

# PRIORITIES OF FRESH WATER USE PURPOSES IN SELECTED COUNTRIES WITH POLICY IMPLICATIONS

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## ABSTRACT

*This paper reports on a study of how various types of water use purposes are prioritised in selected countries with different types and availability of water resources and socio-economic and cultural conditions.*

*A rapid assessment method based on a two-phase questionnaire was used. The first phase involved an analysis of three regions: East Africa (1988), the Baltic region (1994) and Finland (1993, 2001). The respondents were asked to rank ten water use purposes according to their importance. The results implied that there was wide agreement on which water use purposes should receive priority.*

*For the second phase, the questionnaire was modified: all water use categories were to be viewed by the respondents “as they are” and “as they should be”. The ten countries and regions covered were: Colorado (USA), Finland, Karelia (Russia), Kenya, Kosovo, Latin America, Lithuania, Mexico, Tanzania, and Vietnam. The number of respondents was 97 in the first phase, and 339 in the second one. Except for Kenya and Lithuania, the respondents were BSc, MSc or MA students at universities.*

*Community water supply for urban and rural areas was ranked first in all countries except for Lithuania where it placed second. Nature conservation was ranked second. On average, hydropower was ranked third, varying between second and sixth place in national rankings. Industrial water supply was considered fourth most important. Probably the highest variations were noticed with respect to irrigation: from second priority in Colorado to the tenth in Karelia and Lithuania. One of the most confusing categories was probably “recipient body of wastewater effluent”. Also, while “nature conservation” was ranked high, “recreational use” was ranked second lowest in the ten nations/states.*

*We could categorise the water use purposes into four wider categories according to target groups: water for people, water for nature, water for food production, and water for industries. If any further research is carried out, it is suggested that issues related to water pollution control and rehabilitation of water bodies be included.*

*All in all, the priorities of water use purposes seemed to vary less than originally anticipated. It is suggested that while promoting the useful tool of integrated water resources management, water use purposes and related priorities should be fully taken into account at the national, regional and local levels.*

**Key words:** water use purposes, priorities, water policy, community water supply, integrated water resources management

## 1 INTRODUCTION

Fresh water resources, or at least access to them, are becoming more scarce in certain areas of the world. Simultaneously, sector professionals are concerned that, on average, some 70 percent of the freshwater that mankind uses goes to irrigation—even more in some countries. On the

other hand, almost all the water stays within the hydrologic cycle, although due to mankind's activities, as well as changes in natural systems, water quality tends to get worse in many places.

One of the latest and widely publicised and accepted principles is Integrated Water Resources Management (IWRM) as pointed out e.g. by Global Water Partnership, GWP (2003) and the EU Water Framework Directive. GWP (2003, p. 1) defines IWRM as "a process which promotes the coordinated development and management of water, land and related resources in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital eco-systems".

This principle as such can be agreed upon. However, surprisingly little attention has been paid to the priorities and potential conflicts between various types of water use purposes and especially to the obvious need for prioritising the various water use purposes.

## **2 OBJECTIVES AND METHODS**

The aim of the study was to find out how various types of water use purposes are prioritised in selected countries with different types and availability of water resources, water demand, socio-economic and cultural conditions, and societal values. In addition, the study aimed at exploring whether the expected large variations between the countries as well as possible distribution between responses could be explained to some extent.

The study used the rapid assessment method based on a two-phase questionnaire. The core part of the study was carried out by the authors at TUT from November 2001 to September 2002. The first preliminary and preparatory phase of this study was conducted between 1988 and 2001. It analysed three regions: East Africa (Ethiopia, Kenya, Tanzania, Zambia in 1988), the Baltic region (Estonia, Lithuania, Latvia in 1994) and Finland (1993 and 2001).

The preliminary phase used a simple one-page questionnaire form which asked the respondents to rank ten water use purposes according to their importance, where one was assigned to the most important purpose and ten to the least important one. The water use purposes presented in the first phase questionnaire were as follows: nature conservation and reserves, municipal water supply, industrial water supply, fishery and fish farming, recreational use, hydropower, recipient of wastewater effluent, irrigation, flood control and drainage of agricultural land, and traffic and water-borne transportation. This questionnaire originated most probably from those used in connection with the multipurpose water resources plans made to study Finnish watercourses in the 1970s and '80s (RIL 1982).

