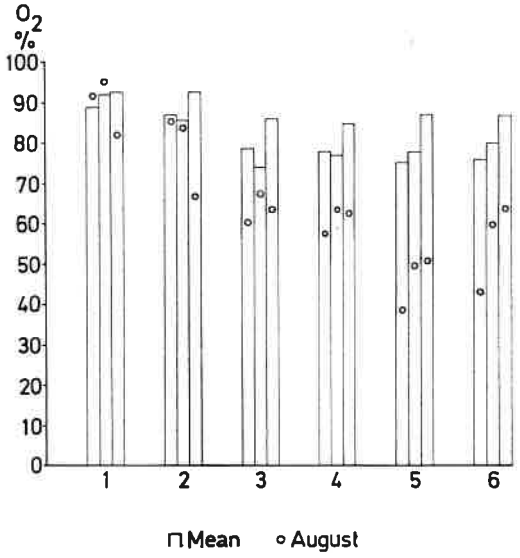

Fig. 5. The saturation degree of oxygen in the years 1969···71. Observation points as in Fig. 4.

The harmful effects of domestic waste waters are mainly hygienic and esthetic. Downstream of Kuusankoski the number of fecal bacteria is so great that water quality does not meet the requirements set for swimming water.

The sea area around the city of Kotka is badly polluted (Figs. 6 and 7). At sea bottom, conditions prevail where there is no oxygen and chemical reduction takes place and bottom fauna do not prevail. The oxygen content of the water masses, too, is low, with saturation degree at 20 per cent, at times, near the mouth of the Kymi River. Other indicators, too, speak for the pollution of the area; total phosphorus content is over 40 μg/liter, total nitrogen content is about 300 μg/liter, and lignin content about 5,0 mg/liter.

At the outskirts of the archipelago water quality improves rapidly. Also, the bottom condition become better and from place to place pure erosion bottom is found.

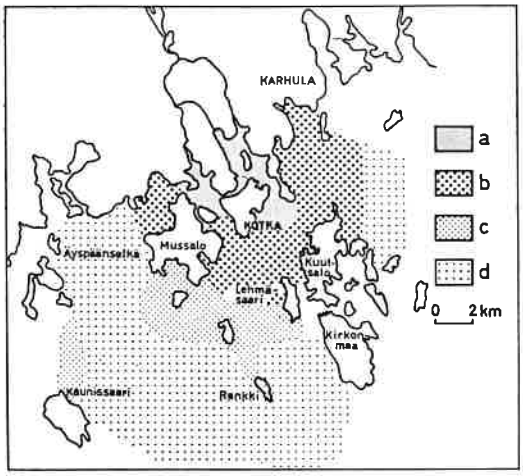

Fig. 6. The state and the quality of the sea bottom around the city of Kotka. a = polluted sedimentation area, b = impaired sedimentation area, c = nearly unpolluted erosion area, d = nearly unpolluted sedimentation area.

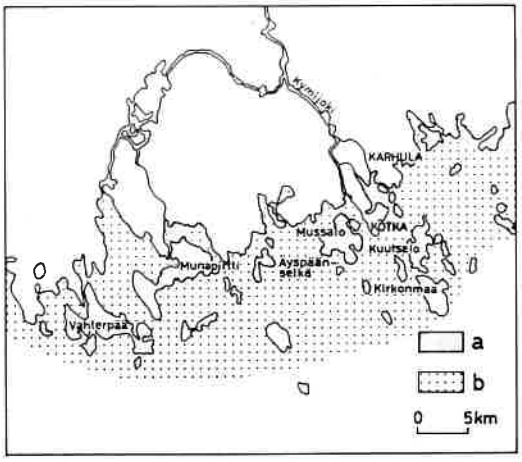

Fig. 7. The sea areas affected by wastes. a = strong influence, b = occasional influence.

Ground Water

The best aquifers in the area are the eskers that were formed during the glacial age. The most important of them are the two Salpausselkä eskers. As the bedrock of the area is, for the most part, weathered granite (rapakivi granite), the conditions are favourable for groundwater flow. The yield of the known aquifers is estimated to be about 170 000 cu.m/day. The Salpausselkä area is also especially suitable for artificial ground water retention.

