Pekka E. Pietilä

Role of Municipalities in Water Services

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Thesis for the degree of Doctor of Technology to be presented with due permission for public examination and criticism in Festia Building, Auditorium Pieni Sali 1, at Tampere University of Technology, on the 3rd of November 2006, at 12 noon.
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This dissertation was written and defended at Tampere University of Technology (TUT), Institute of Environmental Engineering and Biotechnology (IEEB), Finland. However, a significant share of the inputs into this dissertation was collected and compiled outside the walls of the university in meetings and interviews with numerous people and during my shorter or longer assignments abroad.

The content and the topic of this dissertation evolved gradually in sessions and discussions with colleagues of the CADWES research group at TUT/IEEB. The main emphasis of this research is on Finland, but my interest in the role of municipalities was definitely intensified by my experiences in Lithuania and Namibia.

First and foremost I wish to express my gratitude to the supervisors of my thesis, Adjunct Professors Tapio Katko and Jarmo Hukka. Tapio has tirelessly suggested new angles and commented on my research while Jarmo also has structured my scientific approach.

I also wish to express my warmest thanks to the following persons who greatly contributed to the successful completion of the research:

- Professor Jaakko Puhakka, Head of IEEB, for his positive encouragement
- The opponents, Professor Hans Bressers and Professor Ilari Karppi
- The preliminary assessors, Professor Ilari Karppi and Dr. Klaus Lanz
- Dr. Osmo Seppälä and Dr. Harri Mattila, who share a common research interest with me, for their always unselfish advice and help
- Other members of the CADWES research group at TUT/IEEB, in particular Ms. Sirpa Sandelin, Ms. Eija Vinnari, Ms. Sanna-Leena Rautanen, and Dr. Ezekiel Nyangeri
- Other staff of TUT/IEEB
- Researcher colleagues in the WATERTIME project
- Mr. Jorma Tiainen for checking the language, Ms. Sari Merontausta for some excellent graphics, and Mr. Sakari Halttunen for keeping my computer system running
- Numerous water sector experts, both in Finland and abroad, who have given me a better insight into the real-life situation with water and wastewater services.

Furthermore, I am grateful to the members of the ECAT-Lithuania team for the pleasant working environment I was able to enjoy. The CABLE project in Namibia refreshed my thinking and concretely exhibited the difficulties faced when public sector administration is thoroughly restructured.

I also wish to express my gratitude to the financiers of the research: Academy of Finland, Ella and Georg Ehrnrooth Foundation, Foundation for Municipal Development (Kunnallisalan kehittämissäätiö), Jenny and Antti Wihuri Foundation, Land and Water Technology Foundation (Maa- ja vesitekniikan tuki r.y.), Maj and Tor Nessling Foundation, Ministry of the Environment, RIL Foundation (RIL-Säätiö), and Scientific Foundation of the City of Tampere (Tampereen kaupungin tiedarahasto).

Finally, I must acknowledge my deepest appreciation for my family. My dear wife, Irja, has had to spend days or weeks without a husband while I worked abroad. During the writing of the thesis she has reviewed and commented my text and graphs with her unfailing sense of style. In
recent years, when my children, Eveliina, Miika and Juha, have also engaged in academic studies, they, as well as Eveliina’s husband Petteri, have presented me with fresh ideas.

Tampere, 24th of September 2006

Pekka E. Pietilä

**ABSTRACT**

Water is a basic requirement for all human activity. In the early days of human history people had to settle in areas where water was available. Later on, technologies were developed to transfer water over distances to enable permanent habitation of areas suffering from a lack of water. When population centres expanded and ever more water was supplied to them, the problem of wastewater became more serious. Urban streams were transformed into drainage canals, more ditches and channels were built in towns, and the drainage channels also served as sewers to convey liquid waste away from the residential areas. When piped water systems were introduced, and flush toilets became more common, the need to build proper sewers became acute.

The main objective of this research is to analyse the role of municipalities in water and wastewater services in a number of European countries. The countries subjected to closer scrutiny are Finland, Sweden, Lithuania, Germany, Netherlands, France and England. The selection of just these countries was not intended to present the average situation in Europe but rather to demonstrate the variety of practices even within the limited area of Northern and Central Europe they cover. The research concentrates on Finland, the researcher's native country, where he is more familiar with the factors underlying people's and organisations' behaviour.

Water and wastewater services in Finland are, according to international comparisons, exceptionally well organised. In Finland, as in industrialised countries in general, the public sector and particularly the municipalities have played a central role in the development of these services. However, the world is changing and the public sector is facing financial difficulties everywhere. One of the key questions is whether public sector organisations can perform their tasks in the future.

This research looks at water and wastewater services as multi-dimensional activities within a wider institutional context considering the role of all stakeholders of water services. The research draws inputs from a wide range of activities the author has been involved in during the last ten years – in some cases even longer. Action research was the predominant research approach. The summary article is based not only on the four mentioned peer-reviewed articles but also on a number of other peer-reviewed or non-peer-reviewed articles, conference and workshop presentations, research activities including theses supervision and involvement in working groups, professional associations and advisory assignments.