For the second phase of the study, the questionnaire was modified so that all water use categories were to be viewed by respondents "as they are" and "as they should be". Thus, the latter view included an embedded futures perspective. Instead of "municipal water supply", the term "water supply for urban and rural communities" was used. The ten countries and regions covered were: Colorado (USA), Finland, Karelia (Russia), Kenya, Kosovo, Latin America (Argentina, Bolivia, Chile, Columbia, Cuba, Guatemala, Peru, Uruguay), Lithuania, Mexico, Tanzania, and Vietnam. In the middle of the second phase, the order of the water use purposes as listed on the questionnaire was changed from the original English alphabetical order. Yet, no significant changes in results could be identified. In addition to English, the water use purposes were listed also according to the local language in the case of Finland, Karelia, Latin America, Mexico, and Vietnam.

In the first phase, the total number of respondents was 97, and in the second phase 339. Except for the core group in Kenya and Lithuania in the second phase, all the respondents were BSc, MSc or MA students at universities or polytechnics. Only those forms where the full scale from

1 to 10 had been applied were accepted. Except for a few cases, the partially unfilled forms were disregarded.

### 3 RESULTS

Table 1 shows the ranking of the water use categories in the three areas of the first phase: East Africa (1988), the Baltic region (1994), and Finland (1993 and 2001) according to sums of ranking points for each category. Municipal water supply, as interpreted at this stage, was ranked first in all four countries. Nature conservation was ranked second by all others than the East African region, which ranked it as low as seventh. Other remarkable differences were noticed in the category of fishery, and partly also in flood control in the Baltic region. In any case, the results of the first phase implied that there were no wide differences in the ranking of water use purposes.

Table 2 presents a summary of "as they should be" water use priorities and average ranking points for the ten countries or regions of the second phase. The table also shows the sums of the ranking points and averages of national rankings. Water supply for urban and rural areas (communities) was ranked first in all countries except Lithuania where it placed second. Nature conservation was ranked second—it received the lowest ranking in Mexico (fifth). On average, hydropower was ranked third, varying between second and sixth place in national rankings. Industrial water supply was considered the fourth most important although the Latin American group ranked it ninth.

Probably the largest variation was found in the case of irrigation: it ranked second in Colorado but tenth in Karelia and Lithuania. This can be explained by the fact that some 80 to 85 percent of fresh water in Colorado is used for irrigation. Lithuania ranked recreational use relatively highest and nature conservation the highest of all. All in all, Table 2 indicates that the rankings are much the same although countrywise differences occur as in the case of irrigation.

Figures 1, 2, 3, 4 and 5 present the number of respondents assigning a certain ranking to each category in five selected countries and regions on four continents: Colorado (USA), Finland, Kenya, Lithuania, and Vietnam. These countries/states probably represent the most diverse conditions in terms of water resources and availability, socio-economic and cultural conditions, and categories of water use purposes. In all cases, community water supply was clearly ranked most frequently as the most important category while nature conservation was most often ranked as second most important. In Colorado, irrigation was considered the second most important category. Respectively, the three least important categories — recipient body of wastewater effluents, recreational use, and traffic and water-borne transportation—was most frequently assigned lowest priority. The widest deviation of views occurred in the middle categories. In Vietnam (Fig. 5) the average rankings for water use categories varied from 2.5 to 7.3, while in Kenya (Fig. 3) from 1.4 to 9.3.

In Figure 6 the Finnish data (n=167) is divided into eight sub-groups consisting of BSc, MSc, and MA students. The MSc and BSc groups included mainly students of environmental or water-oriented programmes while the MA students also represented other disciplines like history. The figure shows the differences between the various sub-groups. In spite of their different backgrounds, the results are quite similar. In a few cases the differences can be explained by the small number of respondents as with the fifth sub-group of five MA (history) students. Nevertheless all the sub-groups ranked community water supply first.

Figures 7 and 8 show the "as they are" and "as they should be" views in the case of the two countries/states with the largest number of respondents: Colorado (n=53) and Finland (n=167). The respondents were most adamant about the need of a higher ranking for "nature conservation".

The respondents were also asked to fill in their age and gender data, which was done by less than 50 percent of them. The received data showed no remarkable differences between the sexes or age groups.

## 4 DISCUSSION

Contrary to the original assumption, differences between water use priorities in various countries and states were smaller than anticipated. Yet, the national average is only a rough indicator—the situation may, and often does, vary at the local level. The respondents were semi-professionals and can thus perhaps be considered to be more representative of the general public than, e.g., civil servants or governments. In some cases the number of respondents was quite low, less than ten, and can thus be considered only indicative.

