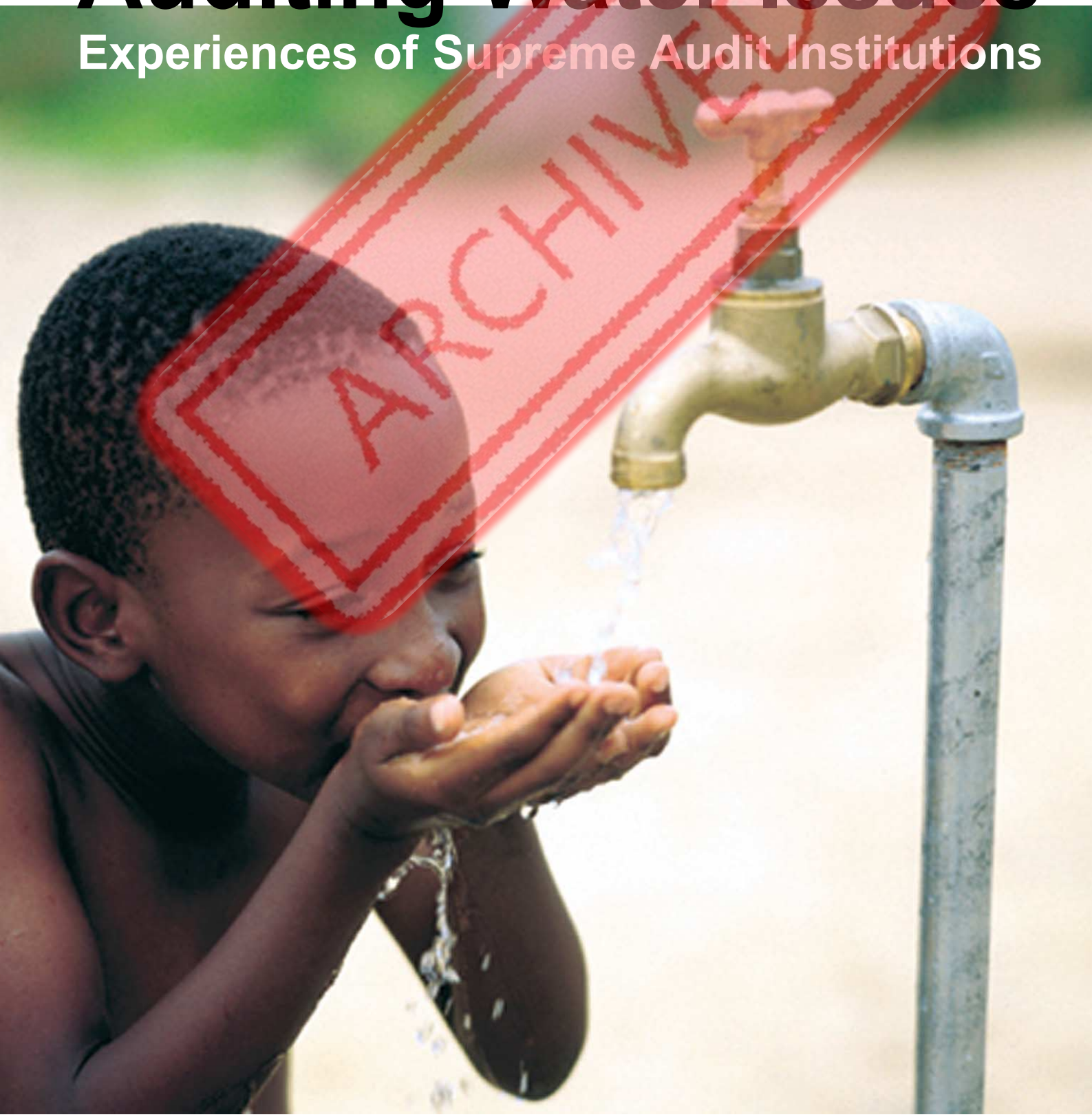
Auditing Water Issues

Experiences of Supreme Audit Institutions



INTOSAI
Working Group on
Environmental Auditing

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Contents

Foreword

Since 1996, freshwater has been one of the central themes of the Working Group on Environmental Auditing (WGEA) of the International Organization of Supreme Audit Institutions (INTOSAI).

In 2001, at the seventh meeting of the WGEA in Ottawa, Canada, the Supreme Audit Institution (SAI) of the Netherlands agreed to prepare a paper summarizing the experience gained by SAIs from around the world during audits of water-related issues. The paper's authors selected a large number of water-related audits from WGEA sources and retrieved many report texts and summaries from the Internet or directly from the other SAIs.

A proposal for the paper was discussed at the WGEA's Steering Committee meeting held in London, England, in 2002. The first draft was discussed at the second Steering Committee meeting held in Costa Rica in January 2003. The Steering Committee's comments were incorporated into the text, and in February 2003, the paper was sent to all INTOSAI members and to selected international organizations for further review. All their comments were incorporated into a second draft, which was given final review and approval at the WGEA's Assembly in Poland in June 2003.

Auditing Water Issues summarizes the collective experience of Supreme Audit Institutions (SAIs) around the world, drawing on the lessons learned from more than 350 audits, and provides practical tips for SAIs. This paper is also available on the WGEA's Web site (www.environmental-auditing.org).

We would like to thank Mrs. Saskia J. Stuiveling and Mr. Pieter Zevenbergen, respectively President and Member of the Board of the Netherlands Court of Audit, for having taken on this project, as well as the authors of the paper, Rob de Bakker, Sylvia van Leeuwen, and Floris Roijackers of the Environmental Auditing team of the Netherlands Court of Audit for their dedication. We also acknowledge the contributions made to this paper by the WGEA Members and many other supreme audit institutions worldwide.

We are sure that this paper will provide many auditors with a useful overview of international experience in the area of water management audits.

Sincerely,

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Chair of the INTOSAI WGEA

Johanne Gélinas
Associate Chair for the INTOSAI WGEA

Executive summary

Water was adopted in 1996 as central theme of the INTOSAI Working Group on Environmental Auditing. This theme was chosen because of the importance of fresh water for the health and well-being of all people and the resulting relevance to all Supreme Audit Institutions (SAIs). Moreover it can be seen as a public responsibility to safeguard the use of water resources in a sustainable way, leaving room for future generations to meet their needs. Access to safe drinking water is a crucial prerequisite for life of all people in the world. The contribution of SAIs to this public responsibility could be to audit the regularity of public expenditures and performance of government in this field.

Central theme water — still relevant
The relevance of water as a central theme of the Working Group has not diminished since it was adopted in 1996. There are ongoing concerns about the quantity and quality of water resources, like lack of access to fresh water and sanitation, water pollution from agricultural and industrial activities, flooding, desertification, and loss of biodiversity (chapter 2). By the mid-1990s, about one-third of the world's population lived in countries suffering from moderate-to-high water stress. By 2025 it is estimated that this will be the case for two-thirds of the world's population. The problems of water pollution and water shortage are global in nature and affect all countries, although they differ in terms of degree and scale.

Water: many options for auditing by SAIs
Several governmental and other public bodies, often in close co-operation with private organizations and international bodies, are involved in problem-solving activities concerning water issues. The instruments used to carry out the national water management strategy, to reach the national goals that were set, provide good starting points for audits by SAIs (chapter 3). This fits the traditional role of SAIs, namely assessing whether public money was spent according to the rules and if it was used economically, efficiently, and effectively. Choosing the right (most relevant) subject and focus for their audits is the main strategic challenge for SAIs, to have a maximum effect.

National or regional plans and programmes on water issues and budget spent to water measures provide good starting points for audits
Various public sector bodies, from national governments to municipalities and public enterprises, have responsibilities for water issues. On each government level, plans and programmes on water issues are likely to be found, which provide good starting points for audits. This is also the case for the budget spent on water programmes and measures. On

the national or regional level, both regularity and performance audits are done on water issues. Frequently occurring types of audit are:

- compliance with national environmental laws and regulations by government departments, municipalities, and/or other bodies;
- the implementation of environmental programs;
- the evaluation of impacts or effects of existing national environmental programs;
- environmental effects of non-environmental programs;
- government environmental management systems.

Depending on the mandate of the SAI, also the general environmental policy towards water management and the evaluation of impacts or effects of *proposed* national environmental programs can be a possible starting point.

Also international water agreements are a good starting point for audits

Around the world, a total of 261 river basins are shared by two or more countries. Together with the marine environment these transboundary water resources are shared responsibilies of most countries. Many international environmental agreements are in place, aimed at dealing with water issues that are shared by countries. One example is the prevention of pollution of rivers and lakes and also of the marine environment (see chapter 4). Despite the many agreements, problems often have not been solved. In this respect, some even speak of a *'crisis in governance'* in the sense that close international co-operation has often not come about.[1] Independent institutions like SAIs could fulfil their role, by auditing the national implementation of international arrangements relating to water issues.

Audit criteria can be derived from agreements that contain clear and stringent obligations. The international secretariats that support these agreements could be contacted when SAIs are preparing an audit, for example, to get insight in the availability of information and the international progress in dealing with the specific water issues.

The Working Group provides guidance

To support the audit of international environmental agreements, the Working Group developed manuals and guidance on the audit process, audit methods, and the selection of international environmental agreements. These are all applicable to the audit of water policy issues and are available on the Web site: www.environmental-auditing.org.

Many audits on water have already been carried out

In the past period many water audits were done by the members of the Working Group and non-member SAIs. Detailed information on audit reports can be found on the afore mentioned Web site. Although member SAIs have carried out more water audits than non-member SAIs, it is not clear whether this was because the WGEA adopted water as its central theme. The SAIs might have been active in this field even before the central theme was adopted. In the regions of EUROSAI and OLACEFS, SAIs developed several water-

[1] HRH the Prince of Orange of the Netherlands (2002). *No Water No Future: A Water Focus For Johannesburg.*

audit projects co-operatively. In some instances the freshwater theme shifted to include marine environment as well. Chapter 5 and 6 contain an overview of the work done by SAIs so far.

Experience with auditing water policy issues: source of inspiration for future auditing
The topics that were audited vary from region to region. Of course each country is confronted with issues specific to that area, and therefore SAI's focus will be on the policies set and the budgets spent to solve these issues. The most audited subjects were policies directed towards water quality, rivers and lakes, prevention and/ or recovery from flooding, treatment of waste water and sewage, drinking water, and sanitation.

Other major audit topics were the natural value and biodiversity of water ecosystems, the prevention of pollution of the marine environment, and the costs of water-related infrastructural works. The audits that have been carried out so far (chapter 6) could be of inspiration to SAIs that start with a similar audit.

Also a number of (international) audits were conducted that included international obligations. Experiences from domestic and international audits of water protection were subject to regional seminars and have been made available on the Internet (for links see Annex 2: Sources).

Other freshwater topics are not yet frequently audited by SAIs, but can be relevant to take into consideration as well, for example, water as a source of energy (hydro-electric stations, dam projects) and measures to fight drought like agricultural irrigation projects.

Additional communication strategies might increase effectivity of SAIs in the region
The aim of SAIs' audit work is to increase the quality of government policy and performance, and the transparency of its (financial) operations, by providing structured feedback to policy makers and executives. The Working Group on Environmental Auditing has tried to stimulate SAIs to work together in this mission, since environmental problems don't stop at national borders. A joint or co-ordinated audit is one of the instruments of SAIs to address common issues.

Another activity could be organizing joint seminars with other key players in the field of water policy evaluation, like UNEP and the World Bank. Both these international institutions have regional branches throughout the world. Some important international organizations are described in chapter 4. Following the regionalization strategy of the Working Group and the strategy of enhanced networking and information exchange, the lessons learned from SAIs' audits could be discussed at joint seminars in the INTOSAI regions, with participants from the evaluation community, policy makers, and regional water sector specialists.

Recommendation: The way forward
The INTOSAI Working Group concludes that working together on the central theme of water has been very fruitful. Audits help to raise the consciousness towards the relevance

of water problems and to improve the programmes of governments to solve these problems. To share experiences and audit methods improves the quality of the SAIs' work.

Because of the great relevance of water as a prerequisite for life, the Working Group will continue to work on this theme during the next period. In line with the regionalization strategy, the INTOSAI Working Group will continue the co-operation on this theme with the regional Working Groups on Environmental Auditing.

The INTOSAI Working Group on Environmental Auditing recommends that SAIs (continue to) give attention to water issues in their audit work. The Working Group also recommends SAIs to make use of the experiences on water audits of their sister organizations within INTOSAI.

The Working Group hopes that this paper will be helpful in this respect. The Working Group also hopes that SAIs will find inspiration to approach the audit of water issues from new angles, to further develop audit skills and methods, and to share these experiences in the near future. In doing so we will further enlarge our shared body of knowledge and contribute to a world that is able to provide fresh water to all people.

1 Introduction

"The world water crisis is a crisis of governance - not one of scarcity."
HRH the Prince of Orange of the Netherlands[2]

A general objective of Supreme Audit Institutions (SAIs) is the promotion of good governance. The regularity of public spendings and the effectiveness of government performance have the constant attention of SAIs. This also applies for environmental issues and the more specifically the subject of this paper: water issues. Within the International Organization of Supreme Audit Institutions (INTOSAI) a Working Group on Environmental Auditing was established, to stimulate SAIs to take up this task.

In 1996 the INTOSAI Working Group on Environmental Auditing adopted 'fresh water' as the central theme of its activities. The theme was selected because of its relevance to all people in all countries of the world. Therefore it is also of interest to all Supreme Audit Institutions (SAIs) auditing the regularity of public monies spent and the performance of government in this field. In some regions the theme shifted to include marine environment as well.

Water is of crucial importance for human health and has ecological ('planet'), social ('people') and economic ('profit') values on a societal level. Striking a balance between these dimensions is the main policy challenge for governments in the present era. This objective is better known as 'sustainable development'. It means, for example, use of freshwater resources for present purposes without endangering the ability of future generations to meet their needs. Withdrawals from water basins and other non-sustainable pattern of use can cause water scarcity later on, consequently affecting the health of people that are dependent on it. Moreover, water scarcity can become the limiting factor to economic growth in the future.

In the Working Group publication on *Sustainable Development* the merits of this concept and the importance of it to SAIs is thoroughly discussed.[3] Also the Working Group paper on *National Resource Accounting* is closely linked to the theme. Generally speaking, natural resource accounting can be seen as a means of demonstrating linkages between the environment and the economy.[4]

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[2] HRH the Prince of Orange of the Netherlands (2002). No Water No Future: A Water Focus For Johannesburg.