Municipalities have played a central role in the development of water and wastewater services throughout the world and are likely to retain their role also in the future. Particularly during the last ten years, privatisation of water and wastewater services and the increased involvement of private companies in the provision of these services have been discussed a lot. Commercialisation of municipal operations, such as water and wastewater services, has been seen as a means to downsize municipal administration. But the problem is that water and wastewater services are and remain natural monopoly services, and thus commercial principles can be applied to them only partially. As far as full privatisation of water services is concerned, there are only few examples of it so far, and the trend does not seem to move in this direction.
Water services have been regarded as such important basic services of society that several countries have confined their ownership by law to the public sector, or the interest of the private sector has been extinguished by not allowing profit making.

This research effort clearly showed that there is no single model or formula for how water and wastewater services should be organised – not even within a single country. Even though municipalities are typically legally responsible for water and wastewater service provision, they do not have to produce these services themselves, and there are several alternatives for producing the services. For instance, municipal water undertakings widely use the services of private companies and outsource certain operations and activities. The respective arrangements should take into account not only economical and technical factors but also local participation, priorities and traditions, etc.

In Finland, there are large rural areas not covered by municipal water and wastewater undertakings, where people have to arrange the services themselves. A common solution has been for people to join forces and establish a cooperative. The tightening of wastewater treatment requirements in recent years has hastened the establishment of wastewater cooperatives. One of the challenges for the future is how to make cooperation between municipal water and wastewater undertakings, cooperatives and other actors as smooth and efficient as possible.

**Key words:** water, water supply, wastewater, sanitation, water services, wastewater services, municipalities, Finland

TIIVISTELMÄ


Tutkimuksessa kävi selvästi ilmi, että ei ole yhtä mallia tai toimintatapaa sille, miten vesihuolto pitäisi ja kannattaisi järjestää – ei edes yksittäisen maan kohdalla. Vaikka kunnat ovat tyyppillisesti vastuussa siitä, että vesihuolto järjestetään, ei niiden tarvitse välttämättä itse näitä palveluja tuottaa, vaan tähän on olemassa lukuisia erilaisia mahdollisuuksia. Kunnat esimerkiksi ostavat hyvin yleisesti palveluja yksityiseltä sektorilta tai tekevät ylläpitosopimuksia yksityisten yritysten kanssa. Vesihuollon järjestämistapoja ratkaistaessa ei pitäisi tuijottaa pelkästään taloudellisiin ja tekniisiin tekijöihin, vaan olisi otettava huomioon myös paikalliset olosuhteet ja toimintaperinteet sekä ihmisten osallistumismahdollisuudet päätöksenteokoon.


Avainsanat: vesihuolto, vesihuoltopalvelut, kunnat, Suomi
# ROLE OF MUNICIPALITIES IN WATER SERVICES

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ORIGINAL PUBLICATIONS
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The dissertation is based on the following peer-reviewed, internationally published articles, referred to in the text by their Roman numerals:


THE AUTHOR’S CONTRIBUTION

Article I:
Pekka Pietilä wrote the article and is the corresponding author. Rimgaudas Spokas commented the sections dealing with Lithuania.

Article II:
Pekka Pietilä wrote the article independently.

Article III:
Pekka Pietilä formulated the contents of the article and wrote a substantial part of the article and is the corresponding author. The co-authors provided inputs by commenting the chapters in their fields of expertise. The article is based on the research work carried out by CADWES Research Group at Tampere University of Technology.

Article IV:
Pekka Pietilä wrote the article and is the corresponding author. Tapio S. Katko introduced the original idea of the article and provided inputs in his field of expertise.
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## ABBREVIATIONS AND ACRONYMS