One of the most confusing categories was probably “recipient body of wastewater effluent” . If efficient water pollution control exists, one may consider the recipient body issue not all that important. But a similar judgment could also be made while water pollution control is not yet considered important. A related example is the high ranking of “nature conservation” while “recreational use” was ranked second lowest in the ten nations/states. The high ranking assigned to nature conservation could perhaps be regarded as an expression of the need to improve water pollution control.

We could also categorise water use purposes into four wider categories according to target groups: water for people, water for nature, water for food production, and water for industries. The first three wider categories were used in the Vision21 process that was given as a mandate to the World Water Council in 1997 in Marrakech and presented in 2000 (World Water Council 2000).

If any further research is carried out, it is suggested that issues related to water pollution control and rehabilitation of water bodies be included. Such a survey might focus on the mutual priority of water management and development practices and strategies.

Table 1. Ranking of water use purposes in the four cases of the first phase (EA = East Africa, BAL = Baltic region, FIN = Finland).

<b>Number of respondents</b>	<b>EA 1988</b>	<b>BAL 1994</b>	<b>FIN 1993</b>	<b>FIN 2001</b>	<b>SUM</b>	<b>AVG.</b>
Municipal water supply	1	1	1	1	4	1
Natural conservation, reserves	7	2	2	2	13	3.3
Industrial water supply	3	3	4	3	13	3.3
Fishery, fish farming	2	8	3	5	18	4.5
Recreation	6	7	5	4	22	5.5
Irrigation	4	5	6	7	22	5.5
Hydropower	5	6	7	6	24	6
Flood control, drainage of agricultural land	9	4	8	10	31	7.8
Recipient of wastewater effluent	10	9	10	8	37	9.3
Traffic, water borne transportation	8	10	9	9	36	9

Table 2. Ranking of water use purposes “as they should be” in ten case countries/states. (CO = Colorado/USA, FIN = Finland, KEN = Kenya, KOS = Kosovo, LAT = Latin America, LTU = Lithuania, MEX = Mexico, TZA = Tanzania, VTN = Vietnam.

AS THEY SHOULD BE Number of respondents	CO 53	FIN 167	KAR 13	KEN 16	KOS 12	LAT 8	LTU 14	MEX 15	TZA 18	VNM 23	SUM 339	AVG.
Community water supply	1	1	1	1	1	1	2	1	1	1	9	1.7
Nature conservation, reserves	4	2	2	2	2	4	1	5	5	2	23	3.7
Hydropower	3	4	5	4	5	6	3	2	3	3	31	4.6
Industrial water supply	5	3	3	3	3	9	5	8	2	4	37	4.8
Irrigation	2	7	10	5	6	2	10	3	4	7	47	5.5
Flood control, Drainage	6	9	7	7	6	3	9	4	7	5	48	6.1
Fishery, Fish farming	7	6	4	6	8	7	8	7	6	6	52	6.2
Recipient of wastewater	7	9	9	8	4	8	7	6	9	10	61	7.0
Recreational use	9	5	6	9	8	10	4	10	10	9	66	7.3
Traffic, water borne transportation	10	8	8	10	10	5	6	9	8	8	64	7.5

### Implications for water policies

The literature on IWRM, such as the Tool Box developed by GWP (2003), does not recognise priorities between water use purposes. Nor can it be found in several other sources related to IWRM. However, some recent literature and sources recognise this obvious need. For instance, the proposed First Edition on National Water Resources Strategy of Zambia (August 2002) points out the need for domestic water (Government of Zambia 2002). Water use priorities in China were pointed out by Boxer (1999). The State of Hawaii (2003) has introduced a bill related to water resources which suggests, among other things, “establishing criteria for water use priorities.