The high fluorine content of the bedrock is reflected in ground water, whose fluorine content varies between 1,1···4,0 mg/liter, as the acceptable content is 3,0 mg/liter, at the most.

Water Supply and Waste Waters

The cities and towns of the area have, until now, mostly utilized surface water. As the Kymi River is quite polluted, the raw water quality in Kotka and Karhula has ceased to be satisfactory.

Nearly all rural communes use ground water for water supply.

Water consumption per capita is constantly growing. In cities and towns it is of the order of 300 liters/day, but in the year 2000 it is estimated at 500 liters/day. In the population centers of the rural communes the values are lower, and in the year 2000 it is estimated at 400 liters/day. The total consumption of the communities, which is, at the moment, about 30 000 cu.m/day, is expected to rise to 110 000 cu.m/day. Besides the increase in quantity, future water supply will be characterized by efforts towards improved quality.

The industry that has its own water supply arrangements, especially wood-processing industry, is by far the greatest water consumer in the area. The water used by industry amounts to 1 million cu.m/day. The industrial plants take water from the Kymi River. The amount of water used by industry will probably not increase with growing production, but will, on the contrary, decrease as water consumption per unit of production decreases. In 1990, demand of water by industry is estimated at 600 000 cu.m/day.

About 7 per cent of municipal waste waters are now treated in treatment plants of differens levels. Industrial plants are now constructing mechanical treatment plants for their waste waters. This will result, mainly, in a reduction in the suspended solids load. In 1974 it will be 45 per cent of the 1970 value.

Load from waste waters was in the year 1970 as follows:

Load parameter	From communities tons/day	From industry tons/day
BOD_7	8,9	190
P	0,3	0,5
N	1,3	2,7
Suspended solids		160
Lignin		140

Biological oxygen demand from municipal waste waters is only a fraction of that from wood-processing industry, but the order of magnitude of nutrients is the same. It is to be noted, also, that it is the domestic waste waters that, for their part, make the Kymi River unsuitable for water supply and swimming by affecting its hygienic state. Diagrams in Figure 8 show the phosphorus load to the Kymi River from industry, communities, and dispersed sources (nature etc.).

The Kymi River serves the municipalities and the industry both as source of water and as waste water recipient, thus linking the two activities.

On the basis of the objective that poses the greatest demands on water quality, two main alternatives have been established:

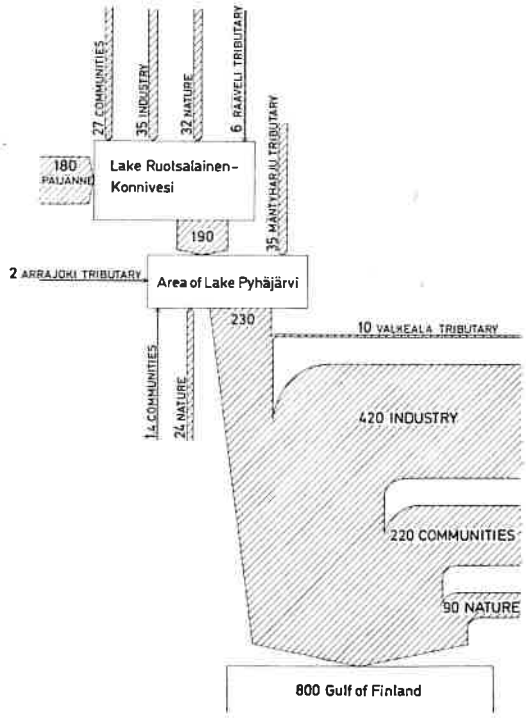

Fig. 8. The phosphorus load to the Gulf of Finland from different sources expressed in kg per day.

I, the Kymi River as recreational water course and II, as source of water for communities. The alternatives may be subdivided in the following way:

Alternative I (Fig. 9)

Along the Kymi River, water supply of the greatest urban settlements is taken care of in such a way, that the Kymi River can be given up as source of water. Water need is satisfied by conducting ground water and artificial ground water from the northern Salpausselkä esker (Ia) or surface water from Valkeala water course either along a conduit (Ib) or the Summanjoki River (Ic).