[3] INTOSAI Working Group on Environmental Auditing (2001b).

[4] INTOSAI Working Group on Environmental Auditing (1998b). Natural resource accounting: 'the compilation within an accounting framework of data relating to natural resources which are organized in terms of stocks and flows.'

The idea behind the selection of water as a central theme was, that if SAIs would collectively focus on this subject for a certain period, results of audits could be compared afterwards. A ‘body of knowledge’ would be generated that could facilitate a process of ‘learning from each other’. In the end this should lead to a more effective performance of Supreme Audit Institutions, aiming to stimulate national governments to improve water policies and programmes and implementation processes. Accordingly, SAIs can contribute to the solution of the world water problems.

The objective of this paper on water is to provide an overview of the substantive lessons of water audits that were carried out so far. What have we learned on a global scale from the audits done on the country level? Although the Working Group chose ‘waste’ as a new central theme at the meeting in Canada in 2001, ‘water’ was maintained on the agenda as well. Therefore, an additional aim of this paper is to stimulate further audit work in the field of environment and water.

This paper is meant to be of interest to the whole INTOSAI community. It might provide some stepping stones for SAIs intending to audit governments policies and programmes dealing with water issues. As the Environmental Working Group, we hope that SAIs will show interest in this major environmental theme and will initiate audits of policies and programmes dealing with the issues involved. This will further develop the body of knowledge in this field.

The structure of this paper is as follows. The next three chapters deal with water issues and public involvement, including a global overview of water issues (Chapter 2), government programmes and policies (Chapter 3), and a description of international dimensions of water policies, like multilateral agreements and international actors in this area (Chapter 4). Chapters 5 and 6 deal with the audit work that has been done by Supreme Audit Institutions.The central question of this part is: what can we learn from the experiences of SAIs with water audits? A quantitative overview of SAIs' audit activities is presented in chapter 5. In chapter 6, the nature and content of these audits is described on the basis of a number of audit examples.
The paper concludes with conclusions and recommendations (chapter 7) on the lessons learned and possible ways to proceed.

Water issues and public involvement

2 Global overview of water issues

2.1 Introduction

Water is found in many places and has a multitude of functions. It is an essential part of the global ecological system and a crucial resource for human existence.

Environmental problems related to water often seem complex in terms of causes and effects. In order for Supreme Audit Institutions (SAIs) to effectively deal with water policies, it might be useful to in some way organize analytically the world of water issues. This chapter gives an overview of the most stressing water issues on a global level.

The following two sections contain a global problem analysis. What are the major stocks of water? What are the main sources of contamination by human activity (§ 2.2)? And what are the vital functions of water and the environmental problems concerned (§ 2.3)?

All countries have in common that water quality and quantity problems are a major concern. Nevertheless, the specific situation of water issues can differ from region to region and from country to country. In paragraph 2.4 the most stressing water problems in the regions of the world are highlighted.

2.2 Geography of water

Table 2.1 shows that water stocks can be divided in two broad geographical categories: salt water and fresh water.

Table 2.1 Major stocks of water [5]

	Volume (1000 km$^{3)}$	% of total water	% of total fresh water
Salt water			
Oceans	1,338,000	96.54	-
Saline/brackish ground water	12,870	0.93	-
Salt water lakes	85	0.016	-
Fresh water			
Glaciers, permanent snow cover	24,064	1.740	68.70
Fresh groundwater	10,530	0.760	30.06
Ground ice, permafrost	300	0.022	0.86
Freshwater lakes	91	0.007	0.26
Soil moisture	16.5	0.001	0.05
Atmospheric water vapour	12.9	0.001	0.04
Marshes, wetlands*	11.5	0.001	0.03
Rivers	2.12	0.0002	0.006
Incorporated in biota*	1.12	0.0001	0.003
Total fresh water	**35,029**	**-**	**100**
Total water	**1,386,000**	**100**	**-**
Note: totals may not add up exactly due to rounding * Marshes, wetland and water incorporated in biota are often mixed salt and fresh water			

The total volume of water on Earth is about 1386 million km^3. Only 2.5 percent of the total volume of water is fresh water — about 35 million km^3. Less than 1 percent of all fresh water is directly accessible for human use.

Marine environment

The water volume in oceans is by far the largest. The major threats to oceans are marine pollution, over-exploitation of living marine resources and coastal habitat loss. Different sectors of human activity cause marine and coastal degradation. Globally, dumping and spills by ships and sewage are a large source of contamination of marine and coastal environment. Also agricultural nutrient run-off and atmospheric inputs, derived from vehicle and industrial emissions are major sources of contamination.

Besides the problems concerning the quality of water and ecology of oceans, flooding and land recession can be a threat to human coastal settlements and coastal ecology. Current predictions for sea level rise over the next hundred years indicate that risks might increase.[6]

[5] Gleick, Peter H. (2000) The World's Water 2000-2001. The Biennial Report on Freshwater Resources.

[6] UNEP (2002). State of the environment and policy retrospective: 1972-2002.

Fresh water
The principal water sources for direct human use are lakes, rivers, soil moisture, and the relatively shallow groundwater basins. As shown, this is a very small proportion of the total volume of water on earth (0.01 percent). Sources of pollution include untreated sewage, chemical discharges, petroleum leaks and spills, dumping of waste in old mines and pits, and agricultural chemicals and manure that are washed off or seep downward from farm fields.

Around the world, a total of 261 river basins are shared by two or more countries. More than half the world's major rivers are 'seriously depleted and polluted, degrading and poisoning the surrounding ecosystems, threatening health and livelihood of people who depend on them'.[7]

Groundwater reservoirs, also referred to aquifers, are also vulnerable for the threats of contamination and overuse. The main causes of groundwater pollution by humans are discharges from urban and industrial activities, and the increased use of chemicals from agriculture. Groundwater use exceeding the natural recharge (overuse) limits the available water resources and raises the costs of pumping.

Much of the water available to humans is located far from their settlements, making water quantity a daily concern for many. From a global point of view water is unevenly distributed, with great natural variations in availability at the local level. Drought and desertification are day-to-day realities for many people and have a devastating impact on people's livelihoods.

2.3 Functions of water

People require water domestically for drinking, food preparation, sanitation, and other purposes. Table 2.2 shows the recommended basic water requirement for human domestic needs.

Table 2.2 Recommended basis water requirement for human domestic needs [8]

Purpose	**Litres per person per day**
Drinking water	5
Sanitation services	20
Bathing	15
Food preparation *	10

* Excludes water required to grow food.

Lack of access to clean water for drinking, food preparation, and sanitation continues to be the greatest threat to human health. It results in hundreds of millions of cases of water-

[7] UNEP (2002). State of the environment and policy retrospective: 1972-2002.

[8] Gleick, Peter H. (2000) The World's Water 2000-2001. The Biennial Report on Freshwater Resources.

related diseases and more than 5 million deaths per year. In 2000 1.1 billion people did not have access to safe drinking water and 2.4 billion lacked access to improved sanitation.[9] Approximately one out of three people live in regions of moderate to high water stress and it is estimated that two thirds of people will live in water stressed conditions by 2025. [10]

Water use generally increases with economic development, particularly for industrial and municipal use. Industry requires water for cooling, washing and processing, with major uses including power generation, steel, chemicals, paper, and petroleum refining. In large cities, total municipal and industrial uses of water have grown by 24 times in the last century and the populations located in urban areas around the world are expected to grow to 5 billion people by 2025.[11] However, on a global basis, the largest volume of water is still used for agricultural purposes. It represents about 70 percent of total water withdrawn from freshwater sources. Most of this amount is used for irrigation, which places a steadily increasing pressure on underground reservoirs and their ability to replenish.[12]

Human demand for water resources continues to grow, but this pressure is also placing freshwater ecosystems and their local species under enormous strain. Indirectly this could also have negative consequences for human society. Freshwater ecosystems — lakes, rivers, wetlands and aquifers — play a variety of essential functions in nature, such as water supply, water purification, flood control, recycling and transport of nutrients, fish production, and conservation of biodiversity. But many freshwater ecosystems are being degraded through excessive water withdrawals, water pollution and the introduction of invasive species of plants and animals. Worldwide, about half of all wetlands have been lost and more than 20 percent of the world's 10,000 known freshwater species are extinct, threatened or endangered. The management of freshwater resources needs to take account of the water requirements of natural ecosystems in addition to the requirements of agriculture, industry and municipalities. This illustrates the dilemma of sustainable development.[13]

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[9] UNEP (2002). State of the environment and policy retrospective: 1972-2002.

[10] Comprehensive assessment of the Freshwater Resources of the World. Report of the Secretary-General of the United Nations. Low water stress: countries that use less than 10 percent of their available fresh water; Moderate water stress: use in the range of 10-20 percent; Medium-high water stress: water withdrawals in the range 20-40 percent; High water stress: use of more than 40 percent of available water.

[11] Gardiner, R. (2002). Towards Earth Summit 2002. Freshwater: A Global Crisis of Water Security and Basic Water Provision.

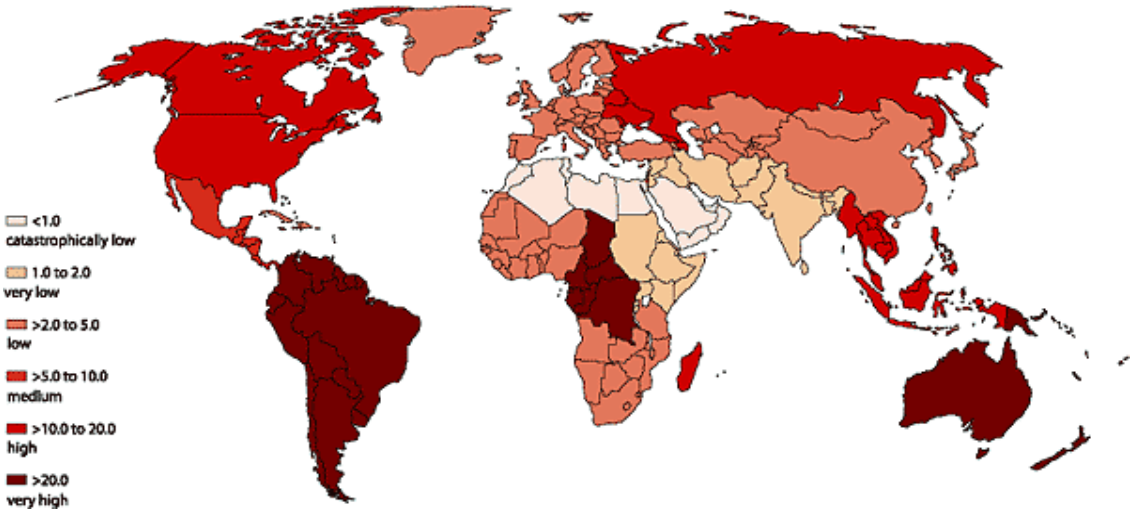
[12] Gardiner, R. (2002). Towards Earth Summit 2002. Freshwater: A Global Crisis of Water Security and Basic Water Provision.

[13] United Nations Department of Economic and Social Affairs (2002). Global Challenge, Global Opportunity. Trends in Sustainable Development.

2.4 Water issues in world regions

Although all countries in the world are experiencing problems with water quality and quantity, there are differences from region to region concerning which issues are the most stressing. For example, figure 2.1 illustrates the differences in water availability between subregions. In the following paragraphs the main problems are highlighted for each region.[14]

Figure 2.1. Water availability by sub-region in 2000
(1,000 m3 per capita/year.)



Source: compiled from UNDP, UNEP, World Bank and WRI 2000 and United Nations Population Division 2001 in GEO-3, UNEP, 2002.

Asia and Pacific region

Asia and the Pacific region have the lowest per-capita availability of fresh water. Lack of water services and sanitation is still a major concern. It is estimated that one out of three people lacks access to safe drinking water. This leads to critical health problems (each year 500,000 infants die from diarrhoeal diseases). Bacterial contamination from human waste is a major cause of water pollution.

Agriculture accounts for 90 percent of freshwater use in South Asia. Depletion of underground reservoirs has led to a drop in water availability. Water extraction exceeds natural recharge rates.

Pollution has considerably degraded the coastal and marine environment. The most significant sources of pollution include oil spills from ships, sewage and other domestic wastes, and industrial effluents.

[14] UNEP (2002). State of the environment and policy retrospective: 1972-2002.

Africa

In Africa water scarcity and desertification is a major stress. Water resources are unevenly distributed throughout the continent. At least 13 countries, particularly the sub-Sahara, suffer from water stress or scarcity.[15] Sanitation is underdeveloped. Poor water supply and sanitation lead to high rates of water-related diseases; 3 million people in Africa die annually from these.[16] Poor water quality also leads to reduced agricultural production. Of the total water use, 88 percent is for agriculture. The available groundwater resources are not well managed; water is extracted more rapidly than it is replenished.

Oil spills and the emptying of ballast on the high sea by ships are affecting the coastal and marine environment of Africa.

Europe and Central Asia

Water pollution is a serious issue. Many countries report groundwater pollution, mainly due to agriculture. Also seas, rivers, and lakes are polluted by run-off from agricultural land. In recent years flooding of rivers was a big problem in Europe. Agriculture accounts for 60 percent of water use in the Mediterranean and 90 percent in Central Asia. In Europe more than half of the cities are over-exploiting groundwater reserves. In many parts of Eastern Europe and Central Asia there is lack of access to drinking water.

Pollution of the coastal and marine environment from land based sources is serious in many areas. Many of the 200 nuclear power plants operating in Europe are located in coastal regions. But also offshore oil and gas and shipping operations, including accidental oil spills, affect the marine environment. In Central Asia environmental stress is caused by intense urbanization of coastal zones and dumping of untreated waste.

Latin America and Caribbean

Water availability varies greatly between countries and even within them. Water demand is rising, mainly due to agricultural use (irrigation) and industrial use. Irrigation technology and practice lack efficiency. Water use for domestic purposes is also on the increase, but great inequities exist. Many of the poor in rural and urban communities have neither access to clean water nor sanitation services. The water quality deteriorates from untreated sewage, excessive use of fertilizers and pesticides, and industrial pollution. Release of heavy metals, nutrients, chemicals, and hazardous wastes from mining, industry, and agriculture lead to groundwater contamination and depletion. Only 13 percent of sewage in the region receives any kind of treatment. This provokes considerable health and environmental risks.