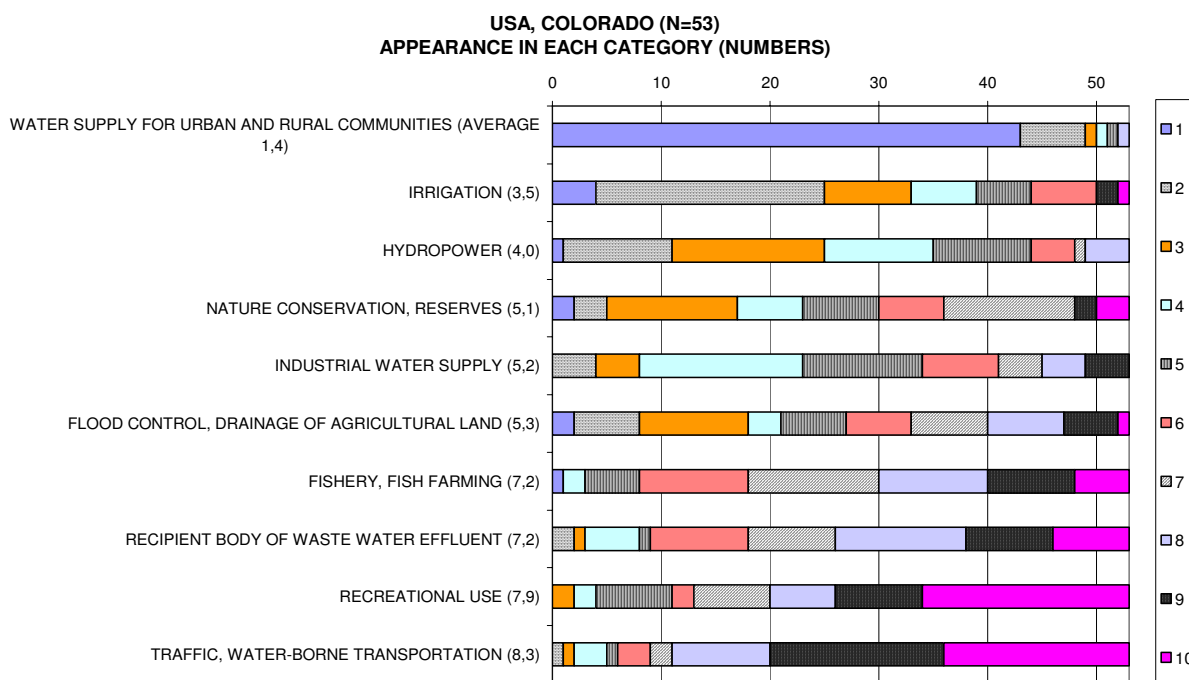


Fig. 1. Water use priorities of each category in Colorado, USA “as they should be”.