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<tr>
<td>ALAL</td>
<td>Association of Local Authorities in Lithuania</td>
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<td>BEF</td>
<td>Baltic Environmental Forum, an environmental non-governmental organisation based in Riga, Latvia</td>
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<td>BIPE</td>
<td>a European economic analysis and consulting company</td>
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<td>BOD&lt;sub&gt;7&lt;/sub&gt;</td>
<td>biochemical oxygen demand</td>
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<td>BOT</td>
<td>build-operate-transfer</td>
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<td>CABLE</td>
<td>a decentralisation support project in Namibia during 2000-2004 sponsored by the Finnish Government</td>
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<td>CADWES</td>
<td>Capacity Development in Water and Sanitation Services, a Research Team at TUT, IEEB</td>
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<tr>
<td>CATWOE</td>
<td>Customer/Actor/Transformation/Weltanschauung (Worldview)/Owner/Environment</td>
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<tr>
<td>Dexia</td>
<td>a European banking group</td>
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<td>GDP</td>
<td>gross domestic product</td>
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<tr>
<td>ECAT</td>
<td>Environmental Centre for Administration and Technology (ECAT-Lithuania), an environment sector expert unit in Lithuania</td>
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<tr>
<td>EU</td>
<td>European Union</td>
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<tr>
<td>EUR</td>
<td>euro, the European Union currency unit</td>
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<tr>
<td>EUREAU</td>
<td>European union of national associations of water suppliers and waste water services</td>
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<td>FTPO</td>
<td>French Technology Press Office</td>
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<td>GWI</td>
<td>Global Water Intelligence, an international water market publication</td>
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<td>HELCOM</td>
<td>Helsinki Commission, an intergovernmental cooperation unit established for protecting the Baltic Sea</td>
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<tr>
<td>IEEB</td>
<td>Institute of Environmental Engineering and Biotechnology at TUT</td>
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<td>IWRM</td>
<td>integrated water resources management</td>
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<td>LVTA</td>
<td>Lietuvos vandens tiekeju asociacij, Lithuanian Water Suppliers Association</td>
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<td>MEA</td>
<td>municipal environmental audit</td>
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<tr>
<td>mg/l</td>
<td>milligrammes per litre</td>
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<td>MMM</td>
<td>Ministry of Agriculture and Forestry in Finland</td>
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<td>MTI</td>
<td>Ministry of Trade and Industry in Finland</td>
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<td>NATO</td>
<td>North Atlantic Treaty Organisation</td>
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<td>ODPM</td>
<td>Office of the Deputy Prime Minister, United Kingdom</td>
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<tr>
<td>Acronym</td>
<td>Description</td>
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<tr>
<td>OECD</td>
<td>Organisation for Economic Cooperation and Development</td>
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<td>OFWAT</td>
<td>Office of Water Services, the economic regulator for the water and sewerage industry in England and Wales</td>
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<td>O&amp;M</td>
<td>operations and maintenance</td>
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<td>PLC</td>
<td>Public Limited Company</td>
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<td>PRINWASS</td>
<td>an EU Research Project on the involvement of private sector in water services, 2001-2004</td>
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<td>RWA</td>
<td>regional water authority</td>
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<td>SSM</td>
<td>soft systems methodology</td>
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<td>SWWA</td>
<td>Swedish Water and Wastewater Association</td>
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<td>TUT</td>
<td>Tampere University of Technology, Finland</td>
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<td>UK</td>
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<td>UN</td>
<td>United Nations</td>
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<td>UNRISD</td>
<td>United Nations Research Institute for Social Development</td>
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<td>USD</td>
<td>United States dollar</td>
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<tr>
<td>VAT</td>
<td>value added tax</td>
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<td>VEHUPA</td>
<td>a Finnish research project on regional cooperation, 2001-2002</td>
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<tr>
<td>VVY</td>
<td>Vesi- ja viemärilaitosyhdistys (Finnish Water and Waste Water Works Association)</td>
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<td>WASH</td>
<td>Water and Sanitation for Health Project, a USAID (United States Agency for International Development) supported water and sanitation project, 1980-1994</td>
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<td>WATERTIME</td>
<td>an EU Research Project on decision making in 29 European cities, 2002-2005</td>
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<td>WEHAB</td>
<td>a UN initiative towards sustainable development (WEHAB = water, energy, health, agriculture and biodiversity)</td>
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<td>WHO</td>
<td>World Health Organisation</td>
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## TERMS AND DEFINITIONS

**CATWOE**
Customer(s) – Actors – Transformation – Weltanschauung (Worldview) – Owner(s) – Environmental constraints. A method for formulating a core definition of a system by analysing the sub-systems, systematic processes and factors affecting the functioning of the entire system.

**Cross-disciplinary**
Combining two or more academic disciplines.

**Concession**
A contractual arrangement in which a utility enters into an agreement with an outside entity to operate and maintain an existing water system, typically for a 20- to 30-year term. The contractor has the responsibility for any capital improvements required to achieve certain specified performance objectives. At the end of the contract, the contractor hands the network and installations in working order back to the owner.

**Delphi**
A group problem solving and forecasting technique based on survey of expert views, commonly used in futures research.

**Divestiture**
Complete privatisation of infrastructure where public assets are sold to a private owner.

**Dublin principles**
In 1992 in Dublin representatives of governments, intergovernmental and non-governmental organisations agreed on four basic principles related to water.

**Grounded theory**
A systematic methodology for generating theory from data, rather than the other way round.

**Interdisciplinary**
Involving two or more academic, scientific or artistic disciplines.

**Intermunicipal**
Joint effort or organisation of two municipalities.

**Johannesburg Summit**
A UN Summit on Sustainable Development organised in Johannesburg, South Africa in 2002.

**Lease contract**
The owner of infrastructure makes investments, but the operations are carried out by an outside entity based on a lease contract. The operator collects the fees and pays rental on the infrastructure it uses, which the owner uses for capital investments. The French lease contract is commonly called ‘affermage’.

**Maastricht Treaty**
Formally, the **Treaty on European Union**, was signed in 1992 in Maastricht, the Netherlands, between the members of the European Community leading to the creation of the European Union and to a common European monetary unit, the euro.

**Management contract**
An arrangement under which operational control of e.g. water infrastructure is vested by contract in a separate enterprise which performs the necessary managerial and operational functions in return for a fee.