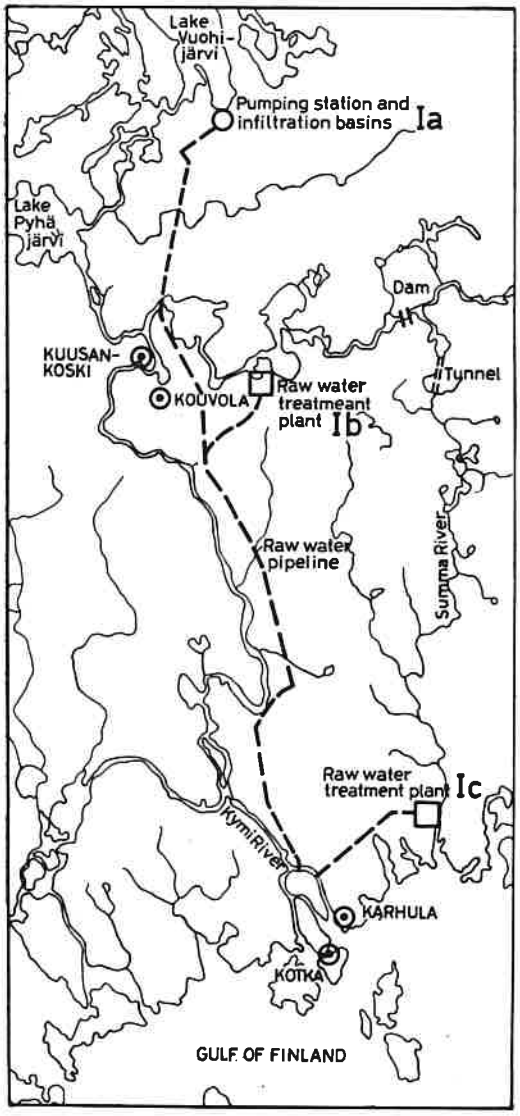

Fig. 9. Water supply and waste water treatment alternatives I; centralized water supply.

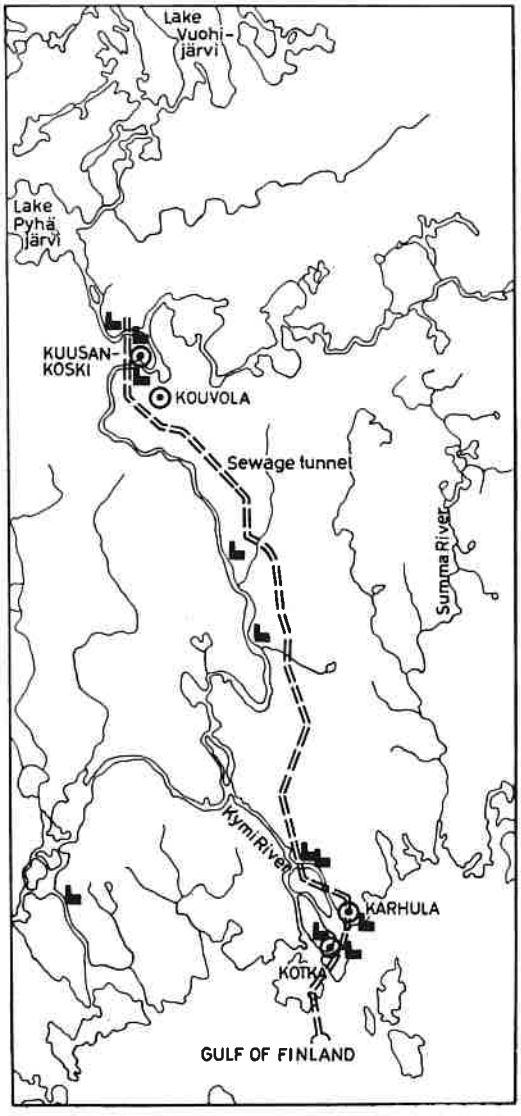

Fig. 10. Water supply and waste water treatment alternatives II a and b; sewage tunnel.