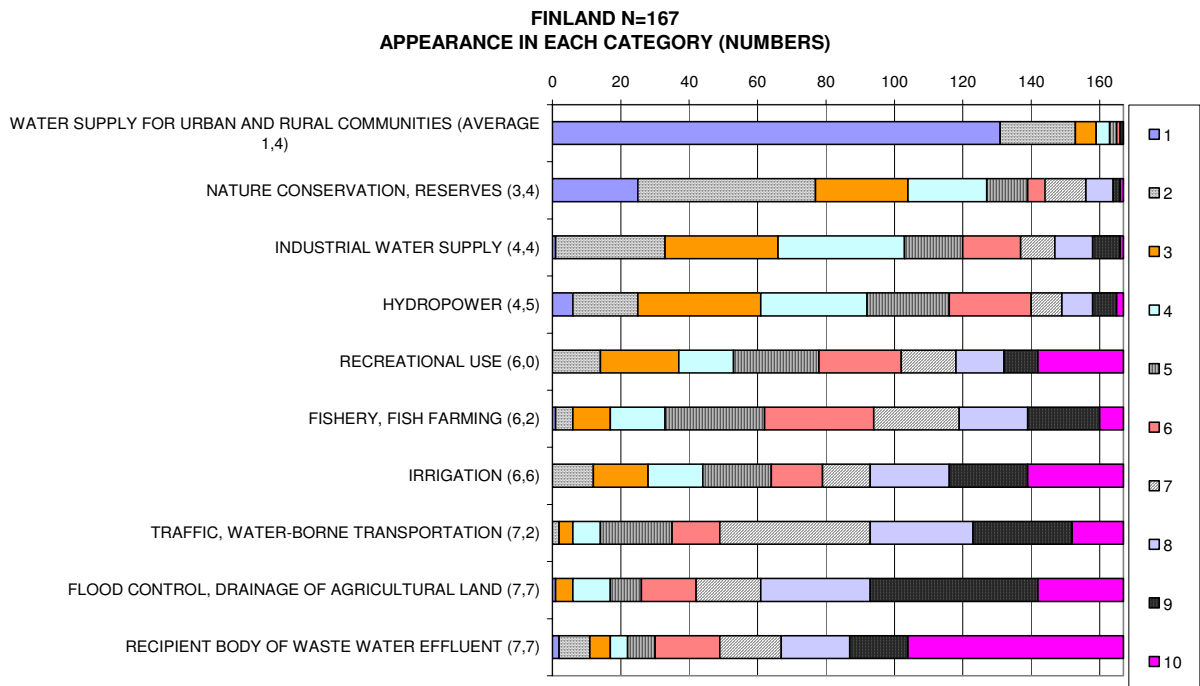


Fig. 2. Water use priorities of each category in Finland “as they should be”.

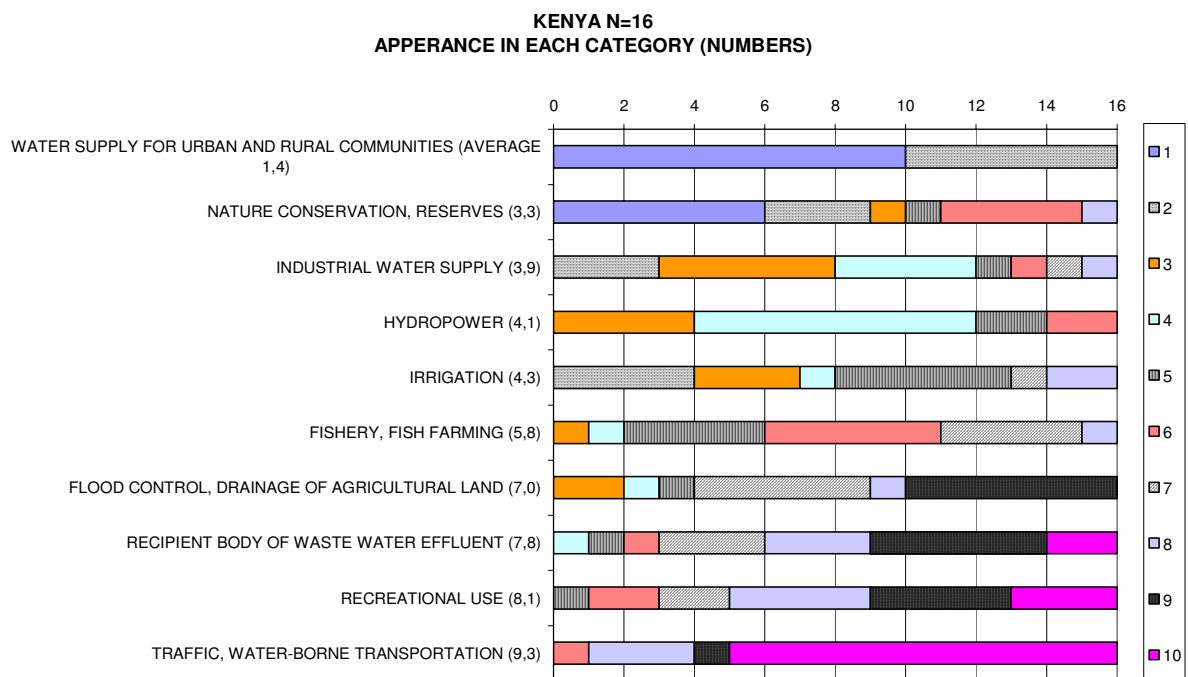


Fig. 3. Water use priorities of each category in Kenya “as they should be”.

LITHUANIA N=14  
 APPERANCE IN EACH CATEGORY (NUMBERS)