**Method**
Technique or arrangement of work for a particular field or subject.
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<td>Methodology</td>
<td>System of methods and principles used in a particular discipline.</td>
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<td>Millennium Development Goals</td>
<td>The eight Millennium Development Goals (MDGs) – which range from halving extreme poverty to halting the spread of HIV/AIDS and providing universal primary education, all by the target date of 2015 – form a blueprint agreed to in 2000 by the world’s countries and the world’s leading development institutions.</td>
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<td>New European Water Culture</td>
<td>Originally a Spanish initiative ignited by a massive water transfer plan in Spain, the New Water Culture stresses that many other aspects, not just economical, should be addressed when solving water-related questions.</td>
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<td>Paradigm</td>
<td>A set of practices that define a scientific discipline during a particular period of time.</td>
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<td>Provision</td>
<td>The act of supplying something, e.g. service; the service provider does not have to produce the service himself but must make sure that the service is available.</td>
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<td>Regional authorities</td>
<td>Territorial authorities between central government and local authorities. The relationship between regional and local authorities is not, however, necessarily hierarchical.</td>
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<tr>
<td>Soft systems methodology</td>
<td>An action research-based methodology commonly used in futures research to describe and analyse the transformation process of an organisation.</td>
</tr>
<tr>
<td>Subsidiarity principle</td>
<td>In political systems the principle of devolving decisions to the lowest practical level.</td>
</tr>
<tr>
<td>Supramunicipal</td>
<td>Joint effort or organisation of two or more municipalities.</td>
</tr>
<tr>
<td>Undertaking</td>
<td>A formal organisation established for a certain function, can be private or public.</td>
</tr>
<tr>
<td>Water Boards (Waterschappen)</td>
<td>Democratic water control institutions in the Netherlands since the 13th century. Originally established for land drainage, but nowadays Water Boards have much wider responsibilities including wastewater treatment.</td>
</tr>
<tr>
<td>Water undertaking</td>
<td>An organisation (utility, company, etc.) providing water services, can be public or private.</td>
</tr>
<tr>
<td>World Water Forum</td>
<td>The World Water Forum is a huge gathering of water sector professionals, politicians and other stakeholders with the aim of raising awareness about water issues all over the world. Forums have been arranged every three years since 1997.</td>
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1 INTRODUCTION

1.1 Background

Well-functioning water and wastewater services are basic requirements for all human activity. Yet, of the world population of 6.5 billion more than 1.2 billion (20%) suffer from the lack of adequate water supply, and 2.6 billion people (40%) do not have access to proper sanitation facilities (WHO 2004; World Water Forum 2006b). We, the lucky ones, who enjoy the privilege of these services often take them as granted failing to appreciate the efforts expended to reach the current state of affairs. It is estimated that even in Europe 41 million people do not have access to safe drinking water and 85 million people lack access to basic sanitation (World Water Forum 2006a).

Water and wastewater services have typically been developed by public sector organisations for two important reasons: i) supply of good quality water and proper sanitation are vital for public health and have, thus, been seen as basic tasks of the public authorities, and ii) water and wastewater services are capital-intensive natural monopolies which need to be kept under public control to prevent the misuse of monopolistic market position (World Water Forum 2006b).

Municipalities have played a central role in the development of water and wastewater services in the industrialised world since modern piped systems were introduced on a large scale around the mid-19th century. In nearly all European countries the responsibility for water and wastewater services has been by legislation vested in the municipalities. Except for a few cases, water and wastewater systems in Europe have been both owned and operated by municipal utilities. (Melosi 2004; Juuti & Katko 2005)

Particularly during the last decades, public sector organisations have been under financial pressure and their traditional structures have been challenged. The most extreme example is England and Wales where during the conservative rule of Prime Minister Margaret Thatcher most public infrastructure services were privatised (Semple 1994; Rees & Zabel 1998; de la Motte 2005b; OFWAT 2006). Elsewhere, new ways to produce services, which so far have been produced by public organisations, are being sought. In Finland municipalities have been given more freedom to decide how to perform their statutory tasks and how to spend the money they collect either through municipal taxes or in government subsidies (Kettunen 1999). The freedom of Finnish municipalities is in reality rather limited because almost all resources have to be spent for statutory purposes.

In Finland water and wastewater services are clearly the responsibility of municipalities in accordance with the Water Services Act (2001). Furthermore, legislation has stipulated since 2001 that all costs, including investments and replacements, related to water and wastewater services have to be covered by the fees collected from the service users, and in order to improve transparency municipal water utilities have to keep separate books from the municipality.

Although municipalities in Finland are in principle responsible for water and wastewater services, it does not mean literally that municipalities have to bring these services to every
household. Municipalities have the overall provision and development responsibility within their areas. Finland is a large country with vast sparsely populated rural areas where the basic responsibility for water and wastewater services lies with the property owner. This means that rural property owners cannot demand the municipality to arrange water and wastewater services for their property, but have to find their own solution. In Finland 11% of the population lives outside centralised water supply systems and 19% outside centralised sewerage (Lapinlampi & Raassina 2002a & 2002b). Recent amendments to legislation require significant improvements in the wastewater treatment practice in rural areas (Domestic Wastewater Degree 2003).

1.2 Objectives

The main objective of this research is to analyse the role of municipalities in water and wastewater services. It deals with selected countries in Europe but focuses on Finland. Water and wastewater services in Finland are, according to international comparisons, exceptionally well organised (Lawrence, Meigh & Sullivan 2002). In Finland, as in industrialised countries in general, the public sector and particularly the municipalities have played a central role in the development of these services. However, the world is changing and the public sector is facing financial difficulties throughout the world. One of the key questions is whether public sector organisations will still be able to perform their tasks in the future. Is the Nordic welfare society crumbling under financial pressures? Will the tasks and duties of the municipalities change?