The key environmental problems facing the coastal and marine areas are related to habitat conversion and destruction, and pollution caused by the discharge of municipal and industrial solid waste and waste water, run-off from agricultural fields, and maritime

[15] See footnote 9

[16] UNEP (2002). State of the environment and policy retrospective: 1972-2002.

transport (especially of hazardous substances), as well as oil and gas extraction, refining and transport.

North America
Groundwater is an important source of usable fresh water in the region, so groundwater contamination and declining aquifer levels are priority issues. Due to population growth, expansion of irrigation and industry, the demand on water resources has increased. The many hazardous compounds used in industry and agriculture are threatening groundwater quality. Agrochemical run-off and non-point sources of water pollutants have contaminated many ground and surface waters. Also underground storage tanks containing, for example, petroleum products, acids, chemicals, and industrial solvents are leading sources of groundwater pollution in the region.

Marine and coastal ecosystems are affected by nutrient inputs caused by large increases in population density, fossil fuel use, sewage inputs, livestock production, and fertilizer use.

2.5 Conclusions

The situation in the world concerning the quality and availability of water is worrying and in some instances even alarming. The availability of safe drinking water is a crucial prerequisite for life of all people in the world.

Although issues differ between regions, all regions and all countries have specific problems to address relating to freshwater resources and marine environment. The main issues are lack of access to fresh water and improved sanitation, water pollution from agricultural and industrial activities, desertification, and loss of biodiversity. In the next chapter the role and responsibility of government and other public bodies concerning these issues is discussed, since the regularity of their expenditures and their performance is the subject of SAIs' audit work.

Some facts on fresh water

- Only 2.5 percent of the total volume of water on Earth is fresh water. The usable portion is less than 1 percent of all fresh water and only 0.01 percent of all water on Earth.
- About one third of the world's population lives in countries suffering from moderate-to-high water stress
- About 80 countries, which constitute 40 percent of the world's population, suffered from serious water shortages by the mid-1990s.
- By 2025, two thirds of the world's population may be living in countries that face serious water shortages
- Although progress is being made, still 1.1 billion people still lack access to safe drinking water and 2.4 billion lack access to improved sanitation.
- Agriculture accounts for more than 70 percent of freshwater withdrawals. Most is used for irrigation which provides about 40 percent of the world food production.
- Water quality problems can often be as severe as those of water availability but less attention has been paid to them, particularly in developing regions.
- Fewer than 35 percent of cities in the developing world treat their waste water.
- Many countries lack adequate legislation and policies for efficient and equitable allocation and use of water resources.
- Water is widely shared among nations, regions, ethnic groups, and communities. A total of 261 rivers are shared by two or more countries, which makes the management of transboundary water resources one of the most important water issues today.

Source: Global Environmental Outlook 3, UNEP, 2002

3 Public involvement in water issues

3.1 Introduction

“The world water crisis is a crisis of governance” — in other words: on a global level there is enough fresh water to provide 'water security' for all, but only if it is managed well (global governance). This was recognized at the World Summit on Sustainable Development in Johannesburg, South Africa, 2002, where the objective ‘water security for all’ was a priority subject.

Because of the importance of water for the process of economic development, for public health, and for the quality of the ecosystems, a government has the responsibility to see that basic services are provided and a balance of competing interests is maintained. Only a central government is in the position to have an overview of all claims on the available water stocks and has the crucial role to serve the public interest. For example, ensuring that the public receives an adequate supply of clean water for domestic use can be seen as a public responsibility, even when the actual water services are privatized.

Since all governments need to deal with the issues at hand, all SAIs have an interest as well. SAIs can contribute to the quality of water policy by providing recommendations for improvement to the bodies they audit, thus dealing with the 'crisis in governance' that was signalled at the Johannesburg Summit. In section 3.2 the main players of the public water management are identified. These bodies could be audited by SAIs. In section 3.3 the water policy instruments will be briefly described. Policy instruments can be starting points for audits by Supreme Audit Institutions.

Of course the subject of public policy on water cannot be treated exhaustively. This general description needs to be reviewed in detail at the national level when a SAI decides to initiate an audit on the state's water policy or specific water policy laws and regulations.

3.2 Key players in public water management

Within countries many different players can have a key role in managing water for economic, agricultural and domestic uses. The basic processes of managing water for human use are collection, storage, treatment, and distribution of water. Moreover, natural processes like precipitation, run-off, and water flowing through watersheds also need to be managed. As well, barrier protection from the sea in many areas of the world is crucial for human settlements along coast lines and on land below sea level.

The central government of a country can be held responsible for ensuring that water supply and sanitation services are safeguarded and that a state-wide system of water management is in place. Lower levels of government (states, provinces, counties, municipalities) may have the role of carrying out the policy, and managing it at the executive level. Of course parts of the water policy can be decentralised as well, when different areas within a country need different approaches in water management.

Many other organizations can play a role in implementing the policy and management structure, like water boards, committees for water services, water authorities, intermediary parties, and so on. Also organizations outside the public sector can play a key role in water-related services. For example, providing clean water to the public is in some countries an activity performed by private companies.
For keeping an eye on policy implementation and compliance with standards that were set by policy makers, different players can be active like enforcements agencies, inspectorates, specialised monitoring, and research institutes.

All these key players can have a role in water management and therefore could make up the bodies to be audited by SAIs. Consequently these could be the target groups of SAIs' recommendations for improvement. A limitation to the role of SAIs is that not all SAIs will be able to audit bodies outside the central-government sphere. This depends on the provisions in an individual SAI's mandate.

3.3 Water policy instruments

The key players in public water management have several policy instruments at their disposal.

General water policy
First, at the central-government level, a general water management policy could be formulated, including the overall objectives, goals, and strategies. The water policy sketches the broad courses of action. Legislative and institutional approaches are part of it. Also principles like "the polluter pays" could be aspects that give direction to water policy. A water policy provides clear signals to the public and to the partners that are expected to implement the proposed policy.

SAIs could examine the general water policy and its components, including for example goal formulation, policy instrumentation, the division of tasks, management agreements between government and executive bodies or lower administrative levels, and compliance with international agreements.

Water pricing

Because water is important for human life and health and the process of economic development, it is provided at subsidized prices, or for free in many countries. Providing water for free or at subsidized prices makes water available to even the poorest segments of society. But it can also encourage wasteful use of water and the perverse result that many of the poor do not have access to clean water at reasonable prices because those who do have access use more water than they need. Sometimes prices are differentiated for user groups. For example users of great volumes, like the agricultural sector, have access to water at relatively low cost. The idea behind pricing water realistically is that it would make users conscious of the real value of the resource and delivery systems. SAIs could audit the effects of the water pricing or subsidy policy. Also side effects of pricing or subsidizing are interesting aspects to include in SAIs' audits.

Water legislation

Water legislation is a basic instrument that governments can use to set standards for water management and the quality and use of water. Issues that could be covered in legislation are, for example: proprietary rights, water supply and water use, pollution control, irrigation, recreation, fisheries, and shipping. Also the roles of the executive bodies could be defined and the division of tasks and responsibilities could be established. An important part of water legislation concerns the regulation of water supply companies. SAIs could compare the existing situation with the intentional situation as described in the legislation.

Permits

The issuing of water permits, for example, for the use of ground and surface water, and for the discharge of pollutants by farmers or industries, could be a tool of the central government or local governments. Of course, the issuing of water permits should be in line with the general water management policy that was set out at the central level. Fees can be part of the permit system. Monitoring of the compliance of permit holders with the rules and standards is included as part of the system. Non-compliance could have implications for the holder of the permit, for example, in the sense that fines can be imposed or that the permit holder's activities cannot be continued without improvement of behaviour. But also the functioning of the system in general should be monitored to see if it is adequate enough to meet the objectives that were set at the national level. SAIs could look, for example, at the availability of information at the central level in order to assess goal attainment.

Inspection and enforcement

Rules, regulations, and standards that are set need enforcement. For example infractions of the rules against the pollution of rivers and lakes caused by illegal dumping should be prosecuted. The central or local government could have specialized bodies like inspectorates, that monitor compliance with the legislation and pursue law enforcement. SAIs could assess the fulfilment of these duties, and the effectiveness and efficiency of these organizations' work.

Fees and fines

Fines can be an instrument to enforce the compliance to permits and legislation. Fines can be very effective, for example, in cases where breaking governmental laws or regulations gives financial advantages to the polluter. An example of such risk is the disposal of waste in water instead of paying the cost for environmentally safe disposal of waste. Fees can also be used to charge polluters with the costs of water purification and/ or the costs of the government to maintain a permit system. As an instrument for the prevention of water pollution, some countries — for example, Poland — use fees for dumping waste into the water or on the ground. The size of fees and fines depends on the type of substances found in waste, their condition, and their quantity. SAIs may audit the process of collecting fees and fines as well as keeping and spending funds raised.

Investments in infrastructure

Collection, storage, treatment, and distribution of water, and dealing with natural water processes like flooding and drought often need infrastructural solutions. Government could subsidize infrastructural projects of public interest or could even finance these completely. Dam construction is an example of infrastructural solution relating to water supply for cities and farms, electricity production, and for the benefits like flood control and navigation. There is also basic infrastructure like sewer systems, water treatment plants, sanitation systems, and flood control constructions. SAIs could audit the regularity of the public money spent and the effectiveness of these type of measures.

Scientific research

Governments can stimulate scientific research and technological development, by subsidizing programmes, scientific institutes, or initiatives from the private sector. Effective management of water resources is dependent on a scientifically sound knowledge base concerning water problems, its causes, and resultant effects. A research advisory commission might be established to advise on program needs and priorities. Also international co-operation could be part of the strategy to establish data and information collection systems. SAIs could assess whether the scientific information that is available and relevant for policy makers is used adequately.

Providing information to the public

Increasing public awareness of issues like the pressure on the national water resources, prevention of pollution, health aspects, or sustainable water use, could be part of the governments' strategy to address water problems. Stimulating behaviour in accordance with sustainable water management could be the objective. Public access to information on the extent and health of water resources could be part of it, for example a 'State of the Environment' reporting system. In their audits SAIs could assess the sufficiency and reliability of public information and the effectiveness of programs aiming to raise public awareness of water problems. SAIs could also stimulate sustainable behaviour.

Monitoring and evaluation
Monitoring and evaluation are important instruments for governments to ensure a proper execution of their policies and the implementation of programmes. Monitoring systems can include various types and levels of information, for example, on the state of the environment, progress in the implementation process of a plan, the implementation of policy measures, compliance to environmental laws and regulation, and policy results and effects. To be accountable and transparent, governments can include performance indicators and evaluation arrrangements in their plans and programmes.
In their audits SAIs could assess whether monitoring information and evaluations are sufficiently available and reliable. They also can assess if the information is used adequately by policy makers to improve the programmes, if this is needed.

3.4 Conclusions

Problems relating to water quality and quantity are high on the agenda worldwide. Probably all governments have formulated some kind of water policy to address the specific national water issues. Many public bodies are players in this field. The water management instruments used by those players provide good starting points for auditing by SAIs. The traditional approach of SAIs can help to improve the quality of water management: public money should be spent according to the rules and should be used efficiently and effectively.

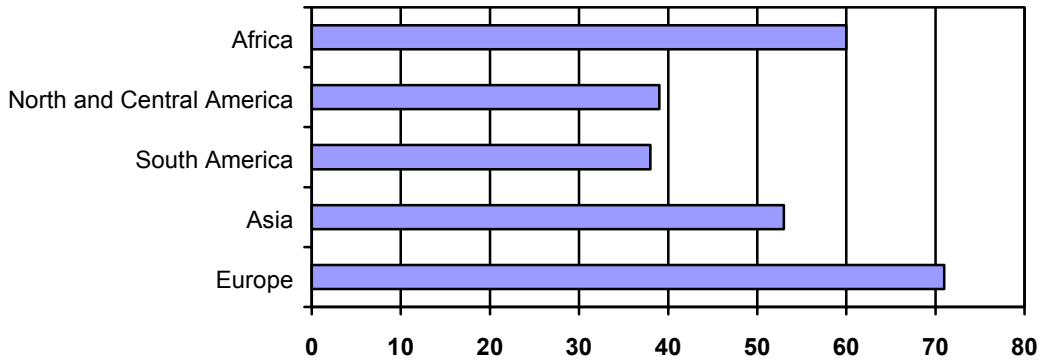
Water issues often have cross-border causes or impacts. Effective solution of these international problems requires the concerted efforts of the countries involved. For this purpose international agreements can be concluded. In the next chapter international agreements relating to water management will be addressed.

4 International agreements and organizations dealing with water

4.1 Introduction

With regard to water issues, many international agreements are in place. These agreements contain obligations the member states should comply with, and as such, the agreements can be used by SAIs to derive audit criteria. To give an idea of the relevance of international agreements, a selection of the most important global agreements on water issues is included in this paper. In addition to these agreements a number of international organizations and programs that can be relevant to SAIs are listed. The relevance of international co-operation on water issues is illustrated by figure 4.1, which shows that a total of 261 river basins are shared by two or more countries.

Figure 4.1: Number of international river basins



Source: Wolf and others, 1999 in Geo 3, UNEP, 2002.

4.2 Environmental agreements

In this section the most important global environmental agreements on water issues will be discussed. In addition to these agreements, a large number of regional and global agreements exist. When preparing an audit, it is advisable to make a more extensive inventory of international obligations for the particular subject and country. Information on these agreements can be found on the Internet at http://sedac.ciesin.org/entri/index.html. This site of the Consortium for International Earth Science Information Network (CIESIN) provides a Register of Environmental Treaties (ENTRI), with information on a large number of agreements: the full text of the agreements, the parties that ratified the agreements, and the dates they entered into force. ENTRI contains a lanrge number of agreements related to water issues (table 4.1).

Table 4.1 Number of international agreements related to water

Subject	Number of agreements
Water resources and conservation management	20
Desertification	6
Seawater quality and pollution	91
Marine resources conservation and management	32
Fishing management and the use of harvestable fish	54

On the subjects of drinking water, groundwater and aquifers, and the agricultural use of water (irrigation), no global international agreements have been concluded. Pollution of water is an important aspect in nearly all agreements mentioned below. However, we did not locate general international agreements on water pollution.

International agreements are a good starting point for co-operation between SAIs. Such co-operation provides excellent possibilities to learn from each other and to further develop the capacity of the institution, not only on audit methods and techniques, but also on the way the agreement is implemented in neighbouring countries. This can lead to a better understanding of the audit subject.