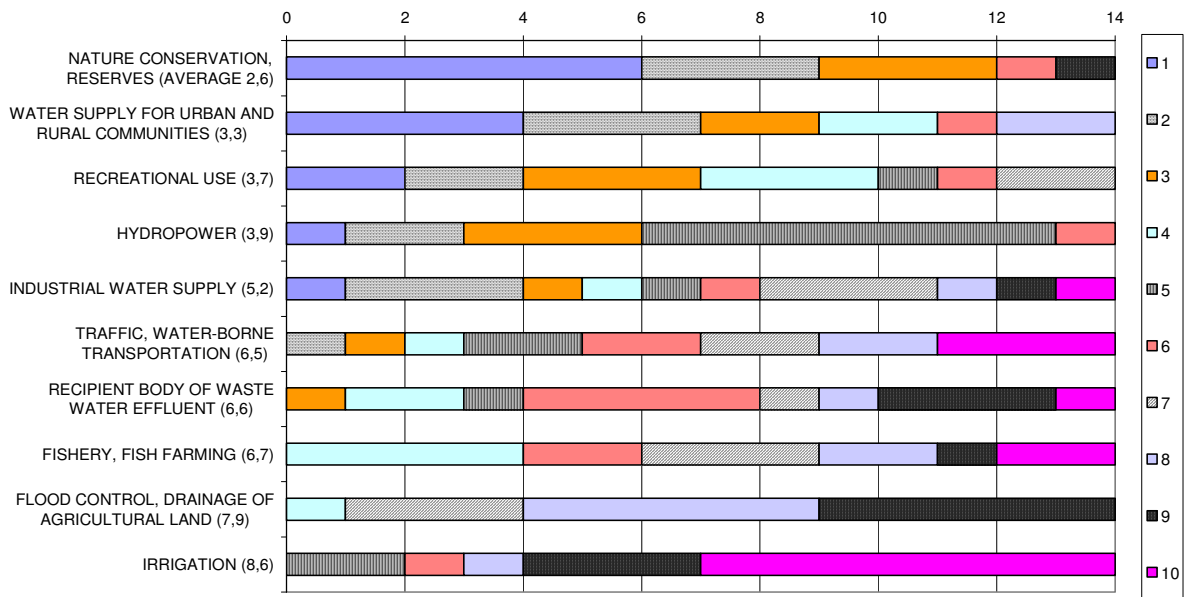


Fig. 4. Water use priorities of each category in Lithuania “as they should be”.

VIETNAM (N=21-23)  
 APPERANCE IN EACH CATEGORY (NUMBERS)

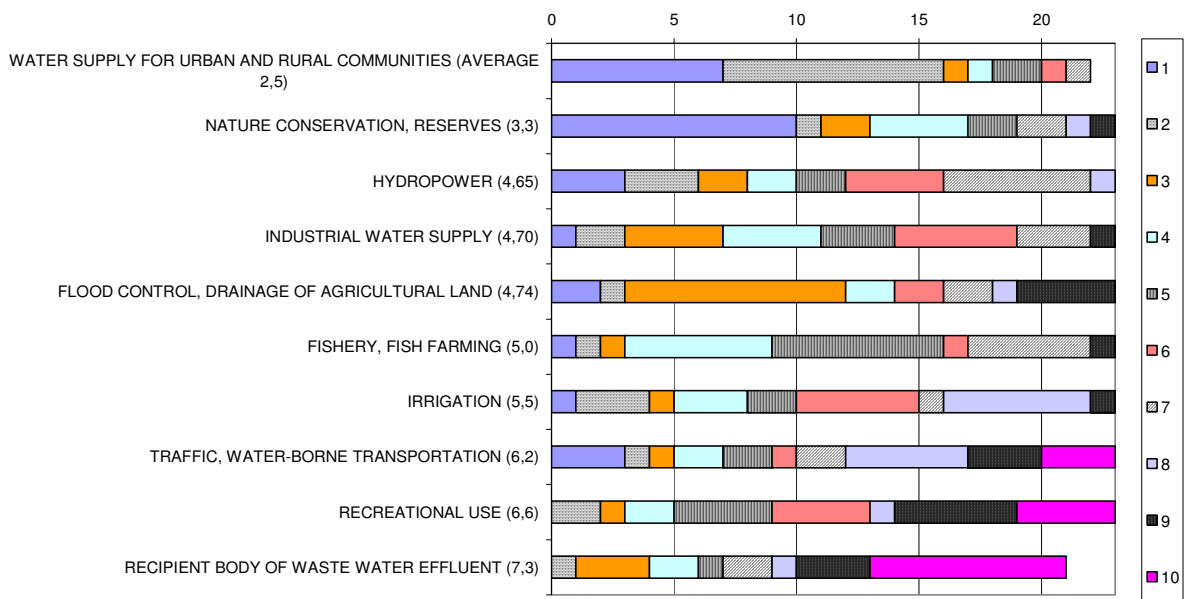


Fig. 5. Water use priorities of each category in Vietnam “as they should be”.