This study seeks answers to the following research questions:

- Briefly introduce the structure of municipal administration in a number of European countries, and particularly what is the role of municipalities in relation to infrastructure services?
- How have water and sanitation services evolved in a number of European countries, and what has been the role of municipalities?
- What effects have various public administration traditions had on the development of water and sanitation services and their institutional organisation?
- What problems and issues are municipalities currently facing in relation to their responsibilities for water and sanitation services?
- What are the future challenges in water and sanitation services and how can they be met particularly in Finland?
- What should the role of municipalities be in ensuring reliable, equitable, affordable and good quality water and sanitation services in the future?

1.3 Structure and scope of the research

This research looks at water and wastewater services as multi-dimensional activities within a wider institutional context considering the role of all stakeholders of water services. On the one hand, the purpose of these services is to fulfil basic human or societal needs through various, mainly engineering, arrangements. Yet, the implementation of these technical solutions is subject to many constraints: legislative, national, regional and local administration, institutions, economics – not only utility economics but also national economics – human and social capital, etc. (Hassan 1996a; Hukkinen 1999; Melosi 2004). Figure 1.1 illustrates the relationship between water and wastewater services and the administrative environment as well as customers, while also recognising the various research approaches to be considered.
Figure 1.1 General framework of the research

The research draws inputs from a wide range of activities the author has been involved in during the last ten years – in some cases even longer. This dissertation consists of a summary article and four peer-reviewed articles as shown in Figure 1.2. The summary article is based not only on the four peer-reviewed articles but also on a number of other peer-reviewed or non-peer-reviewed articles, conference and workshop presentations, research activities including theses supervision and involvement in working groups, professional associations and advisory assignments.

The countries viewed more closely in this research are Finland, Sweden, Lithuania, Germany, the Netherlands, France and England. The selection of just these countries was not intended to present the average situation in Europe but rather to demonstrate the variety of practices even within this limited area of Northern and Central Europe. The research concentrates on Finland, the researcher’s native country, where he is better able to understand the factors underlying people’s and organisations’ behaviour than in a foreign environment.

Swedish practices and traditions are not that different from Finnish ones, but Sweden provides a nice reference point in any case. Lithuania, on the other hand, has a clearly different tradition of public administration due to her fifty years under Soviet rule until 1990. The researcher gained deep understanding of Lithuania from 1996 to 2000 while working in that country for an organisation supporting its municipalities in environmental sector activities.

Germany is an example of a large federal state with a strong tradition of municipally run infrastructure services. Netherlands has a long and unique history in water management for flood prevention and land drainage purposes; this historical tradition has also shaped the organisation of water and wastewater services. France has a very large number of small municipalities and a long tradition of privately operated water services via lease or concession contracts. England, since 1989, is an extreme and rare example of completely privatised water and wastewater services. Water and wastewater services were privatised also in Wales but not in Scotland and Northern Ireland. Yet, this research deals only with England, not the United Kingdom as a
whole. The researcher also has experience from England having worked for Thames Water Authority in 1978–1980 when it was still publicly owned.

![Figure 1.2 Structure of the research: study itself, related publications, and other activities](image)

Namibia is not included in the countries discussed in more detail in this research, even though one of the peer-review articles dealing with the role of local government focuses also on Namibia. There are similarities with the problems faced by countries like Namibia, moving from a strong centralised administrative structure to a decentralised form. It would certainly have been interesting to widen the scope of the research to cover also Namibia, but even the limited number of European countries included in the study introduced a wide enough selection of different traditions and practices.

The research itself is described in six chapters. Chapter 2 introduces the concepts of water and wastewater services, infrastructure systems and water resources management. It also provides some background for the trends and challenges water and wastewater services and service provision are facing. Chapter 3 explains the methodology and methods of the research.

Chapters 4 and 5 analyse the situation in selected European countries. Finland is dealt with in more detail than the other countries because the emphasis of the later chapters is clearly on Finland. Chapter 4 concentrates on the development and role of municipalities in administrative structures of various countries. Special attention is paid to the role of municipalities in infrastructure services. Chapter 5 studies the development of water and sanitation services – how
have these services evolved, what have been the tasks and duties of central and local
government, what is the current state, and how does the future appear?

Chapter 6 discusses the nature of water and wastewater services and how these services are
organised. The situation is different in urban and rural areas. Extra dimensions to be considered
are ownership of the assets on the one hand, and the provision of services on the other. Chapter
7 reviews the research carried out, presents conclusions, and proposes some topics for further
research.
2 PROBLEM FORMULATION

2.1 Development of water and wastewater services

Water is a basic requirement for all human activity. In the early days of human history people had to settle in areas where water was available. Later on, technologies were developed to transfer water over distances to enable permanent habitation of areas suffering from the lack of water. Alternatively, naturally available water resources could be complemented to allow a larger population to settle in the area. There are magnificent examples of such water transfer and storage schemes already from the Greek and Roman periods more than two thousand years ago, the Central American Maya culture over a thousand years ago, and the later South American Inca culture until the 16th century. (Hughes 2002; Kessener 2005)

Figure 2.1 Roman aqueduct in Segovia, Spain, built during the first century A.D. (Hodge 2000, photo P. Pietilä)

When population centres expanded and ever more water was supplied to them, the problem of wastewater became more serious. The early Romans already had sewerage systems and some water-flushed toilets. Urban streams were transformed into drainage canals, more ditches and channels were built in towns, and the drainage channels also served as sewers to convey liquid waste, and to some extent solid waste, away from the residential areas. When piped water
systems were introduced more widely in Europe during the 19th century, and flush toilets became more common, the need to build proper sewers became acute.