Municipal waste waters are treated by applying the principle of decreasing load. All urban settlements must treat their waste waters so as to give a result comparable to chemical clarification, by the year 1980. Later, as the load increases, treatment efficiency is raised.

Waste load from industry is decreased by improvements in the process and by chemical treatment of waste water, which will be started by the year 1980 in the pulp, paper and fiber-board factories of the area.

Waste waters are released locally into the Kymi River and the sea.

Alternative II

Water supply is based on local water resources by developing and expanding present water works.

Municipal waste waters are treated as in alternative I. In alternative IIa, industrial waste waters are treated mechanically and in IIb, chemically, and the Kymi River is by-passed by taking the waste waters in a tunnel into the Gulf of Finland (Fig. 10). In alternative IIc, to acquire maximal lignin reduction the bleaching unit at Kuusankoski sulfate pulp mill is provided with an activated carbon phase. This alternative assumes the Kymi River as the recipient of waste waters.

The cost of each alternative is discounted to the year 1972 by using discount rate of 6 per cent, with time horizon at the year 2000 (Table 1).

Table 1. Alternatives for water supply and waste water treatment. Costs discounted to the year 1972.

Alternative	Water supply		Industrial waste waters		Domestic and municipal waste waters		Present value of costs
	Kotka and Karhula	Whole area, costs	Treatment	Disposal	Treatment	Disposal	
I a	From Selänpää	42 Mmk	Process improv. + chemical treatment 64 Mmk	Local	Chemical treatment 82 Mmk	Local	188 Mmk
I b	From Valkeala watercourse	32 Mmk					178 Mmk
I c	Via Summanjoki River	28 Mmk					174 Mmk
II a	From Kymi River	16 Mmk	Mechanical treatment —				161 Mmk
II b			As in altern. I 64 Mmk	Tunnel to sea 64 Mmk	Chemical treatment 82 Mmk	Tunnel to sea	226 Mmk
II c			As in altern. I + supplementary measures 110 Mmk	Local	Chemical treatment 82 Mmk	Local	207 Mmk

In order to measure the quality of the different alternatives, a number of criteria have been created, based upon the general objectives of the planning work. These criteria should be independent of one another and they should take notice, as far as possible, of the advantages and disadvantages of each alternative. The following criteria have been chosen:

Tangible criteria (Table 2)

— *Evaluation of improved water quality.* A cubic meter of ground water is taken as worth 10 pennies more than water from the Kymi River, while high quality surface water is worth 3 pennies more than water from the Kymi River.
— *Benefits to fisheries* from increased catch and improved variety of fish.
— *Benefits to recreational use of waters.* From present price differences between summer-house lots situated by clean and by polluted waters it has been estimated that by by-passing the Kymi River and by taking the waste waters directly to the Gulf of Finland, the value of land along the river can be increased by 1,5 marks/sq.m, while with chemical treatment the increment is 1,0 marks/sq.m, when the 1973 price level is applied.

Table 2. Tangible benefits. Benefits discounted to the year 1972

Alternative	Value accorded to water quality Mmk	Benefits to fishery Mmk	Recreation benefits Mmk	Total benefits Mmk
I a	9,9	0,8	4,6	15,3
I b	2,3	0,8	4,6	7,7
I c	0	0,8	4,6	5,4
II a	0,8	—0,4	7,0	7,4
II b	0,8	0,0	7,0	7,8
II c	0	0,8	4,6	5,4

Intangible criteria

— Future state of the Kymi River aside from the tangible benefits from improved water quality.
— Future state of the sea area, used for estimating the effects on the sea of the waste water tunnel.
— Ecological quality which is inversely proportional to the quantity of wastes released into nature.
— Risk aversion which designates the security of, for example, a water supply system.
— Financing feasibility which is inversely proportional to the size of the investments needed.
— Potential for economic growth. The use of a water body for water supply puts restrictions on its use as waste water recipient.
— Influence on community development and other forms of land use.