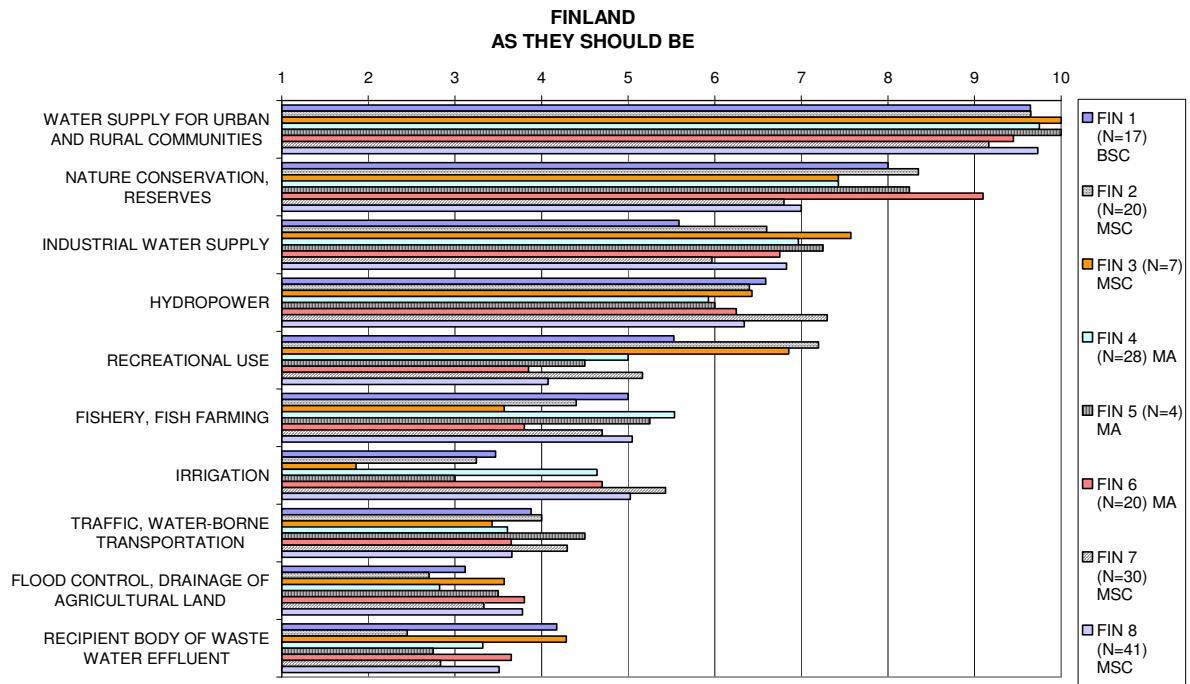


Fig. 6. Water use priorities of each category in Finland by eight sub-groups “as they should be”.