### 2.2 Nature of infrastructure systems

Physical infrastructure systems – such as water, wastewater and solid waste services – cannot be considered separately from socioeconomic systems; we have to keep in mind that infrastructure systems are based on, and closely connected, to the natural environment (Figure 2.2). Basically, infrastructure supports a complex socio-economic system while, on the other hand, it is dependent on the natural environment which to a large extent determines its scope and limitations.

![Diagram of infrastructure systems](image)

Figure 2.2 Relationship between infrastructure, socio-economic systems and the environment (Grigg 1988a)

This simplified diagram must, however, be expanded greatly to show all the different categories of infrastructure, industries of the economy, and levels of government involved in infrastructure management.

The World Development Report (World Bank 1994) also highlights the importance of infrastructure to human activities as follows: *Infrastructure represents, if not the engine, then the "wheels" of economic activity. … Users demand infrastructure services not only for direct consumption but also for raising their productivity by, for instance, reducing the time and effort needed to secure safe water, to bring crops to market, or to commute to work. Much research in recent years has been devoted to estimating the productivity of infrastructure investments. Many studies attempting to link aggregate infrastructure spending to growth of GDP show very high returns in a time-series analysis. What is evident is that a strong association exists between the availability of certain infrastructure - telecommunications (in particular), power, paved roads and access to safe water - and per capita GDP. An analysis of the value of infrastructure stocks indicates that their composition changes significantly as incomes rise.*

On the other hand, the level of infrastructure reflects the state of the economy and standard of living: infrastructure has to be developed in tune with GDP and cannot run significantly ahead of other sectors.

### 2.3 Infrastructure and society

Infrastructure systems support the functions of society, but also need to be financed and maintained by the society. What are these infrastructure systems? A dictionary might define them as basic facilities, equipment, and installations needed for the functioning of a societal
Collins Dictionary (Hanks 1986) defines infrastructure as: 1) the basic structure of an organization, system, etc., and 2) the stock of fixed capital equipment in a country, including factories, roads, schools, etc. considered a determinant of economic growth.

Kaijser (1994) explains that the word infrastructure was put together from the Latin words *infra* and *structura* which mean below or underneath and building or structure, respectively (Morwood 2003). The word infrastructure was first used by NATO in the 1950s to describe airports, telecommunication and other basic functions necessary in military activities. In the 1960s the word was taken into wider use in German civil society literature to describe the basic material and immaterial functions of society. Around the same time the concept of “social overhead capital”, meaning roughly the same as infrastructure, started to appear in English-language literature particularly in connection with the developing countries. Infrastructure can be understood either narrowly to mean only physical structures such as transportation, energy, communication, water supply and sewer systems, or more widely to include also non-material basic functions of the society such as education systems.

Engineering definitions also specify what infrastructure systems do and state that infrastructure is physical assets arrayed in systems that provide essential public services. This definition includes three conceptual ideas about infrastructure – what it is, how it is organised, and what it does (Grigg 1998b). Usually infrastructure systems are considered to include the following: transportation, communications, water and wastewater services, energy, waste management, and the built environment. Figure 2.3 gives an example of the various levels and inter-related activities of infrastructure systems.

The first main policy question concerning infrastructure is how much of society’s resources should go to public goods – such as roads, health care, defence, and welfare – and how much should be left for private consumption of cars, entertainment, clothes, and other purchases (Grigg 1998b). Then, as regards the public component of resource allocation, how much of it should go to capital investment, operation, and maintenance of infrastructure, and how much should go to other public programmes such as government pensions and education? And how do we determine which parts of infrastructure constitute public goods versus private goods? If there is no effective mechanism for resolving the competing budget claims of politicians, line ministries, and sub-national governments, public expenditures will exceed available funds. The resulting unsustainable fiscal deficits can translate into high inflation and high interest rates (World Bank 2003). Water and wastewater service provision is extremely capital intensive activity, and as such particularly vulnerable to external constraints upon its investment programme. In this context, central government controls upon investment which serve to satisfy short-term financial goals can have serious long-term consequences for the service infrastructure, and ultimately for the consumer. But one should make a difference between different public and infrastructure services. Some services, such as water, can at least in principle – and in many countries even in practise – be financed by direct user charges, not by taxation funds. Thus, the dilemma of different sectors fighting for the same money can at least partly be avoided.
### 2.4 Water resources and water services

Water and wastewater services are strongly path dependent; structures built today should last tens of years, even up to a hundred years. In economic calculations 20 years is generally regarded as a relatively short time span. In water resources allocation and management the time horizon is even longer. Desirable policies should foster the long-run viability of both economic and environmental systems. Livingston (1993) stresses the need for a long-term approach by pointing out that “water resources allocation that maximizes net present value in the short run (50 years), may be destructive for long-run productivity and environmental integrity and therefore seriously jeopardize the prospects for future generations”.