Comparative merit is estimated for each alternative according to different criteria. Comparative merits are indicated by numbers running from 0 to 100. Comparative merits have been determined by using different units of measure, for example, analysis results, when such have been available. For three criteria, however, no units of measure were found, and subjective deliberation and, in one case, narrative examination, were resorted to. Comparison is based on the situation of 1973.

The so called net costs are acquired by subtracting from present values of costs in Table 1 the present values of tangible benefits. These and the intangible benefits are given in Table 3.

Table 3. Net costs and intangible benefits in numbers indicating comparative merit.

Alternative	Net costs Mmk	Intangible benefits					
		State of Kymi River	State of sea area	Ecological quality	Risk Aversion	Financing feasibility	Potential for economic growth
I a	173	58	100	75	100	22	100
I b	171	58	100	75	80	34	100
I c	169	58	100	75	60	38	90
II a	154	100	0	0	50	18	60
II b	218	100	22	50	50	0	60
II c	202	61	100	100	20	49	20
Weight		0,84	0,84	0,50	1,13	1,34	1,34

The sum of comparative merits for each alternative is obtained in two ways:

1) Comparative merits are added up as such, because comparison among the different criteria is difficult and each of them is deemed important for the expedient use of waters.
2) Persons and organizations representing the different forms of water use in the council set up to follow the planning give weights to the criteria. The weighted comparative merits are then added up.

In both cases the total merit is determined as a benefit-cost ratio, which is obtained by dividing the sum of comparative merits by net costs (Table 4). It seems that in both cases the alternatives I are superior to the alternatives II. Alternative Ia is recommended for further development.

Figures 11 and 12 show the development of waste water load in the alternative chosen. The decrease in load affects primarily the Kymi River, where suspended solids content goes down from 6 mg/liter to 2 mg/liter by the year 1980.

Table 4. Comparison of alternatives.

Alternative	Choice without weights			Choice with weights		
	Sum of comparative merits	Benefit-cost ratio	Rank	Sum of comparative merits	Benefit-cost ratio	Rank
I a	445	2,72	1	448	2,69	1
I b	447	2,71	2	441	2,68	2
I c	421	2,59	3	411	2,53	3
II a	228	1,54	5	245	1,66	4
II b	282	1,33	6	264	1,25	6
II c	350	1,78	4	301	1,54	5

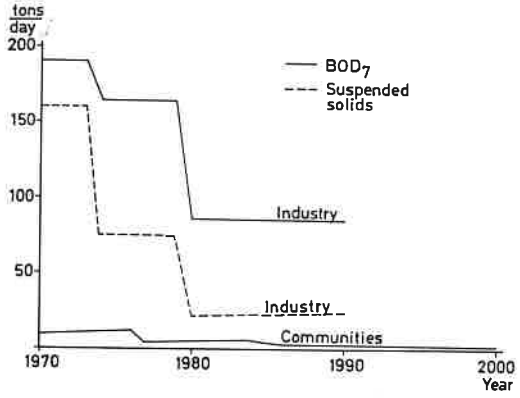

Fig. 11. Decreasing of BOD_7-load and suspended solids load.

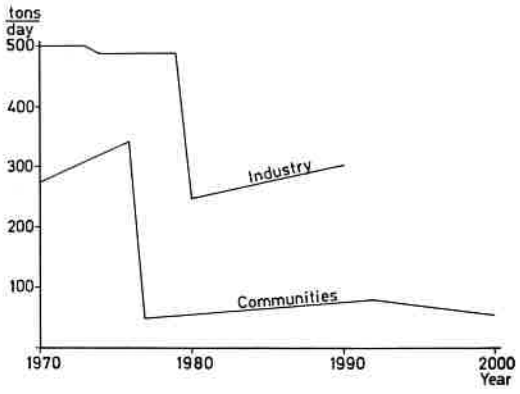

Fig. 12. Decreasing of phosphorus load.

Lignin content is reduced to one half of its present value and as for oxygen, there will be improvements, too.