To support the audit of international environmental agreements, the Working Group developed some manuals and guidance on the audit process, audit methods, and the selection of international environmental agreements:

- INTOSAI Guidance "How SAIs may co-operate on the audit of international environmental accords" (1998);
- Working Group Paper "the audit of international environmental accords" (2001);
- INTOSAI "Guidance on Conducting Audits of Activities with an Environmental Perspective" (2001).

These documents and other relevant information are available on the Web site of the INTOSAI Working Group on Environmental Auditing: www.environmental-auditing.org.[17]

Marine environment

The most important global agreements on marine pollution are:

- The *International Convention for the Prevention of Pollution from Ships* (MARPOL 1973/ 1978) and annexes. The objective of this convention is to prevent pollution from ships. The annexes refer to various sources of pollution;
- The *International Convention on Oil Pollution Preparedness, Response and Co-operation* (OPRC, 1990), which is directed to co-operation in cases of pollution.

On the topic of sea fishery a large number of international agreements also exist. An example is the *Convention on Fishing and Conservation of the Living Resources of the High Seas* (1958). The objective of this convention is to solve the problems involved in the

[17] The INTOSAI documents are available in English, German, French, Spanish, and Arabic. The Working Group Paper is available in English and Spanish.

conservation of the living resources of the high seas through international co-operation, considering that through the development of modern techniques some of these resources are in danger of being over-exploited.

In addition to these global agreements there are additional agreements for nearly every sea, ocean, or marine region. They can deal with pollution prevention, protection of marine biodiversity and resources, co-operation in case of emergencies and pollution, and fishery. Examples are the *Convention on the Prevention of Marine Pollution from Land-based Sources* (OSPAR, 1974) in the Atlantic region and the *Convention for Co-operation in the Protection and Development of the Marine and Coastal Environment of the West and Central African Region* (1981).

Rivers and lakes
The *Convention on the Protection and Use of Transboundary Watercourses and International Lakes* (1992) is a global convention. It intends to strengthen national measures for the protection and ecologically sound management of transboundary surface waters and ground waters. The Convention parties are obliged to prevent, control, and reduce water pollution from point and non-point sources. Under the convention, the *Protocol on Water and Health* was adopted in 1999.

Also a number of international agreements with a regional scope exist on the environmental problems and water management. They are related to specific geographic entities like rivers, lakes, and water basins. Examples are agreements on the Danube River, Rhine River, Mekong River, Senegal River, Rio Pilcomayo, the Zambezi River system, Lake Constance and Lake Victoria. Often these regional agreements are a good starting point for audits by SAIs.

Drinking water and sanitation
In September 2002 during the World Summit in Johannesburg, South Africa, an agreement has been reached between African ministers, aiming to reduce by half the proportion of people on the continent without access to water and sanitation by 2015.

Natural value and biodiversity of water ecosystems
An important global convention is the *Convention Concerning the Protection of the World Cultural and Natural Heritage* (1972). This convention recognizes the duty of each state party to ensure the identification, protection, conservation, presentation, and transmission to future generations of the cultural and natural heritage on its territory. To protect the cultural and natural heritage of outstanding universal value, the intergovernmental World Heritage Committee is established within the United Nations Educational, Scientific and Cultural Organization (UNESCO).

The *Ramsar Convention on Wetlands of International Importance especially as Waterfowl Habitat* (1971) includes obligations on member states to protect and preserve wetlands, recognizing the fundamental ecological functions of wetlands, and their economic, cultural,

scientific, and recreational value. Obligations to member states include, for example to designate at least one wetland on the List of Wetlands of International Importance, to consider their international responsibilities for conservation, management and wise use of migratory stocks of wildfowl and to establish wetland nature reserves.

The *United Nations Convention on Biological Diversity* (UNCBD, 1992) is a global convention with three main goals: the conservation of biodiversity, the sustainable use of the components, and the sharing of benefits arising from the commercial and other utilization of genetic resources in a fair and equitable way. The programme of work on biological diversity of inland water ecosystems aims to facilitate the implementation of the objectives of the Convention at the catchment, watershed and river basin levels using the ecosystem approach at the national, regional and global levels, including through assessment and monitoring activities and the strengthening of enabling environment.

Extreme events: Drought and flooding
An important global agreement on desertification and drought is the *International Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa*, agreed on in September 1994. The objective of this Convention, which is signed by 113 countries, is to combat desertification and mitigate the effects of drought in countries experiencing serious drought and/or desertification through effective action at all levels, supported by international co-operation and partnership arrangements. The agreement includes obligations of affected country parties as well as obligations of developed country parties.
Despite all efforts, the struggle against desertification and drought was not successful enough. Therefore, in March 2002, 179 governments agreed on *Annex 5* to the Convention to Combat Desertification. This Convention aims to promote effective action through innovative local programmes and supportive international partnerships. Countries affected by desertification have to implement the Convention by developing and carrying out national, regional, and sub-regional action programmes. Criteria for preparing these programmes are detailed in five "regional implementation annexes" of the agreement: Africa, Asia, Latin America and the Caribbean, the Northern Mediterranean, and Central and Eastern Europe.

Indirectly the *United Nations Framework Convention on Climate Change* (UNFCCC) and the *Kyoto Protocol* can be seen as relevant to this subject: climate change might influence the distribution of water over the world, causing droughts and floods. The Convention on climate change sets an "ultimate objective" of stabilising greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic (human-induced) interference with the climate system.

4.3 International organizations and programmes

Most of the international agreements have a secretariat or a co-ordinating bureau. Most secretariats gather and publish all kind of useful information, for example, about the way

the agreement should be interpreted, the implementation of the agreement, and the performance of member states. The secretariats are also involved in monitoring and evaluation and the organization of the "Conference of Parties". Most secretariats provide guidance on the implementation of the agreement and some can even advise and actively assist member states on request. For SAIs these secretariats can be a very useful source of information when preparing and executing an audit.

Within the framework of the *United Nations* (UN), there is the *World Water Assessment Programme (WWAP*). This system-wide effort of 23 UN agencies and commissions concerned with fresh water, is committed to monitoring progress against water-related targets in such fields as health, food, ecosystems, cities, industry, energy, risk management, economic evaluation, resource sharing, and governance. WWAP has been charged with responsibility to report back to the international community at regular intervals on the state of the resource. The first World Water Development Report, *Water for People – Water for Life,* was released in March 2003, and includes contributions from each agency, in addition to country tables and seven pilot case studies of actual watersheds representing different socio-economic and environmental settings. Information about each partner agency, the assessment programme, and the case studies is available on the WWAP Web site: www.unesco.org/water/wwap.

All of these organizations have activities and programmes related to water and environment. Often these programmes include support to national governments in developing their environmental policy by providing information and practical guidance to national and/or regional authorities. This might be relevant especially to developing countries. These organizations are also active in monitoring and evaluation. The information of international organizations may be useful to SAIs as well, and in their audits SAIs may find out if their governments make good use of the possibilities these international organizations and programmes offer.

Some examples of activities and programmes developed by the *United Nations Environment Programm*e (UNEP) are:

- The *Dams and Development Project* of UNEP, aimed at promoting a dialogue on improving decision-making, planning and management of dams and their alternatives, based on the World Commission on Dams core values and strategic priorities;
- The *Global Programme of Action for the protection of the marine environment from land-based activities* of UNEP, aimed at preventing the degradation of the marine environment from land-based activities;
- The *Mediterranean Action Plan* of UNEP strives to protect the environment and to foster development in the Mediterranean Sea. The plan covers coastal zone management, pollution assessment and control, protection of ecosystems, and preservation of biodiversity;
- A total of 69 countries all over the world participate in the *"Global environmental monitoring system freshwater quality programme"* of UNEP. It is a multi-faceted water science programme oriented towards understanding freshwater quality issues

throughout the world. Major activities include monitoring, assessment, and capacity building. The programme provides an *"Annotated digital atlas of global water quality"*, which provides data on the water quality for 84 major river basins.

Some examples of activities and programmes developed by the *United Nations Development Programme* (UNDP) are:

- The UNDP and the *International Maritime Organization* (IMO) implemented the *Partnership for environmental management for the seas of East Asia* (PEMSEA). Integrated coastal management is one of the main components of the programme;
- The *Sustainable Water Management Programme* of UNDP deals with the development of global and regional strategies in sustainable water management. The Millennium Development Goals of UNDP, namely poverty reduction and reduced child mortality, also include two specific water-related goals. First, to reduce by half the proportion of people who are unable to reach or to afford safe drinking water by the year 2015; and second, to stop the unsustainable exploitation of water resources by developing water management strategies at the regional, national, and local levels which promote both equitable access and adequate supplies.
- The UNDP established the *Drylands Development Centre* to support countries affected by desertification and drought in the implementation of the *Convention to Combat Desertification*. The Centre provides assistance to countries in the form of policy advice, technical support, institutional capacity development, etc.

The *Food and Agricultural Organization* (FAO) of the UN hosts the *International Programme for Technology and Research in Irrigation and Drainage* (IPTRID). This internationally funded programme aims at promoting technology and research in irrigation and drainage in and by developing countries. Its objectives are to improve technology and management in order to increase the production of food and agricultural commodities, enhance food security and assist in eliminating poverty, while giving due regard to the needs of the environment.

More information about international projects and organizations as well as on international agreements can be found on the Internet at the UNESCO Water Portal: www.unesco.org/water/. Via this site, Web sites of (secretariats of) agreements and regional offices of international organizations of the UN can easily be traced.
General contact information for international organisations is included at the end of Annex 2.

4.4 Conclusions

With regard to water issues, many international agreements are in place. These global and regional agreements contain obligations the member state should comply with, and as such, the agreements can be used by the SAI to derive audit criteria. Therefore these international agreements can be a good starting point for audits by SAIs.

To support the audit of international environmental agreements, the Working Group developed some manuals and guidance on the audit process, audit methods, and the selection of international environmental agreements. These are all applicable to the audit of water policy issues and are available on the Web site: www.environmental-auditing.org.

International agreements deal with water problems that are common across borders, for example, related to the marine environment, rivers and lakes, the natural value and biodiversity of water ecosystems, and drought and desertification. It is advised to contact the secretariats of these agreements when preparing an audit related to an international agreement.

Also international organizations within the United Nations Framework, like UNEP, UNDP, UNESCO, and FAO develop international water programmes, including monitoring programmes and evaluations. The secretariats of international agreements and the international organizations of the UN can provide useful information to both governments and SAIs. A good entrance to search information on Internet is the World Water Portal.

SAIs’ practices in auditing water programmes and policies

5 Overview of water audits by SAIs

5.1 Introduction

In the preceding parts of this paper, global water issues have been outlined and the role of governments and the function of international agreements on these issues have been discussed. This third part of the paper is focussed on the audit work that has been done by SAIs in this field in recent years.

The INTOSAI Working Group on Environmental Auditing has gathered information on environmental audits that were carried out by SAIs all over the world, by means of three surveys[18]. This resulted in a database of environmental audits conducted in the period 1993 to 2000. In this chapter the state of the art on the auditing of water issues will be presented on the basis of analysis of this database. A more qualitative thematic overview will be presented in chapter 6.

With regard to the database two remarks must be made. First, the database doesn't offer a full view of the audits that have been conducted; it only contains information on audits from the SAIs that participated in at least one of the Working Group surveys[19]. Second, audits can be aimed at more than one subject. For example, an audit on policy information of the ministry of environment can comprise several environmental topics. This chapter is dedicated to all audits with a water component, varying from audits uniquely focussed on water issues to general environmental audits.

5.2 Facts and figures

Audits on water issues prove to be a quite common practice for SAIs. Analysis of the environmental auditing database pointed out that half of the SAIs have conducted, on average, six audits on water issues between 1993 and 2000. In this period a total of 378 audits containing at least one component about water were carried out by 66 of the 131 SAIs in the database.

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[18] Results of these surveys were published in 'Results of the third survey on environmental auditing' in the years 1993, 1998, and 2001.

[19] 131 out of the 180 SAIs that are member of INTOSAI responded to at least one survey; 110 responded to the third survey in 2000.

Table 5.1 shows that the audit topic of the large majority of the audits is fresh water. It is clear that the division in two categories — fresh water and salt water — which was preconstructed in the survey, is too broad for the purpose of this paper.

Table 5.1 Audit topics 1993-2000

Topic	**Audit reports**	**Percentage**
Fresh water	305	81
Salt water	34	9
Both	39	10
Total	**378**	**100**

Therefore a more detailed thematic categorization of the audits was constructed on the basis of the report titles, as presented in table 5.2. This table shows that rivers and lakes are the most audited water subject, followed by waste water and sewage, and drinking water. Most audits however deal with water subjects on a broader scope. Examples of this broader scope are audits on environmental protection in general, ministries of environment, and environmental agencies. Audits on 'other' topics are in most cases focussed on environmental aspects of infrastructural projects and economic activities.

Table 5.2 Thematic categorization of water audits*

Issues	**Audit reports**	**Percentage**
Marine pollution	18	5
Rivers and lakes	53	14
Groundwater	6	2
Drinking water	32	8
Agricultural use	4	1
Biodiversity	1	0
Degradation and pollution	25	7
Industrial pollution	10	3
Agricultural pollution	4	1
Waste water and sewage	42	11
Drought	0	0
Flooding	5	1
Broader scope	131	35
Other	73	19
Total	**378**	**100**

* A report may be listed in more than one category.

Performance auditing seems to be a more general practice than regularity auditing when it comes to auditing water issues. A combination of these two types seems to be most common (see table 5.3).[20]

Table 5.3 Type of water audits

Audit type	**Audit reports**	**Percentage**
Performance	141	37
Regularity	54	14
Both	183	48
Total	**378**	**100**

Table 5.4 shows that the most common types of performance audits of water are compliance with national environmental laws and regulations, and implementation of environmental programs.

Table 5.4 Most common types of performance audits of water*

Audit type	**Audit reports**
Environmental policies	43
Implementation of environmental programs	160
Impacts or effects of *existing* national environmental programs	84
Impacts or effects of *proposed* national environmental programs	28
Environmental effects of non-environmental programs	80
Compliance with national environmental laws and regulations by government departments, ministries and/or other bodies	173
Compliance by the government with international obligations	45
Government environmental management systems	73

* A report may be listed in more than one category.