Water resources, on the one hand, and water and wastewater services, on the other, are closely interlinked (Figure 2.4). Surface and groundwater resources are used as sources for water supply. Thus the availability and quality of water resources are of utmost importance to the water service provider. After water has been consumed, it will be discharged more or less polluted via
sewerage and wastewater treatment systems to watercourses which, again, are the water sources of downstream users. The efficiency of wastewater treatment upstream directly affects the cost of purifying water to drinking water standards in the locality downstream. Tighter treatment requirements imply higher costs and consequently higher water tariffs. Thus, the economic regulation of water and wastewater services cannot be divorced from environmental regulation. (Tomkins & Wharton 1996)

Figure 2.4 The linkage of water services and water resources management

Integrated Water Resources Management (IWRM) has been identified as one of the basic water-related policy approaches in recent environment and water sector international forums such as the Johannesburg Summit in 2002 and World Water Forums in 2003 and 2006 (Varis 2005). In Europe, the EU Water Framework Directive provides a useful instrument for integrated water resource management in river basins.

On the one hand, IWRM calls for the management of water resources based on larger geographical areas than the typical water services areas. River basins are often shared by neighbouring countries and may even extend over several countries while water services are typically operated and managed locally at municipal level. On the other hand, the subsidiarity principle, which is established also in the EU law by the Maastricht Treaty, and the Dublin principle of 1992 both stress that water should be managed at the lowest appropriate level (UNCED 1992). Thus, broadly speaking, water resources management is largely a regional, national and even international issue while water services management is more of a local one.
2.5 New challenges for infrastructure services

Until recently, infrastructure management – at least in Europe – has been characterised by the aim of providing affordable, adequate and secure services to all. The overall objective has been to build supply capacity and extend distribution networks to meet growing need, get as many people as possible connected to the supply system, and improve performance standards. The process has been predominantly supply-driven. Water supply undertakings have typically enjoyed territorial monopoly, and they have been able to do long-term planning and distribute costs evenly among the users. Yet, prices between consumer groups have varied. There are also significant regional and sectoral variations to conventional infrastructure management. The variations can be explained by the degree of local authority responsibility for infrastructure services, the regulatory framework, the market structure of each utility sector and the dominant technique or techniques used (Moss 2001).

Liberalisation and privatisation are not the only recent challenges to water and other infrastructure services. There are also other pressures such as stricter environmental regulation, heavy investment needs and growing public concern for service quality and costs (Guy, Marvin & Moss 2001). Figure 2.6 summarises the features of infrastructure services, emerging challenges and recent responses.
The introduction of the private sector to water service provision has been a socially and politically sensitive issue. It is worth noting that the general public has often been against it (Myers 1998). The huge salary increases of England's privatised water companies’ directors and senior executives have been criticised strongly. During the drought of 1995/96, the new mood of customers manifested itself. When Yorkshire Water, one of the large private water companies in England, appealed to the public to save water, people did not obey. Some users even took countermeasures and let their taps run continuously. The company’s water-saving programme failed. The people no longer considered water a ‘public good’ after it had been privatised based on a political decision. (Osborn & Marvin 2001)

The roles of the public and private sector as providers of services for citizens have been extensively discussed within various service sectors in different parts of the world (Serageldin 1994; Jackson & Price 1994; Mody 1996; Holzer & Callahan 1997; Rasinmäki 1997; Myers 1998; Dosi & Easter 2000; Kuks 2006). In several developing countries water was regarded as a basic good two or three decades ago which the citizens should get free of charge. The responsibility for water supply provision was at the state level which is why centralised administration systems were in use. The lesson learned was that a centralised system cannot produce the necessary services – decentralisation is indispensable.

When public vs. private provision of services is discussed in international forums, “public” is very often, and wrongly, equated with state-controlled. But “public” can also mean municipally owned which is often overlooked in the discussion. In Europe and much of the rest of the world
water and, in particular, wastewater services are typically the responsibility of municipalities, not the state. The disregard for municipalities may be due to the less important role of municipalities in some countries (like Britain) compared with, for instance, the Nordic countries. (Mennola 1991; Foreign & Commonwealth Office 1998)

### 2.6 Public vs. private provision

In Western Europe and elsewhere, new ways of providing services, which traditionally have been provided by municipalities, have been introduced – partly due to financial and ideological pressures (Bortolotti, Fantini, Siniscalco & Vitalini 1998; Mannion 1998). One common solution has been privatisation in one form or another (Martin 1994). Rail traffic has been opened to competition by private operators in Britain with highly questionable results. Public transport and energy companies have been sold to private investors. After the collapse of the Soviet Union, a wave of privatisation swept over the former Soviet Republics as well as other countries in Central and Eastern Europe which had been under the influence of the Soviet Union.

Outside the former Soviet Union, probably the most extreme example of political change towards privatisation occurred in England where during the 1980s most state owned enterprises were sold to private investors. This move towards privatisation was a political decision of the ruling Conservative Party. The aim was to create an industrial structure where state ownership plays only a minor role (Okun 1994; Hassan 1998; Gustafsson 2001; Lobina & Hall 2001).

Figure 2.7 shows the three key stakeholders in water service provision: i) consumers or water users, ii) the operator, or producer of the services, and iii) the political and institutional setting in which these services are provided. But these three stakeholders cannot operate in isolation from the environment and the environmental consequences of their activities.

![Figure 2.7 The balance of “market” forces (Hartvelt 1997)](image)

The interest of the private sector to provide water services is quite understandable. Water is an essential commodity which people, businesses and industries need, and water cannot be replaced by any other product. The business of providing water services to the community is essentially a natural monopoly. The customer base is solid and the use of the services is rather stable, and economic fluctuations have only a minor effect. These features as such create potential for an
extremely solid business investment (Myers 1998). Various forms of private sector involvement in water service provision are presented in Figure 2.8.