Water Power

There are, at the moment, 13 water power plants in the Kymi River. Their total power output is 184 MW and energy production about 1100 GWh/year, which can satisfy over one third of the demand of electricity of the Kymenlaakso district and about 4 per cent of that of the whole country. The theoretical available energy is about 1750 GWh/year.

In the Kymi River the only unharnessed waterfalls are downstream of Anjala. If the most important of these, Pernoo and Hirvikoski, were built, the power output of the Kymi River would increase by 20 MW and at the same time the conditions would become more favourable for diurnal regulation. The energy thus obtained would, however, cover only a very small fraction of the country's need of electricity, while the last free waterfalls with great discharges in Southern Finland would be destroyed, it is obvious that the construction of these hydro power plants would be a mistake from the society's point of view.

Regulation of the Watercourse

The objective of the regulation of Lake Arrajärvi is to keep the water level at its mean value, which is obviously beneficial for most forms of water use. This would allow to produce about 1,8 GWh/year of additional energy. Its capitalized value would be about 1 million marks. For recreational use the benefits from water regulation would amount to several millions of marks. The estimated benefit for agricultural land and forest land also greatly exceeds the possible compensations.

The objectives of the regulation of Lake Pyhäjärvi are to improve the drainage of agricultural land on the shores, to secure minimum water levels for timber floating, to subdue, to some extent, water level fluctuations that are disturbing to summer-house settlement along the shores, and to add to the energy output. Effect of the planned water regulation on water levels is given in Figure 13. The net benefits for hydro power and agriculture would total to 180 000 marks.

The water levels of the lakes Kivijärvi that were lowered in the 1960s to serve agriculture, are intended to be raised to meet the needs of the present use of the shores. A detailed plan is now under work.

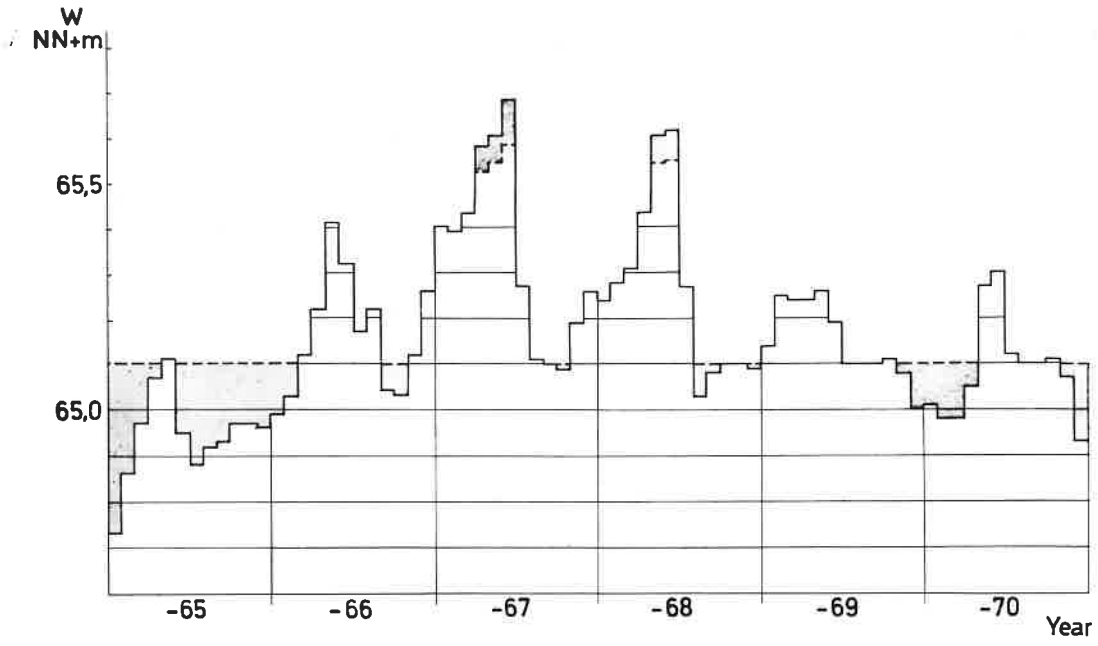

Fig. 13. Effect of the planned water regulation on water levels of Lake Pyhäjärvi. Dashed line represents regulated water levels.