Though it must be kept in mind that table 5.5 is somewhat biased because nonresponse to the Working Group surveys varies by region, it is safe to draw the conclusion that SAIs in the OLACEFS and EUROSAI regions in general are the most active of the INTOSAI community in the field of water auditing.

[20] The category 'both' is assumed to be biased. Part of the audits in this category are assumed to be performance audits or regularity audits. The proportion of this bias is unknown.

Table 5.5 SAIs who have conducted water audits by region

Region	Total number of SAIs	SAIs who have conducted water audits	
	SAIs	SAIs	% of region
EUROSAI	41	26	63
ASOSAI	32	17	53
ARABOSAI	19	9	47
AFROSAI	49	7	15
CAROSAI	14	0	0
OLACEFS	20	13	65
SPASAI	13	2	15
NO REGION *	12	2	17
INTOSAI in total **	**180**	**66**	**37**

* SAIs which are no member of a regional organisation of INTOSAI

** Some INTOSAI regions are overlapping: some members of ARABOSAI are also member of AFROSAI or ASOSAI; some members of ASOSAI are also member of SPASAI or EUROSAI.

Policy issues related to the marine environment are audited most frequently in the EUROSAI region, both in absolute and in relative terms. It can also be noted on the basis of tables 5.5 and 5.6 that the SAIs in Canada and the USA, and in the EUROSAI and OLACEFS regions, on average, conducted more audits on water per SAI.

Table 5.6 Water audit reports by topic and region

Region	Salt		Fresh		Both		Total	
	Audit reports	%	Audit reports	%	Audit reports	%	Audit reports	%
EUROSAI	22	55	153	47	25	63	200	50
ASOSAI	8	20	57	18	8	20	73	18
ARABOSAI	1	3	16	5	0	0	17	4
AFROSAI	2	5	10	3	1	3	13	3
CAROSAI	0	0	0	0	0	0	0	0
OLACEFS	6	15	63	19	5	13	74	18
SPASAI	0	0	5	2	1	3	6	1
NO REGION*	1	3	20	6	0	0	21	5
INTOSAI in total **	**40**	**100**	**324**	**100**	**40**	**100**	**404**	**100**

* SAIs which are no member of a regional organisation of INTOSAI, in this table Canada and USA.

** Some INTOSAI regions are overlapping: some members of ARABOSAI are also member of AFROSAI or ASOSAI; some members of ASOSAI are also member of SPASAI or EUROSAI.

Measuring the effects of adopting water as a central theme by the INTOSAI Working Group on Environmental Auditing in 1996 is desirable but difficult. Table 5.7 makes it clear that

members of the Working Group have carried out water audits substantially more often than non-members[21].

Table 5.7 SAIs who conduct water audits by membership of WGEA

Status	Total number of SAIs	SAIs who have conducted water audits	
	SAIs	SAIs	% of all SAIs
Member of WGEA	36	30	83
Non member of WGEA	144	36	25
INTOSAI in total	**180**	**66**	**37**

A causal relation between the adoption of the central theme and the number of audits that have been carried out since 1996 cannot be deduced from the database (table 5.8). However, since 2000 a number of joint or coordinated audits on water took place (or are still in the audit process) in which a large number of SAIs are involved and that are directly initiated by Working Group members. In Europe the audit of the Helsinki Convention on marine pollution of the Baltic Sea was carried out by the eight countries. An audit on marine pollution from ships, with eight SAIs also involved, is currently running. On the subject of freshwater audits, five countries are auditing the Danube River. The SAIs of Canada and North-America have conducted an audit on ballast water in the Great Lakes.

Table 5.8 The number of water audit reports completed by year

	All SAIs		Members of WGEA	
Year	Audit reports	Percentage	Audit reports	Percentage
1991*	5	1	0	0
1992*	3	1	0	0
1993	40	11	21	12
1994	36	10	20	11
1995	39	10	19	11
1996	80	21	37	21
1997	54	14	23	13
1998	39	10	12	7
1999	52	14	30	17
2000	30	8	17	9
Total	**378**	**100**	**179**	**100**

* Officially not included in the Working Group surveys.

[21] Members of the WGEA do have a higher response to the WGEA surveys, but because of the high overall response, this can account for only a small portion of the difference in the levels presented in table 5.6.

5.3 Conclusions

Various public sector actors, from national government to municipalities and public enterprises, have responsibilities on water issues. On each government level, plans and programmes on water issues are likely to be found, which provide good starting points for audits. This is also the case for the budget spent on water programmes and measures. Many SAIs have conducted audits on water issues in recent years.

On the national or regional level, both regularity and performance audits on water issues have been carried out. Frequently occurring types of audit are:

- compliance with national environmental laws and regulations by government departments, municipalities and/or other bodies;
- the implementation of environmental programs;
- the evaluation of impacts or effects of existing national environmental programs;
- environmental effects of non-environmental programs;
- government environmental management systems.

Depending on the mandate of the SAI, the general environmental policy towards water management and the evaluation of impacts or effects of *proposed* national environmental programs can also be a possible starting point. Another frequently used starting point is the compliance to international environmental water agreements.

The audit topics vary from region to region, depending on the specific problems that are encountered. Rivers and lakes, waste water and sewage, and drinking water are the subjects that are most frequently audited.

In the past period water audits were done by both the members of the Working Group and non-member SAIs, but more frequently by member SAIs. However, it is not clear whether this was caused by the adoption of the central theme, or by the overall interest and activities of the members of the Working Group in environmental auditing in general.

Although the effects of adopting water as a central theme of the INTOSAI Working Group on Environmental Auditing cannot be measured in an exact way, many initiatives have been taken by members of the Working Group. On a number of occasions these initiatives combine a focus on water with an orientation on international obligations and co-operation between SAIs. This was especially the case in the regions of EUROSAI and OLACEFS. In some instances the freshwater theme shifted to include the marine environment as well. Detailed information on audit reports can be found on the Web site www.environmental-auditing.org. In the next chapter the audit topics will be discussed more in-depth.

6 Results of the water audits

6.1 Introduction

This chapter is an overview of audits carried out by SAIs, that deal with different kinds of water issues. The database of the INTOSAI Working Group on Environmental Auditing was consulted to find out which audits on water were published. The most important sources for this part were the SAIs' Web sites, from which reports on water were collected. In Annex 2 the Web sites are listed. When reports weren't available on a Web site, SAIs were contacted to provide the specific report or an English summary. This resulted in a collection of around 50 reports and summaries.

The audit reports of SAIs can be divided into the following broad categories, but not exclusively:

- Water quality (§ 6.2)
- Rivers and lakes (§ 6.3)
- Flooding (§ 6.4)
- Drinking water and sanitation (§ 6.5)
- Nature and biodiversity (§ 6.6)
- Marine environment (§ 6.7)

In the following sections for each category some audit reports will be presented with special attention to those audit aspects that could be of interest to SAIs and other actors in the field of water policy evaluation. Audit examples were selected to illustrate a wide range of topics and approaches.

Audit reports are by definition time-bound, so the audit examples presented here do not necessary reflect the current situation in the countries concerned.

6.2 Water quality

The reports on water-quality issues are very diverse. Some deal with financial control and management issues and have water issues as a secondary subject. However, others look at water problems in society as a starting point, such as lack of access to clean water. It is not possible to formulate a general conclusion based on opinions of SAIs concerning water quality policy. One element that does seem to be a central problem of policy implementation and organization is the problem of lack of sufficient and reliable policy information. Basic information on money spent, activities carried out, outputs delivered and

impacts achieved, to be used for key management and policy decision making, often seems to be inadequate.

In this paragraph an overview will be given of the audits on water quality issues that were collected. The collected reports can be divided in two broad categories: regularity audits and audits of management provisions, and performance audits including those on policy information.

Regularity audits and audits of management provisions
In 1999 the SAI of China (CNAO) conducted a financial audit that focussed on the operating funds of a wastewater treatment plant.[22] It was found that the wastewater treatment fee level was low and a rather big gap existed between the subsidy the plant received and the operating funds available to the plant. CNAO recommended that the fee for wastewater treatment be raised step-by-step to ensure normal operation of the plant.

In 2000 the Portuguese SAI carried out an audit, analyzing the management of the Programme "Protection, Conservation and Valorisation of the Public Hydric Domain."[23] This programme consisted of six projects pertaining to water management to prevent pollution and for flood control. For example a project to create a system to collect and treat urban and industrial sewage waters within a municipality stopped water courses and coastal sea waters from being polluted. Main findings of the audit were that the objectives of the projects were consistent with the National Environmental Policy Plan. Monitoring and control of the implementation of the programme contracts were found to be ineffective. More was spent than initially forecasted, in certain cases by very high amounts. It was found that a system of self-assessment for the programme was not in place and no systematized and global information was available about the progress of the projects.

Performance audits and audits on policy information
The SAI of the United States has published a couple of reports on freshwater issues, with different approaches (see Annex 2). The most recent report dates from 2000 and is focussed on policy information.[24] The SAI determined whether the information in the National Water Quality Inventory of the Environmental Protection Agency (EPA) was reliable and representative of water quality conditions nationwide. Moreover it reviewed available data to determine if they were sufficient to allow state officials to make key management decisions regarding water quality.
The SAI concluded that the National Water Quality Inventory does not accurately portray water quality conditions nationwide. Almost all states monitor a subset of their waters, but not in a way that allows for statistically valid assessments of water quality conditions in unmonitored waters. Also the wide variation among states' monitoring and assessment approaches make the national statistics unreliable. Data gaps are particularly serious in the

[22] National Audit Office of the People's Republic of China (1999).

[23] Country paper SAI of Portugal (2001).

[24] United States General Accounting Office (2000).

case of nonpoint sources, which are widely accepted as contributing to the majority of the nation's water quality problems. EPA uses these data as a basis for a number of important decisions and activities, such as deciding how to allocate federal funds and measuring the implementation of the *Clean Water Act*.

The SAI of Argentina did an in-depth analysis of the quality of groundwater and sources of pollution in urban areas.[25] The audit is thorough and comprehensive, and focussed on the capital, Buenos Aires, and 19 urban areas. The history and geographical make-up of the studied area is described and an inventory is made of all stocks of water, the water services provided, all sources of contamination (industry, agriculture), and even all contaminants. Moreover health issues connected to deficiencies in water supply and quality are dealt with. The SAI of Argentina has many recommendations. On an abstract level it recommends the development of an integral policy for the protection of groundwater and prevention of pollution. Moreover, according to the SAI a policy should be formulated to deal with water services and sanitation. Also systems should be established to monitor quality, quantity, and use of the underground reservoirs in the area.

The SAI of South Africa published her interim report on freshwater resources and water services in 2000.[26] It is an unique audit because Chapter 18 of Agenda 21, the part of the international agreement dating from 1992 on the protection of the quality and supply of freshwater resources, was the starting point. The audit was limited to fresh water for domestic use. Findings of a financial, compliance, and performance audit nature were reported. The availability of policy information on the government level was a main aspect of the audit. In 1999 7.5 million people in South Africa were without adequate water supply. The original target set by the department was for this backlog to be addressed by 2007. It was not clear at the time of the audit whether this target could still be reached. It was recommended that the department set out detailed timescales and priorities for addressing the backlog in water services provision. The SAI recommended that Water Conservation and Water Demand Management (WC/WDM) could still play a more valuable role to ensure water for all. For example, studies of the department show that inefficient water utilization could be reduced by implementing new available technologies and stimulating behavioural changes of consumers. The SAI recommended that the WC/WDM policy is made more effective by formulating performance indicators on items such as consumption/cost per capita and unaccounted for water.[27] The SAI reported that full cost -recovery through differentiated water-use charges may not be achieved soon. The cash-based accounting policy and financial systems were a bottleneck. The SAI recommended to make full use of a trading account structure, in anticipation of a new generally-recognized accounting practice for a government that caters to policy issues such as the pricing strategy for water-

[25] Auditoría general de la Nación, Argentina (1997)

[26] Interim report of the Auditor-General of South-Africa on a transversal environmental audit of certain aspects of freshwater resources and water services (2000)

[27] Unaccounted for water: difference between water purchased and provided by a municipality versus water sold to the inhabitants.

use charges. The establishment of national monitoring and information systems on water and water services were still in process. It was found that information on microbial characteristics of fresh water was unavailable on a continuous basis and there was no information available for the majority of areas where people are using untreated water. The funding required for the implementation of guidelines and manuals for a national microbial monitoring and education programme, was not available at the time of the audit.

Also the SAI of France conducted an audit on pollution of water that is intended for human consumption.[28] It illustrates the dilemma of sustainable development — balancing the economic and social objectives with the environmental objectives. The main conclusion of the audit was that despite public expenditure since 1993, there was no significant improvement in water quality. The regulations designed to reconcile water protection and the exercise of agricultural activities were ignored in favour of the latter. Moreover the regulations were poorly monitored and were primarily designed to avert accidental pollution and not pollution from diffuse sources. According to the Court, the actions undertaken by the different parties involved were not consistent, lacked steadfastness over time, and sided with the most favourable solutions for livestock farmers. Suggestions to reduce livestock have been systematically excluded from the programmes and actions undertaken, although the reduction of this pollution source might have been the most effective solution.

The SAI of the Republic of Albania published a broad report on environmental protection, with a paragraph on water quality.[29] A substantial source of pollution of water in Albania is industrial (cement, leather, fuel, and gas). The report signals heavily polluted rivers and underground reservoirs. The SAI recommended that the government set technical requirements in order to prevent pollution. These requirements should apply to water treatment plants, and to plants that are the source of contamination. Moreover, the monitoring of water quality should be improved according to the Supreme State Audit Institution. The arrangements for the monitoring network need to be expanded to all zones.

6.3 Rivers and lakes

For the audits discussed in this section the geographical entity of a watershed, river, lake, or water basin was the audit subject and starting point. Often a river or watershed was the starting point: Pirai River (Bolivia), Tachira River (Colombia and Venezuela), Nile River (Egypt), Loire River (France), Mantaro River (Peru), Oder River (Czech Republic, Slovak Republic, and Poland) and Danube River (Romania, Bulgaria, Croatia, Slovak Republic, and Slovenia). The environmental problems related to these water entities vary widely between the countries and the regions within countries.

The national ministries responsible for water management, environmental protection, flood protection, health and/ or environmental education are always included in these audits. In

[28] Country paper SAI of France (2001)

[29] Supreme State Audit Republic of Albania (2001).

most audits, the provincial councils and/or local municipalities situated along the river or lake are also included. A third group of bodies being audited consists of inspectorates, that is the organizations responsible for testing or checking water quality, drinking water, health, or the environment. The fourth level of groups being audited are water companies, state enterprises, and private sector enterprises. These groups can be involved in the audit as a user of water resources, as an actor to improve water quality, or as a polluter, or a combination of these.