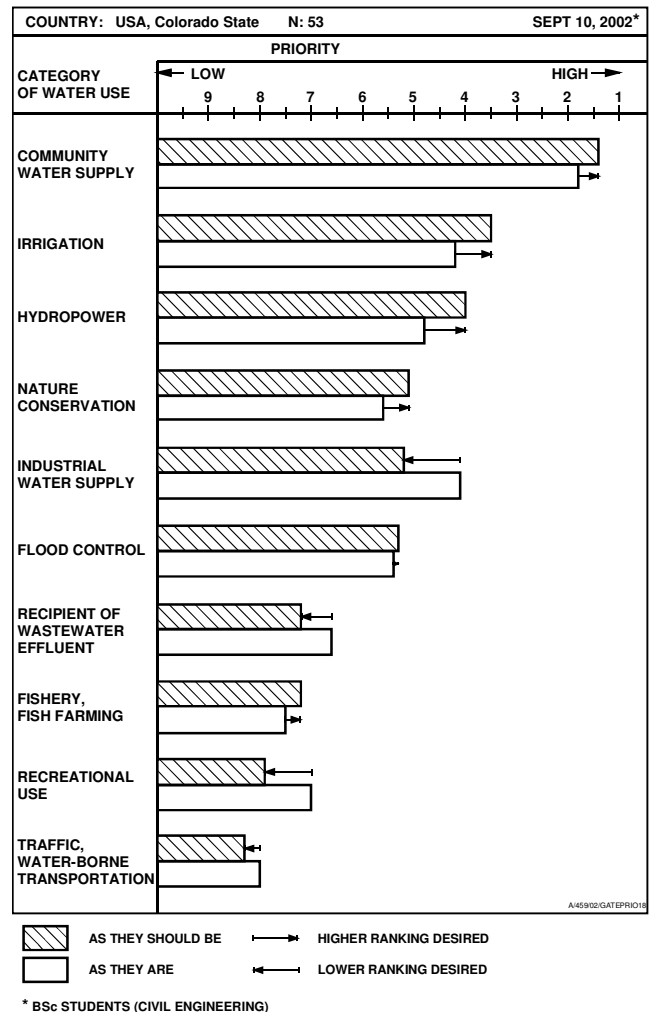
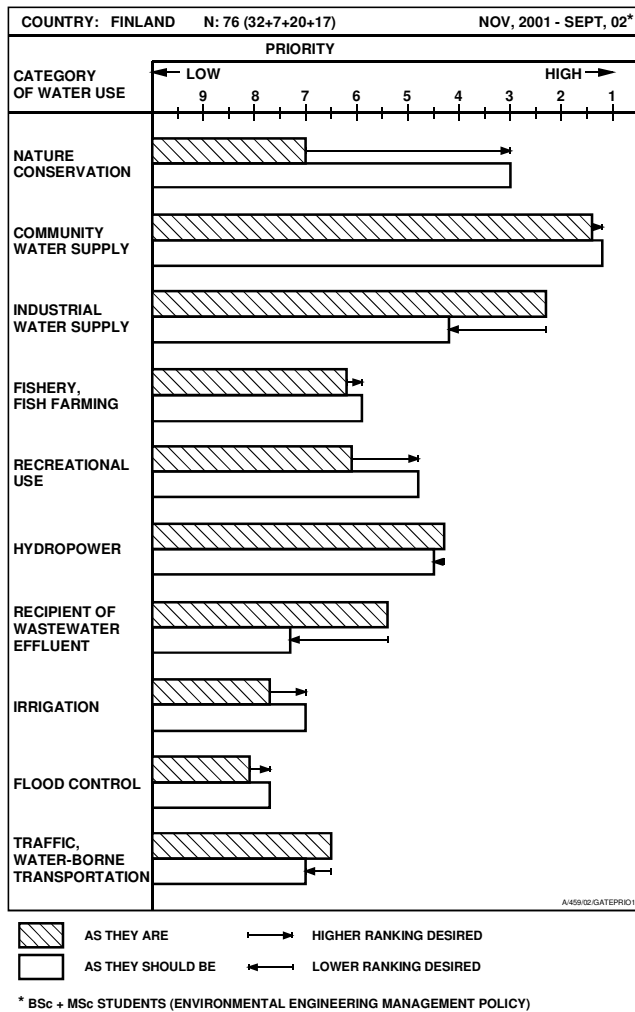


Fig. 7. Water use priorities in Finland “as they are” and “should be”.

Fig. 8. Water use priorities in Colorado, USA “as they are” and “should be”.

Perhaps we should analyse what lessons could be learnt from the multipurpose water resources plans implemented in many western countries in the 1970s and '80s. Such a study would also indirectly show that, at least in urban areas, integrated management could be started by combining water supply and sewerage services. It is widely practised in the Nordic countries with remarkably good results according to several recent international comparisons of water and environmental quality.

It is true that the basic requirement for domestic water is very small compared to, for instance, the amount of virtual water used for food production (Thatte 2002). According to WSSCC (2002), “there is a minimum quantity of safe water required for a person to drink, prepare food, ensure personal cleanliness and hygiene and use a sanitary latrine. However, any estimate of a minimum requirement may need to be qualified by other considerations, such as level of service, culture, and distance between a water source and the user. It also needs to be remembered that further health benefits accrue when communities move from public tap to house connections”. This would support the basic finding of the study: first priority to community water supply.

In developing policies for various regions and countries, water use purposes and their priorities should be fully taken into account. In any case, it should be left to the regions, countries and local communities to decide how best to proceed and prioritise their use of water resources.

## 5 CONCLUSIONS

The following conclusions can be drawn from the study based on rapid assessment:

- (i) Community water supply was considered the first priority of water use, while nature conservation came second. In the case of Colorado, irrigation was deemed the second most important use.
- (ii) Priorities of water use seemed to vary less than originally anticipated: in ten countries/states with clearly different water resources, availability and use, geography as well as socio-economic, cultural and religious conditions they seemed to be more similar .
- (iii) When promoting the tool of integrated water resources management, water use purposes and their priorities should be fully taken into account at the national, regional and local levels.

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