As a means to increase the value of hydro power, the possibilities for daily and weekly regulation of the Kymi River have been studied. Such regulation would, however, cause big fluctuations in stage — 60 cm in some reaches — and the adverse effects for recreation and fisheries would be so remarkable, that the feasibility of the project requires more research.

Timber Floating and Navigation

On the Kymi River watercourse, timber is floated in bundles since 1966 when floating of loose logs ended. A floating channel was built for log bundles from Lake Päijänne to Kuusankoski. The amount of timber floated from Lake Päijänne has grown at constant rate during the past few years. On the tributaries floating is declining. About 15 per cent of the local industry's demand of timber is transported into the area by floating.

With the present network of channels no increase can be expected in the amount of timber floated. Development in floating will not take place unless new channels are built. A channel for log bundle floating should be extended from Kuusankoski to the Gulf of Finland. The feasibility of the project depends upon the amount of timber to be floated, which is not very easily forecast. In comparing the present state with the planned floating-channel, other things besides amount of timber should be taken in consideration; such are water quality, natural landscape, fisheries, effects on the balance of payment, operation during a crisis, etc. In most cases the present state provides a better alternative. The problem belongs to the sphere of traffic policy, and cannot

be solved on the basis of water resources development only.

The most important form of navigation in the area is the sea traffic from and to the harbour of Kotka. Kotka is Finland's biggest export harbour. Its share of the exports in 1970 was about 20 per cent. In the inland waters, passenger traffic is serving tourism.

Fisheries

The potential catch in the sea at the mouth of the Kymi River in the natural, unpolluted state is estimated at 100 kg/hectare · year and in the lower parts of the Kymi River in the unpolluted state, at 60 kg/hectare · year. The potential catch in the lake district is estimated to vary between 20 and 40 kg/hectare · year, depending on location.

As a result of waste water disposal and canalization of the river the fish life has changed in quality and in quantity. The influence of improved fishing methods has enforced the change. At present, the estimated value of potential catch in the sea area is only about 40 kg/hectare · year and that of the Kymi River about 30 kg/hectare · year. The potential catch in the lake district has remained almost constant, although slight change may have taken place. In some reaches of the Kymi River mercury contents are remarkably high, and partly due to this the actual annual catches are only about one tenth of the potential catch. Commercial fishing has practically ceased in the lake district. Most fishing is for own consumption or for recreation.

A program has been drawn up for the rational management of fisheries. Its aim is the development a pisciculture equivalent to the natural state of waters or suited in an optimal way to the prevailing conditions.

Recreation

In great numbers, summer-houses are to be found on the shores of the lakes north of the Salpausselkä esker, on one hand, and in the coastal area offering abundant shoreline, on the other. There were 11 000 summer-houses in 1970 in the entire project area. A fast growth is foreseen and by 1980 the number will have doubled. The forecast may be critisized on the grounds that, among other things, suitable shore-line may run short, waters may be polluted, landscape may be spoiled or urbanization may take place, and the price of land may soar up and thus change the prognosis.

Possibilities for swimming are rather good in the natural lakes of the area. Along the river, however, the conditions do not favour swimming, due to poor hygienic state and waste fiber from wood-processing industry.

Boating is important in the sea area and in the lakes. There are some 3 400 motorboats in the lake district; their number is expected to be fivefold by the year 1990. Natural obstructions and man-made structures in the waterways limit the development of long-distance boat travel.

In planning the use of shores for recreation and summer-house settlement, attention should be paid to the following:

— in the neighbourhood of population centres land must be reserved for public recreation facilities,
— summer-house settlement should be concentrated around service points,
— space for concentrated summer-house settlement or vacation centers should be reserved along watercourses with abundant flow,
— no building should be allowed along narrow straits and small ponds or the shores of small islands,

— even in areas of summer-house settlement, 40···50 per cent of the shoreline should be left for public recreation and for agricultural and silvicultural use.