In the OLACEFS region, the SAIs of Peru, Bolivia, Colombia, and Venezuela performed comprehensive audits with a watershed as the starting point. The audits include institutions belonging to the central and departmental government as well as the local governments in the watershed. Attention was given to water pollution caused by various sources, like industry, mines, agriculture, and households.

The audit of the SAI of Bolivia on the pollution of the Pirai River, Santa Cruz (1999) shows the relevance of water quality measurements as one of the audit method. The analyses included the physical and chemical water properties as well as the presence of bacteria. The water quality analysis considered non-treated water (from the source) that belongs to the Piraí River catchment area, polluted by industries and some other commercial activities that discharge their treated and untreated waste water. The SAI concluded that the monitoring duties carried out by the Environmental Authority were not effective concerning the control of the Piraí River water quality and some other small rivers that discharge their water to the Piraí River. This conclusion was based on dissolved oxygen and organic bulk measurement, as well as Basic Oxygen Demands (BOD), Coliforms, etc. Even less effective were the monitoring duties aimed to identify the causes of the environmental problems. Also the SAIs of Peru and Colombia included water quality measurements in their audits.

The SAI of Peru audited the environmental administration of the Basin of the Mantaro River, situated in the Andean area. The SAI completed 17 audits of the main sectors; the sectors evaluated included, for example, energy and mines, agriculture, health and education, sanitation companies, and local governments. The reports were published in 1999. One respect that we did not see often in other audits is the attention given to the effects of contamination on the health of the local population. The Mantaro River is contaminated from mining activities, as well as by garbage of the cities. In co-operation with a hospital, toxicological analyses were done of the level of lead in blood samples of the citizens. The worrying results was that 60 percent of the citizens exceeded the maximum level of lead that is permitted in blood samples, before damage occurs.

The SAI of Peru recently audited Lake Titicaca (2002). Because of its outstanding natural and cultural value, Lake Titicaca is being promoted to be included on the World Heritage List of UNESCO. Lake Titicaca also is an ecosystem protected by the RAMSAR Convention for its international importance, especially as a habitat for aquatic birds. The unique feature of the audit is that its objective was to evaluate the natural and cultural

heritage of the ecosystem of the lake in an integrated way. In the six intersectorial audits all public entities that have responsibility in this area were involved: the special bilateral project of the Lake Titicaca, the National Institute of Natural Resources, the municipal government, the sanitation company, the regional directorate of industry and tourism, and the National Cultural Institute. In addition to the six specific reports, the SAI published an integrated report directed to the highest government levels. It includes complementary recommendations to achieve a more efficient and effective administration. With this audit the SAI of Peru promotes conscience and concern for the cultural and environmental values of the region. The preservation of its resources are vital elements for the resident's life and for achieving sustainable development. The SAI wishes to explore this topic in more depth in the future and to search for co-operation with other SAIs.

The SAI of Costa Rica audited the protection and conservation of the riverbanks and areas for the potential recharge of underground reservoirs, in two important water basins: The Grande de Tárcoles and The Tempisque River. According to the laws, these are protected areas that must have enough wood covering, however the SAI concluded that there is scarce wood covering, which indicates a lack of law enforcement. The SAI also noticed that although the law allows incorporating the cost of watershed protection into the water bill, this part of the law has not been applied. In addition, a National Plan for Urban Development with defined protected recharge areas for the underground reservoirs was lacking.

The audits on the application of the *Convention on Co-operation for the Protection and Sustainable Use of the River Danube* are also related to water quality and water pollution. The SAIs of Romania, Bulgaria, Croatia, Slovak Republic, and Slovenia co-operated in this project. The audit objective was to analyze and estimate how much of the legal, administrative, financial, and technical measures had been implemented. These measures had been laid down in the national legislation regarding the quality, protection, and use of the Danube’s River water resources. The audit on compliance with the convention provisions included the implementation in the national legislation, the transnational monitoring system on water quality, and the implementation and results of the Joint Action Programme and other measures taken. Also in Bulgaria and Romania, the degree of harmonization with EU directives and regulations was assessed.

The SAI of Korea audited a comprehensive plan to improve the water quality around the valleys of four major rivers. The audit of the investment management shows the importance of good policy information and a sound foundation of investment plans to realize effective government investments. For example, in the improvement plan for the Han River, inaccurate past statistical data were used. For Paldang Lake, a poor forecast for the improvement of water quality was used; this leads to setting a target for water quality that would be hard to achieve even if everything goes according to the plan. The improvement plan for the Kum River allotted too little investment for the maintenance of the drainage line, while in the plan for the Nakdong River, the capacity of sewage treatment plants was six times higher than the daily sewage discharges. The planning for the Young-San River

did not give priority to investments in the Juan Lake area, the largest source of drinking water in the river, which required the largest demand for such investments.

The Italian Court of Auditors addressed land conservation, hydro-geological damage, and watershed management. Their reports, published in 1999, 2000, and 2001 highlighted the shortcomings, delays, most significant negative aspects, and accounting irregularities and offences. The SAI also compared initial forecasts with actual results. An important aspect of the audit was the distribution of power and functions between the central and local authorities, which became more complex than before.

In two other audits the geographic entity was a lake or a series of lakes and watersheds: Lake Ypacaraí (Paraguay) and the Great Lakes and St. Lawrence watersheds (Canada). The audit questions and methods used for lakes and watersheds are comparable to those used for audits of rivers.

In the report “A legacy worth protecting”, the Commissioner of the Environment and Sustainable Development of Canada (2001) assessed the strengths and weaknesses of the government approach in protecting and preserving the key ecosystem of the Great lakes and St. Lawrence River watershed. Remarkable achievements and some environmental progress have been realized. However, some important matters were not addressed which meant that many commitments have not been met and policies were not always implemented. Also a federal strategy was missing. One of the key findings of the audit was related to policy information. The SAI concluded that scientific research, and monitoring and measurement systems were impaired. The SAI detected major gaps in essential information and expressed its concern that the federal government lacks a uniform approach to environmental sustainability.

The SAI of Egypt audited the extent of available protection necessary to prevent pollution of the Nile River in 2001. The audit was focussed on compliance with environmental rules, legislations, and standards that safeguard protection of the Nile River and other fresh waterways, the actions taken against violations, the state of the sanitation system. The audit also received the treatment and development of known sources of pollution. The audit produced a number of findings. Most of the Nile River pollution indicators were within permissible limits. Delay in implementing some resolutions resulted in prolonging the violation period. There were too few drainage purification samples. The inspection of tourist ships and the action taken against non-compliance showed that there was sufficient supervision.

The main recommendations were that the number of drainage purification samples should be increased; funds must be found to implement the plan for renewing the sanitation system stations; the citizens’ health awareness should be intensified; the legislations and sanctions on the draining of establishments should be applied; the sanctions to compensate for the pollution-caused harms should be strengthened; the collaboration and

co-ordination of the efforts of the concerned ministries should be improved to overcome the difficulties facing the enforcement on the laws that protect the Nile River.

The relation between the water quality of rivers and seas becomes obvious in a long-term collaboration model of SAIs in the Central European area. First a parallel audit was conducted by the signatories of the Helsinki Convention on the Protection of the Baltic Sea. Then, the SAIs audited measures to improve the water quality of rivers with an outset into the Baltic Sea. The participants were several SAIs of those landlocked countries where the rivers either originate or flow through as they discharge into the Baltic Sea. For example, the SAI of the Czech Republic, Poland, and the Slovak Republic audited the water quality of the Oder River.

6.4 Floodings

Some audits deal with the issue of managing water quantity in relation to flooding, particulary the risk of flooding. Some examples of this issue are the audits of the SAIs of France, Italy, Japan, Poland, the United Kingdom, and the Czech Republic. Subjects of the audits included the flood protection system, the preparation of flood rescue plans, the performance of rescue operations during flood events, and flood damage repairs and effect elimination.

The SAI of the United Kingdom audited the inland flood defence (2001). The SAI concluded that flood defences can reduce the risk or extent of damage, but they cannot prevent all flooding. Awareness of the risk and actions before and during a flood can be the single most important defence against the worst effects of flooding. The number of organizations involved, and the fact that they have separate budgets rather than a single flood protection programme, causes confusion and absorbs energy. The current division of responsibilities might increase the risk of suffering from flood damage for some citizens. Finally the SAI concluded that careful prioritization of capital and maintenance programmes are required.

The SAI of France audited flood prevention in France. The audit showed that an overflow of the Seine River would cause a lot of damage. However, the populations at risk are not sufficiently aware that they are vulnerable to flooding. Very often, there were no plans to reduce the risk in the most urbanized flood-prone areas. Also the general preventive measures were not sufficiently effective.

In another audit, the French Court of Audit checked the State’s implementation of the Loire Plan; the first stage of it is dedicated to flood fighting (1999), while the Regional Court of Accounts of the Centre region assessed the management of the public institution responsible for the development of the Loire and its tributaries. One of the main conclusions is that local authorities generally intervene within an obsolete legal framework and with disorganized skills. The State’s responsibilities are however enormous. The Court also mentioned ambiguities as the technical doctrine of the Ministry of Environment. It is not positive towards the rivers’ great development works, but does not demonstrate the

equivalence of alternative solutions. The Court also found a lack of transparency in the choice of reference floods.

The SAI of Japan (2000) audited comprehensive flood control measures carried out in urban areas. The measures include repairing channels, retarding and controlling river basins, combined with measures for river basins to prevent disasters, for example, by constructing ponds. The SAI concluded that the rivers have not been improved according to the original plans since it was difficult to acquire the required land in urban areas and pay the compensation. The SAI recommended that the government promote the improvement of the measures and re-examine the overall improvement plan to achieve its purpose.

Next to the national flood protection system, the SAI of Poland also audited the rescue operations during floods that took place in 1997 and 1998 . It also reviewed the legality, effectiveness, integrity, and purposefulness of public funds spent on recovery measures after two floods that took place in 1997. The Polish SAI concluded that the division of tasks and duties of responsible state bodies were scattered in various legislative acts and encouraged contradicting interpretations. The SAI questioned 1.6 percent of the total sum of the money spent on recovery measures. Also the SAI assessed the results of flood recovery efforts.

The SAI of the Czech Republic has published several reports on flood issues in 1997 and 1998. The audit on state funds for the elimination of flood effects revealed that, in general, beneficiaries made appropriate use of the funds, although there were several violations of conditions and terms specified in the rules for the grant allocations. The audit on the state budget provided to repair damages in the transportation infrastructure showed that the aim of the funds was achieved. Only a small sum of money was spent inappropriately; however, co-operation between various departments that were responsible for roads or watercourses was poor. The audit on the state budget provided for the treatment and repair of energy distribution and production areas also pointed out that the aim was achieved, but that legislation is not adequate for such disasters. The SAI also recommended that the government solve the problems concerning insurance of energy companies.

In another audit, the SAI of the Czech Republic checked the management of state funds allocated to determine the damages from the flood disaster in the Ministry of Agriculture. The main audit conclusion was that the ministry issued rules and regulations which were not obligatory. There was no definition of criteria and conditions for appropriate funds spending. Also, not all the damages caused by the flood in the agricultural production were confirmed; so there was a lack of documents for requests for financial compensation by entrepreneurs.

6.5 Drinking water and sanitation

In line with the global importance of drinking water, SAIs in general devote a lot of attention to this topic. The audits are generally focussed on the availability or on the quality of potable water, often in relation to its costs. Most bodies audited in this field are (public) water companies.

In 2000 the Mauritius Audit Office conducted an audit on leakage in potable water storage and distribution systems. The reason for this audit was a large volume of unaccounted for water (UFW) that lead to the classification of Mauritius as a 'water stressed' country. The decrease in rainfall, in combination with an estimated increase in the demand for potable water by more than 20 percent by 2010, poses an urgent problem for the country. This shortage can seriously hamper economic and social development. The unaccounted for water level has been around 47 percent of total production in 1998 and 1999. The audit office concluded that if the target of decreasing UFW to 35 percent by 2010 can be achieved, no other substantial water resources have to be harnessed. The main identified causes of the high level of UFW are the poor performance of contractors; an inadequate monitoring of their work by the water companies; the abundant use of substandard materials; a general shortage of materials, equipment, and skilled labour; and restricted job specifications. Apart from specific recommendations to solve the above mentioned causes, the main recommendation is to implement an intensive programme to control leakage . This programme can be financed by increased tariffs, savings on inefficiencies, and a budget reallocation, which will cost less than maintaining the same level of UFW and harnessing more water resources to meet requirements.

The United States General Accounting Office has conducted a number of audits on drinking water in recent years. Most of these audits are focussed on the Environmental Protection Agency (EPA). The other audits are generally aimed at the amount of money spent by the States. In 1999 an audit report on the planning of drinking water research by the Environmental Protection Agency (EPA) was published. The SAI assessed the EPA's budget requests for drinking water research during 1997 through 2000, obtained the views of stakeholders, and assessed the EPA's drinking water research plans. The main conclusions were that in the period 1997-2000, the EPA annually requested millions of dollars less than the Congress authorized, though the gap has narrowed over the years. According to EPA officials, the budget request reflects the level of resources that they believe is needed to fulfil their obligations. Stakeholders expressed concerns about the adequacy and timeliness of the research for upcoming regulations, particular for research on health effects and analytical methods used to detect contaminants. More stringent regulations than scientifically justified would cause high treatment cost for water utilities and less stringent regulations would expose people to harmful contaminants longer than necessary. The EPA plans for research on drinking water are detailed but lack an identification of resources needed for the implementation and an effective system to monitor the progress of ongoing research. As a result, it is difficult to ascertain whether the

research has been adequately funded or will be available in time to support the development of new regulations and regulatory determinations.

In 2000 the SAI of the United Kingdom published an audit report on leakage and water efficiency. The drought in 1995 highlighted the fact that some 30 percent of the water put into water companies' distribution systems was being lost as a result of leakage. Reducing leakage and promoting water efficiency became an important government objective for the water industry. The SAI examined how the Office of Water Services (OFWAT) are carrying out their responsibilities for regulating the way water companies manage leakage and promote the efficient use of water. The SAI also examined what progress has been made in reducing leakage. Main conclusions of the audit are that the OFWAT have sought to reduce the amount of water lost through leakage by means of the introduction of mandatory or self-proclaimed targets for the water companies. The water companies have responded to these targets and the leakage has been reduced to around 21 percent in 1999-2000. This produced benefits, although the costs incurred are not clear. There are nonetheless problems in determining how much further the leakage should be reduced, which OFWAT needs to resolve. An important aspect of this problem is the uncertainty of the economic and environmental value of water saved by reducing leakage. Water companies have made progress in promoting water efficiency, but OFWAT needs to improve the information on the effectiveness of promotion activities.

In 2002 the SAI of Poland audited the drinking water supply in urban agglomerations. Not all surface water in Poland intended for the abstraction of drinking water meets the requirements of the relevant European Union directives. Water supplied to the population is of low quality at the water intake and its quality after treatment and at the consumption place in terms of organoleptic characteristics is not satisfactory either. The SAI assessed tapping, treatment, and distribution of water as well as sanitary and epidemiological supervision, and the performance of municipal self-governments to ensure the supply of water in suitable quantities and of satisfactory quality. It also assessed measures aimed at economical use of water and rules applied in the management of surface and underground water resources. The SAI concluded that more effort could be spent on legislative work on provisions which would take into account the EU requirements. Furthermore the SAI demanded strengthening of the supervision over drinking water quality control and tightening the supervision and control over waterworks by self-governments to get the analysis of treatment processes used and to improve the condition of the water mains. The last demand concerned the issuing of executive provisions to the *Water Law Act* which would govern water management within river basins and would, in particular, deal with drafting water management plans as well as with conditions of using water from water regions.

In 2002, the Brazilian Court of Audit conducted an audit on water resources management. The audit focussed on the federal government acts and revealed that 19 metropolitan regions of the country are under present or future risk of crisis in their water supplying systems. The main causes are fountainhead degradation, poor sewerage treatment

system, and water leakage. The report concluded that federal agencies responsible for managing water resources do not deal with this issue in a systematic, integrated way. This is due to a lack of co-ordination of government actions and to insufficient analysis of the impact of the policies that deal with the use of water. The Brazilian SAI suggested that the National Council of Water Resources, which is responsible for the co-ordination between the states and the national water resources plan, has to take part in the budgetary plan. The high rates of water leakage on the state's sanitation companies were also noted: on a rank of 27 state companies, 9 have losses over 50 percent and 3 show figures that reach almost 70 percent. According to the report, leakage is mainly a result of the lack of maintenance of the water distribution system. As a consequence, suggestions were made to increase federal support for the necessary corrective actions, such as reopening of credit lines and to focus on actions to improve the institutional, operational, and commercial management of the state's sanitation companies.

The SAI of Costa Rica audited the national strategy regarding water resources and the State's management of water use. The SAI concluded that a national development plan had been established; however, the responsible authorities did not have adequate strategic plans for the middle- and long-term according to that development plan. The authorities were also facing a lack of financial resources. Furthermore, the SAI noticed an absence of co-ordination mechanisms. Consequently, it is not guaranteed that water for human consumption gets priority over other types of use, although this is prescribed by law. The absence of co-ordination also results in a lack of reliable information on water resources (for example, on the real situation of underground reservoirs and water quantities available), which is needed for planning and decision making. Another conclusion of the Costa Rican SAI is that the department responsible for this has not taken enough control and follows actions against the illegal exploitation of water sources. This can lead to further damage to critical areas and a loss of state revenues. Because of this lack of control, missing information, and insufficient enforcement, it is difficult to manage the recharge of water sources and prevent overexploitation.

In 2003 the SAI of the United Kingdom audited projects of the Department for International Development (DFID) to improve access to water and sanitation in developing countries. The SAI concluded that the projects have been largely successful and have led to beneficial changes in developing countries. Where information was available, three quarters of projects completely or largely achieved what they had intended. However, there is often not enough evidence to determine the extent to which improvements have been sustained. The most common problems were that insufficient attention had been paid to operation and maintenance issues in individual projects, a lack of local capacity in developing countries, and an inadequate understanding of local circumstances when designing projects. The SAI recommends that DFID further develop its approach to project evaluation to provide better information and identify those factors which lead to a lasting beneficial impact. DFID has to balance what it spends in the water sector and what it spends in other sectors, such as health and education. Compared to some other sectors, DFID's bilateral assistance to the water sector in developing countries is relatively modest.

DFID's water expenditure is significantly less than some other donors and there are few substantive country water programmes.

6.6 Nature and biodiversity

Indirectly most water audits on rivers, lakes, and seas have a reference to the very broad issue of nature and biodiversity. However, dedicated biodiversity audits on water issues appear to be scarce. Despite of the broadness of the issue, the two examples presented here are coincidentally dealing with the same subject: the implementation of the international agreement on wetlands.

One of the four international agreements that the New Zealand Office of the Controller and Auditor-General presents in the audit report 'Meeting International Environmental Obligations' is the Ramsar Convention on protection and wise use of wetlands. The main conclusion is that progress has been made in a number of areas for the management and protection of wetlands, but the policies and legislative measures adopted to implement the Ramsar Convention do not appear to have been successful in meeting the desired outcomes of the Convention. New Zealand did not enact specific legislation to implement the Ramsar Convention because existing legislation was considered adequate. In view of the SAI this may have contributed to the inadequate administrative arrangements for ongoing implementation of the Ramsar Convention. Allocation of policy responsibility for wetlands has also been deficient in the view of the SAI. This has resulted in a lack of a coherent national policy framework on wetlands. Wetland degradation in New Zealand has been worse than it ought to have been. The desired outcome of the Ramsar Convention — to stem the progressive encroachment on and loss of wetlands now and in the future — has not been met.

In 1999 the Netherlands Court of Audit published an audit report on the compliance with international agreements on wetlands. Like New Zealand, the Netherlands is party to the Ramsar Convention on protection of wetlands and must comply with two European Union directives: the Bird Directive and the Habitat Directive. The main findings were that the Netherlands had drafted many plans for the management and restoration of wetlands, but in practice the implementation of these plans was often problematic or extremely slow. The international obligations were inadequately operationalized in national policy — the ministry of nature management had not made agreements with local authorities on the fulfilment of international obligations. As a result, the local authorities were badly informed about the substance of the obligations. The ministry of nature management did not have a clear image about the condition of nature sites and of the effects of the regional wetlands policy. The ministry thus couldn't determine whether compliance with the international obligations has been achieved.

6.7 Marine environment

The marine environment is by definition a topic shared by more than one country. Most of the recent audits on the marine environment that were carried out in Europe focussed on the national implementation of international obligations. The SAIs of several countries worked together in joint or concurrent audits.

The SAIs of Norway, Denmark, and Iceland audited the compliance of their countries with the OSPAR Convention, that aims to prevent and eliminate pollution in the north-east Atlantic. They specifically looked at the government administration's choice of measures and the use of policy instruments to ensure compliance by industry, wastewater management, and agriculture. The major audit findings of the Norwegian SAI, that reported in 2001, were that the OSPAR target of halving discharges of nutrients by 1995 (on basis of 1985 figures) has been met in 1999 for phosphorous compounds and is expected to be met in 2005 for nitrogen. Further reductions are still necessary to attain the goal to cease all emissions of hazardous substances within one generation. The Norwegian Pollution Control Authority primarily uses mild forms of reaction to violations of specifications set in discharge permits by industry; it most frequently uses written orders to remedy the errors. The observation that the number of violations remains relatively large through the years raises the question of whether more severe sanctions to violations would be more effective. The dual role of the municipalities in wastewater treatment as agents and pollution control authorities leads to a high level of non-compliance with the conditions regarding emissions. With regard to the agricultural sector, the audit demonstrated that some environmental measures like granting funds for alternative tilling and cultivation methods were not focussed on areas where the need was the greatest.

The SAIs of Poland, Denmark, Estonia, Finland, Latvia, Lithuania, Russia, and Sweden audited the obligations of the Helsinki Convention on protection of the Baltic Sea area. The scope of this audit shows similarity with the OSPAR audit, the audit is also aimed at government measures to reduce pollution of the sea by land-based sources. In this case the focus was on implementing the Helsinki convention in national legislation, on control procedures and measures, and on the use of public funds regarding non-point sources of pollution (mainly agriculture) and point sources (mainly urban zones and wastewater treatment plants). In 2001 the joint audit report was published. This joint report consists of national parts and a general part, in which an abundance of extracts from the national reports and aggregate findings on the audited subjects are presented.

A joint report on marine pollution from ships is being prepared now and is expected to be published in 2003. The outline for this audit is taken from the MARPOL convention on prevention of marine pollution by ships and the OPRC convention on dealing with pollution. The SAIs of the Netherlands, the United Kingdom, Cyprus, France, Greece, Italy, Malta, and Turkey have reported their national findings to their respective governments or are still in the audit process. The SAIs of Israel and Denmark have covered elements of marine pollution from ships in national audit reports.

In the national audit report on marine pollution from ships of the Netherlands SAI, general conclusions and specific conclusions on prevention of and dealing with pollution were drawn. Co-operation between the various public services could be improved. Some MARPOL-provisions have only been implemented in national legislation in part or not at all. This makes it impossible, for example, to prosecute illegal discharges outside the coastal zone. Too many risks are involved in the shipping inspectorate's contracting out of flag state control surveys on ships to commercial classification societies: the shipping inspectorate lacks sufficient information and steering options; at the same time, there are indications that the classification societies pay less attention to environmental aspects than the inspectorate itself. The shipping inspectorate's port state control inspections could be more focussed on high-risk ships. The minister of Transport has failed to provide adequate port reception facilities for unloading ship waste; this responsibility was delegated to the port authorities without setting further criteria or taking other measures that these facilities are indeed adequate and furthermore gathered no information on this topic. As a result of this, the expected functioning of port reception facilities is hampered in a substantial number of ports. Adequate response to pollution of the sea is limited due to a structural underrealization of planned aerial surveillance and frequently lengthy response times. The revision of the national contingency plan was stagnated for several years. The efficacy of the prosecution of polluters is hampered by gaps and erroneous formulations in national legislation. The coordination between administrative and criminal enforcement leaves a lot to be desired.

6.8 Conclusions

SAIs all over the world have gained experience with the audit of water issues, on a growing number of occasions in international audits. The overview presented in this chapter shows that the audits that have been carried out are indeed very diverse.
The audit examples presented in the paper are related to water quality, rivers and lakes, prevention and/or recovery from floodings, treatment of waste water and sewage, drinking water, and sanitation. Other major audit topics are the natural value and biodiversity of water ecosystems, the prevention of pollution of the marine environment, and the costs of water related infrastructural works. Also a number of (international) audits were conducted that included international obligations.

There are other freshwater topics, which have not yet been frequently audited by SAIs, but can be relevant to consider. They include water as a source of energy (hydro-electric stations, dam projects) and measures to fight drought like agricultural irrigation projects.

The audits presented differ from SAI to SAI in audit type, methodology used, and issues covered. As a result of this diversity a broad variety of audit methods and findings is available. The audit reports presented in this paper provide a good illustration of the audit work done by SAIs in this field. Perhaps they can be a source of inspiration to future audits.

7 Conclusions and recommendations

7.1 Conclusions

Water was adopted in 1996 as a central theme of the activities of the INTOSAI Working Group on Environmental Auditing. This theme was chosen since it is relevant to all SAIs because of the importance of fresh water for the health and well-being of all people.

Audits help to raise the consciousness towards the relevance of water problems and to improve the programmes of governments to solve these problems. To share experiences and audit methods improves the quality of the work of SAIs.
Although member SAIs of the INTOSAI Working Group on Environmental Auditing have carried out more water audits than non-member SAIs, it is not clear whether this was caused by the adoption of the central theme, or by the overall interest and activities of the members of the Working Group in environmental auditing in general. In the regions of EUROSAI and OLACEFS, SAIs developed several water-audit projects in co-operation. In some instances the freshwater theme shifted to include marine environment as well.

The INTOSAI Working Group concludes that working together on the central theme of water has been very fruitful, and that water as a central theme is still relevant. Therefore the INTOSAI Working Group on Environmental Auditing decided to continue this central theme during the next period of activities.

7.2 Recommendations

The Working Group recommends SAIs to continue to do water audits
The INTOSAI Working Group on Environmental Auditing recommends that SAIs (continue to) give attention to water issues in their audit work. As is shown in this paper, the water theme provides SAIs with many options for environmental audits. Good starting points for audits, and for co-operation with other SAIs, are national or regional plans or programmes on water issues, public budgets spent on water measures, and international water agreements and obligations.

The audit examples presented in this paper reflect a wide range of audit options. They can be a source of inspiration for future auditing.

The Working Group recommends SAIs (to continue) to exchange experiences and to co-operate

The Working Group recommends SAIs to make use of the experiences on water audits of their sister organizations within INTOSAI as reflected in this paper. The SAIs that provided audit examples for this paper are willing to further share their experiences with other SAIs.

The Working Group also hopes that SAIs will find inspiration to approach the audit of water issues from new angles, in order to further develop audit skills and methods. The Working Group invites all SAIs (to continue) to share these experiences with the Working Group and sister organizations in the near future. By doing so we will further enlarge our shared body of knowledge and contribute to a world that is able to provide fresh water to all people.

Co-operation with regional working groups is desirable

In accordance with the regionalization strategy of the Working Group and the strategy of enhanced networking and information exchange, the INTOSAI Working Group will continue the co-operation on this theme with the regional Working Groups on Environmental Auditing. Regional Working Groups could for example organize regional seminars to exchange audit experiences and knowledge on regional water issues and policies between SAIs. Regional Working Groups also can provide a platform to further co-operation on audit work between SAIs in their region.

Additional communication strategies might increase the effectivity of SAIs in the region

The aim of SAIs' audit work is to increase the quality of government performance and the transparency of its (financial) operations, by providing structured feedback to policy makers and executives. The Working Group on Environmental Auditing has tried to stimulate SAIs to work together on this mission, since environmental problems on many occasions don't stop at national borders. Joint or co-ordinated audit is one of the instruments of SAIs to address those common issues.

Another activity could be the organization of joint seminars with other key players in the field of water policy evaluation, like UNEP and the World Bank. Both these international institutions have regional branches throughout the world. The lessons learned from SAIs audits could be discussed at joint seminars in the INTOSAI regions, with participants from the evaluation community, policy makers, and regional water-sector specialists.