Boating activities will be located where other forms of use of shores and waters will not suffer excessively. Ports for small vessels are planned for areas suited for boating.

Drainage and Irrigation

The territory south of the Salpausselkä esker is important agricultural land, where the portion of cultivated land is 30 per cent of total land area. Drainage of fields has been intense; in some communes, lands profiting from drainage make up one third of the total field area. In future, the number of draining projects will decrease.

Irrigation is still of little importance in the area. With the equipment existing at the start of 1972, only about 1 per cent of the field area can be irrigated. The territory west of the Kymi River is intensively cultivated, and in June—July when water is most important for growth there is little of it available.

To increase the flow of the small rivers to the west of the Kymi River the possibility of conducting additional water from the Kymi River for irrigation purposes has been studied. The economic use of irrigation equipment is considered to be limited to a distance of one kilometer from the river channel. There are about 10 000 hectares of fields within that zone;it is estimated that 20 per cent of them will be irrigated in the future. The estimated need of irrigation water is 0,35 liter/sec · hectare. As the runoff of the area is 250 liters/second even during dry periods, the additional flow to be diverted from the Kymi River is 450 liters/second in June and July. The annual benefits from sprinkling would clearly surpass the annual costs from installation and operation of the irrigation systems.

Nature and Landscape Conservation

There are a number of nature conservation sites established by law, in the area, but beside these there are many other places that are valuable from the point of view of nature conservation, cultural history, and landscape. In the plan, a list is presented of the sites which may, in one way or other, be affected by hydraulic engineering or water pollution control measures and which require special attention in planning the development of water resources and in bringing them into effect.

Working Group

The working group for the Kymi River consisted of the following persons each responsible for some field of knowledge:

Ilkka Hirsto, civ.eng. — coordinator
Jaakko Kallio, civ.eng. — timber floating
Ilppo Kettunen, M. Sc. — water quality
Jukka Ruohtula, civ.eng. — water power and regulation
Päiviö Tokola, civ.eng. — water supply of communities
Paavo Tulkki, D. Sc. — recreational use and nature conservation
Pertti Vakkilainen, civ.eng. — assistant coordinator.

Tiivistelmä

Vesien käytön kokonaissuunnitelma on ensimmäisenä valmistunut Kymijoen vesistön alaosalle. Suunnitelmaehdotuksen on laatinut vesihallituksen ja Kymen vesipii-

rin vesitoimiston työryhmä, ja suunnittelua on seurannut alueen vesien käyttäjiä edustanut neuvottelukunta. Vesihallitus on julkaissut sen tiedotuksina n:o 29 I—III ja 25.

Suunnitelmaan on koottu perustiedot vesivarojen määrästä ja nykyisestä tilasta sekä selvitetty vesien käyttötilanne. Kullekin vesien käyttömuodolle on laadittu suunnitelmia tai on tutkittu olemassa olevia suunnitelmia ja niiden soveltuvuutta kokonaisuuteen. Keskeisimpiä kohteita ovat olleet Kymijokivarren kaupunkien ja taajamien vedenhankintaongelmat sekä niiden ja alueen puunjalostusteollisuuden jätekuorman vähentämiskysymykset. Suunnitelmassa on kehitetty edullisuusvertailumenetelmä, jonka perusteella on näissä kiinteästi toisiinsa liittyvissä vesien käytön muodoissa päädytty vedenhankinnan osalta alueelliseen keskitettyyn ratkaisuun ja vesiensuojelussa puunjalostusteollisuuden osalta prosessiteknisiin parannuksiin ja kemialliseen käsittelyyn. Yhdyskuntien jätevesien käsittelylle on laadittu pitkän tähtäyksen ohjelma. Vesistöjen käyttökelpoisuuden ja soveltuvuuden perusteella on esitetty suositukset virkistyskäytön alueelliseksi ohjaamiseksi. Edelleen on tarkasteltu mm. vesien paranevan tilan suomia mahdollisuuksia kalatalouden kehittämiselle ja tutkittu mahdollisuuksia nippu-uittoväylän ulottamiselle Kuusankoskelta merelle.