Annex 1: List of abbreviations and acronyms

AFROSAI	Regional organisation of Supreme Audit Intitutions in Afica
ARABOSAI	Regional organisation of Supreme Audit Intitutions in the Arabian region
ASOSAI	Regional organisation of Supreme Audit Intitutions in Asia
BOD	Basic Oxygen Demands
CAROSAI	Regional organisation of Supreme Audit Intitutions in the Carribean region
CIESIN	Consortium for International Earth Science Information Network
CNAO	Chinese National Audit Office, the SAI of China
DFID	Department for International Development of the United Kingdom
ENTRI	Register of Environmental Treaties of CIESIN
EPA	The Environmental Protection Agency of the United States of America
EU	European Union
EUROSAI	Regional organisation of Supreme Audit Intitutions in Europe
FAO	Food and Agricultural Organization
IMO	International Maritime Organisation
INTOSAI	International Organisation of Supreme Audit Intitutions
IPTRID	International Programme for Technology and Research in Irrigation and Drainage
MARPOL	International Convention for the Prevention of Pollution from Ships 1973/1978
OFWAT	Office of Water Services of the United Kingdom
OLACEFS	Regional Organisation of Supreme Audit Intitutions in Latin America
OPRC	International Convention on Oil Pollution Preparedness, Response and Co-operation, 1990
OSPAR	Convention on the Prevention of Marine Pollution from Land-based Sources, Oslo-Paris, 1974
RAMSAR	Ramsar Convention on Wetlands of International Importance especially as Waterfowl Habitat, Ramsar, 1971
SAI	Supreme Audit Intitution
SPASAI	Regional Organisation of Supreme Audit Intitutions in the South Pacific
UFW	unaccounted for water
UN	United Nations
UNCBD	United Nations Convention on Biological Diversity, 1992
UNDP	United Nations Development Programme

UNEP	United Nations Environmental Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCC	United Nations Framework Convention on Climate Change
WB	World Bank
WC/WDM	Water Conservation and Water Demand Management
WGEA	Working Group on Environmental Auditing
WWAP	World Water Assessment Programme

Annex 2: Sources

Background literature

Gardiner, R. (2002). Towards Earth Summit 2002. Freshwater: A Global Crisis of Water Security and Basic Water Provision. www.earthsummit2002.org

Gleick, Peter H. (2000). The World's Water 2000-2001. The Biennial Report on Freshwater Resources. www.worldwater.org

Gleick, Peter H. and others (2002). The World's Water 2002-2003. The Biennial Report on Freshwater Resources. www.worldwater.org

HRH the Prince of Orange to the panel of the UN Secretary General, in preparation for the Johannesburg Summit (2002). No Water No Future: A Water Focus For Johannesburg. (Initial Contribution). www.unesco.org/water

INTOSAI Working Group on Environmental Auditing (1998a). INTOSAI Guidance “How SAIs may co-operate on the audit of international environmental accords”. www.environmental-auditing.org

INTOSAI Working Group on Environmental Auditing (1998b). Working Group Paper “Natural Resource Accounting”. www.environmental-auditing.org

INTOSAI Working Group on Environmental Auditing (1998c). Working Group Paper “Results of the second questionnaire on environmental auditing”. www.environmental-auditing.org

INTOSAI Working Group on Environmental Auditing (2001a). INTOSAI Guidance “Guidance on Conducting Audits of Activities with an Environmental Perspective”. www.environmental-auditing.org

INTOSAI Working Group on Environmental Auditing (2001b). Working Group Paper “The audit of international environmental accords”. www.environmental-auditing.org

INTOSAI Working Group on Environmental Auditing (2001c). Working Group Paper “Sustainable Development: the role of Supreme Audit Institutions”. www.environmental-auditing.org

INTOSAI Working Group on Environmental Auditing (2001d). Working Group Paper “Results of the third survey on environmental auditing”. www.environmental-auditing.org

Ministry of Foreign Affairs of the Netherlands, Policy and Operations Review Department (IOB; 2000). Making integrated water resources management (IWRM) work: lessons from the evaluation of water sector programmes. Working Document. www.minbuza.nl

United Nations (2001). Comprehensive assessment of the Freshwater resources of the World. Report of the Secretary General of the United Nations. www.un.org

United Nations Department of Economic and Social Affairs (2002). Global Challenge, Global Opportunity. Trends in Sustainable Development. www.un.org/esa

United Nations Environmental Programme (1999). Overview GEO-2000. Global Environmental Outlook. www.unep.org

United Nations Environmental Programme (2002). GEO: Global Environmental Outlook-3.. Past, present and future perspectives. www.unep.org

Audits

SAI of Albania (2001). Report on the audits carried out by the Supreme State Audit on environmental protection for year 2000-2001. members.albaniaonline.net/klsh/

SAI of Argentina (1997). Investigacion y analisis de los antecedentes de la problematica del agua subterranea en el area metropolitana. www.agn.gov.ar

SAI of Austria (2001). Country paper on Water and wastewater management. Presented at the Second Meeting of EUROSAI Working Group on Environmental Auditing. www.rechnungshof.gv.at

SAI of Bolivia (2002). Exposicion de la Auditoria Ambiental sobre la contaminacion del Rio Pirai - Santa Cruz. Presented at the “Seminar contribución del control en la gestión ambiental y patrimonio cultural”, organized by the SAI of Peru. www.cgr.gov.bo

SAI of Brazil (2002). Water resources management. www.tcu.gov.br

SAI of Bulgaria (2002). Country paper on Water protection - pollution from agriculture (River Danube). Presented at the Second Meeting of EUROSAI Working Group on Environmental Auditing.

SAI of Canada (2001). A legacy worth protecting; Audit on the Basin from Thunder Bay to Quebec City, Severn Sound to Trois Riveres, the Great Lakes and St. Lawrence River Basin. www.oag-bvg.gc.ca

SAI of China (1999). Summary: A case of water resource audit: auditing a wastewater treatment plant of X City in China. www.environmental-audit.org.cn

SAI of Colombia (2002). Exposicion de la Auditoria ambiental a la subcuenca binacional del Rio Tachira. Presented at the “Seminar contribución del control en la gestión ambiental y patrimonio cultural”, organized by the SAI of Peru. www.contraloriagen.gov.co

SAI of Czech Republic (2002). Country paper on Parallel audit aimed at the improvement of purity of the Baltic Sea conducted by states, which are non-signatories of the Helsinki Convention (on River Oder). Presented at the Second Meeting of EUROSAI Working Group on Environmental Auditing. www.nku.cz

SAI of Czech Republic (2002). Country paper on Information about updated results of the parallel audit aimed at the improvement of purity of the Baltic Sea conducted by States, which are non-signatories of the Helsinki Convention. Presented at the Second Meeting of EUROSAI Working Group on Environmental Auditing. www.nku.cz

SAI of Czech Republic (1997-1998). Several reports on flood issues. www.nku.cz

SAI of Denmark (2001). Surveillance of oil pollution at sea. www.rigsrevisionen.dk

SAIs of Denmark, Estonia, Finland, Latvia, Lithuania, Poland, Russia and Sweden (2001). Joint final report on findings over parallel audits of implementation of the provisions of the convention on the protection of the marine environment of the Baltic Sea area (Helsinki Convention). www.nik.gov.pl

SAIs of Denmark, Iceland, Norway (2001). Evaluation report on the concurrent audit of the national implementation of the OSPAR-convention. www.riksrevisjonen.no

SAI of Egypt (2000). Audit on the extent of the available protection necessary for preventing pollution of the River Nile.

SAI of France (2002). Country paper on Preservation of water resources in the face of pollution from agricultural sources: the case of Brittany. Presented at the Second Meeting of EUROSAI Working Group on Environmental Auditing. www.ccomptes.fr

SAI of France (2002). Country paper on the Loire plan. Presented at the Second Meeting of EUROSAI Working Group on Environmental Auditing. www.ccomptes.fr

SAI of France (2002). Country paper on Flood prevention in France. Presented at the Second Meeting of EUROSAI Working Group on Environmental Auditing. www.ccomptes.fr

SAI of Israel (2001). Transport of Fuel in the Gulf of Eilat. www.mevaker.gov.il

SAI of Italy (2002). Country paper on Flood prevention and water protection. Presented at the Second Meeting of EUROSAI Working Group on Environmental Auditing. www.corteconti.it

SAI of Japan (2000). Paper “Comprehensive flood control measures carried out in urban areas”. (FY2000 Audit Report). www.jbaudit.go.jp

SAI of Korea (2002). Paper “Major audit reports on the status of water quality management around the valleys of four major rivers”. www.bai.go.kr

SAI of Mauritius (2000). Leakage in Potable Water Storage and Distribution Systems. ncb.intnet.mu/audit

SAI of the Netherlands (2001). Marine pollution from ships. www.rekenkamer.nl

SAI of the Netherlands (1999). Compliance with international agreements on wetlands, parliamentary paper no. 26 490. www.rekenkamer.nl

SAI of New-Zealand (2001). Meeting International Environmental Obligations. www.oag.govt.nz

SAI of Peru (1999). Environment management audit to Mantaro River Basin, International "Alpha" Project, Sectors: Education, Energy and Mines, Health and Agriculture (total: 4 reports). www.contraloria.gob.pe

SAI of Peru (1999). Environment Management Audit to Mantaro River Basin, International "Beta" Project, Sectors: Sanitation, Health and Local Governments (total: 13 reports). www.contraloria.gob.pe

SAI of Peru (2002). Auditoria de Gestión Ambiental y de Patrimonio Cultural a la Cuenca del Lago Titicaca/ Audit of Environmental Administration and of the Cultural Patrimony in the Cuenca of the Lake Titicaca. www.contraloria.gob.pe
Next to this general report there are 6 specific reports on:

- the special bilateral project of the Lake Titicaca;
- the National Institute of Natural Resources;
- the municipal government;
- the sanitation company;
- the regional directorate of industry and tourism;
- the National Cultural Institute.

SAI of Poland (2002). Country paper on Water protection – Pollution from agriculture. Presented at the Second Meeting of EUROSAI Working Group on Environmental Auditing. www.nik.gov.pl

SAI of Poland (2002). Country paper on Flood prevention and river management. Presented at the Second Meeting of EUROSAI Working Group on Environmental Auditing. www.nik.gov.pl

SAIs of Poland, Czech Republic and Slovak Republic (2002). Joint Final Report of the parallel audits of implementation and fulfilment of tasks concerning the protection of water against pollution in the Baltic Sea Catchment Area (Helsinki Convention) by the countries which are not signatories to this convention with the participation of the Supreme Chamber of Control of the Republic of Poland.
www.nik.gov.pl

SAI of Portugal (2001). Country paper Summary of audit report on 'Protection, conservation and valorisation of the public hydric domain' programme. Presented at the Second Meeting of EUROSAI Working Group on Environmental Auditing. www.tcontas.pt

SAI of Romania (2002). Country paper on Water protection - pollution from agriculture (River Danube, Sofia Convention). Presented at the Second Meeting of EUROSAI Working Group on Environmental Auditing. www.rcc.pcnet.ro

SAI of South Africa (2000). Interim report of the Auditor-General of South-Africa on a transversal environmental audit of certain aspects of freshwater resources and water services. www.agsa.co.za

SAI of the United Kingdom (2002). Dealing with pollution from ships. www.nao.gov.uk

SAI of the United Kingdom (2001). Inland Flood Defence. HC 299, session 2000-2001: 15 March 2001. www.nao.gov.uk

SAI of the United Kingdom (2000). Office of Water Services: Leakage and Water Efficiency. www.nao.gov.uk

SAI of the United Kingdom (2003). Department for International Development: Maximising impact in the water sector. www.nao.gov.uk

SAI of the United States of America (2000). Key EPA and State decisions Limited by Inconsistent and Incomplete Data. www.gao.gov

SAI of the United States of America (2000). Testimony Water Quality. Identification and Remediation of Polluted Waters Impeded by Data Gaps. www.gao.gov

SAI of the United States of America (1999). Drinking Water Research: Better Planning Needed to Link Needs and Resources. www.gao.gov

SAI of the United States of America (1996). Clean Water Act. State revolving fund loans to improve water quality. www.gao.gov

SAI of the United States of America (1996). Water pollution. Differences among the States on issuing permits limiting the discharge of pollutants. www.gao.gov

SAI of the United States of America (1996). Water pollution. Many violations have not received appropriate enforcement attention. www.gao.gov

SAI of the United States of America (1994). Water pollution. Information on the use of alternative wastewater treatment systems. www.gao.gov

International organizations

United Nations (UN)
Web site: www.un.org
E-mail:

- United Nations, Division for Sustainable Development, dsd@un.org

United Nations Environmental Program (UNEP)
Web site: www.unep.org
E-mails:

- UNEP/ Global Program of Action (GPA), gpa@unep.nl
- UNEP/ Division of communications and public information (CPI), cpiinfo@unep.org

United Nations Development Program (UNDP)
Web site: www.undp.org
E-mail:

- Communications Office of UNDP, enquiries@undp.org

World Bank (WB):
Web site: www.worldbank.org
Email:

- World Bank, Environmentally and Socially Sustainable Development Network (ESSD) Advisory Service, eadvisor@worldbank.org

International Maritime Organization (IMO)
Web site: www.imo.org
E-mail:

- Public Information Manager, info@imo.org

CIESIN
Web site: www.ciesin.columbia.edu
ENTRI-database international agreements: http://sedac.ciesin.org/pidb/pidb-home.html
E-mail:

- CIESIN User Services, ciesin.info@ciesin.columbia.edu

United Nations Educational, Scientific and Cultural Organization (UNESCO)
Web sites:
UNESCO : www.unesco.org
Water Year 2003: www.wateryear2003.org
Water Portal: www.unesco.org/water
World Heritage Centre: whc.unesco.org
E-mails:

- UNESCO International year of fresh water - 2003, wateryear2003@unesco
- UNESCO Water Portal, waterportal@unesco.org
- UNESCO World Heritage Committee, wh-info@unesco.org
- UNESCO World Heritage Centre, wh-info@unesco.org

United Nations Convention on Biological Diversity (UNCBD)
Web site: www.biodiv.org
E-mail:

- Secretariat of the Convention on Biodiversity, secretariat@biodiv.org

Food and Agricultural Organization (FAO)
Web site: www.fao.org
E-mails:

- FAO, Sustainable Development Department, SD-Dimensions@fao.org
- FAO Office of program, budget and evaluation, Evaluation Service, evaluation@fao.org

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