![Diagram of public-private partnerships options](image)

**Figure 2.8** Main options for public-private partnerships according to WASH (1992)

Note: O&M = operations and maintenance

### 2.7 Central vs. local level

In international discussion and even in scientific literature “public” is frequently equated more or less with state or central government. It is true that particularly in the past, in many countries public administration was extremely centralised – not only in the socialist countries under the direct influence of the Soviet Union, but also elsewhere. But there have also been, especially in Europe, countries with a strong tradition of local administration and local democracy. One strong indication of local democracy in the form of real local power is the local authority’s right to levy taxes. Partly due to the financial dilemma of too many stakeholders fighting for the centrally collected tax money, decentralisation has gained ground throughout the world in recent years (World Water Forum 2006b). But one should keep in mind that any radical change in administrative structure – such as a move from centralised to decentralised administration – will take time to effect and become truly functional. Functional decentralisation requires clearly defined responsibilities at various levels, on the one hand and transparency and accountability to gain the trust of the people, on the other (Figure 2.9).

![Diagram of central vs. local relationship](image)

**Figure 2.9** Key relationships in democratic decentralisation (Barnett, Minis & VanSant 1997)
2.8 Special features of water and wastewater services

The special features or ‘ontology’ of water and wastewater services are discussed in more detail in Article IV. In connection with water and wastewater services, it is worthwhile to keep in mind the long-term nature of the decisions related to them. We need to look as far as 100 years or even further ahead in the development and upgrading of infrastructure (Hall, Lanz, Lobina & de la Motte 2004). The physical assets built today are in many cases expected to be still in use a hundred years from now, and once in place, such assets have little alternative use (Melosi 2000). Production of water and wastewater services is highly capital intensive (Tomkins & Wharton 1996).
3 METHODOLOGY

Research can be carried out in many ways using a variety of approaches, and it can be based on different research paradigms. The nature of the research question has an important role in the selection of a relevant paradigm or approach, but a number of paradigms can be justified in connection with any given research question. Broadly speaking, research approaches are typically classified as qualitative or quantitative. The objective of qualitative research is to understand phenomena while in quantitative research the objective is to make statements that have predictive power (Stainback & Stainback 1988). But the boundaries of these two approaches are not clear, and it is hard to find research that is purely qualitative or quantitative (Alasuutari 1999). Each research paradigm comprises several methodologies, each drawing on a number of methods for data collection and interpretation. The interrelationship of paradigm, methodologies and methods is illustrated in Figure 3.1 (Dick 2006).

![Figure 3.1 Methodologies and methods of a research paradigm (Dick 2006)](image)

The leading paradigm of this research is action research, and the methodology mainly used is the soft systems methodology. The Delphi technique, grounded theory, case studies and literature surveys are the main methods.

3.1 Action research

Action research is an established research paradigm that has been used in the social and medical sciences since the mid-twentieth century. A German social and experimental psychologist, Kurt Lewin, is generally considered the ‘father’ of action research (O’Brien 2001). Action research can be described as a family of research methodologies which pursue action (or change) and research (or understanding) at the same time. Action researchers are among those who assume that complex social systems cannot be reduced for meaningful study. They believe that human organisations can only be understood as whole entities. Action research refers to a group of research approaches, rather than a single, monolithic research method (Baskerville 1999). The role of municipalities in water and wastewater services provision clearly is a question requiring a comprehensive research approach which justifies application of the action research methodology.
The positivist conception of science has long dominated the practice of physical, biological, and social sciences. In the positivistic research tradition, scientific knowledge is derived only from data that can be directly experienced and verified by independent observers (Allen 2001). Action research is based on a different approach. It does not follow the traditional research cycle where you may have a clear research question to start with, you study the literature, establish your research set-up, do the research, collect data, and draw your conclusions.

Action research is more of a holistic approach to problem-solving than a single method for collecting and analysing data (O’Brien 2001). Action research is closer to a process – in the beginning you do not know exactly what you will face on the way and how you should act. For instance, the relevant literature is defined by the data you collect and your interpretation of it (Dick 2006). Action research is different from many other types of research paradigms in that the researcher does not need to try to remain neutral but can openly acknowledge his/her bias to the other participants. Yet, the researcher studies the problem systematically and ensures that the findings are based on theoretical considerations (O’Brien 2001).

Baskerville and Wood-Harper (1996, cited by Baskerville 1999) concluded that the ideal domain of action research methodology is characterised by a social setting where:

i) the researcher is actively involved, with expected benefits for both researcher and organisation

ii) the knowledge obtained can be immediately applied

iii) the research is a process linking theory and practise.

Action research is a paradigm which has the dual aims of action and research (Dick 2006): (i) action to bring about change in some community or organisation or programme, and (ii) research to increase understanding on the part of the researcher or the client, or both (and often some wider community). Action research methods may have action as their main emphasis but research may just as well be the main focus making action only a by-product. In research-oriented action research the publishing of results for the researcher audience is often of central importance.

Manninen (2006) has compared the approaches of traditional research and action research (Box 3.1). While traditional research argues for objectivity, action research admits its subjectivity. In action research the researcher himself/herself aims at changing and developing the phenomenon.

<table>
<thead>
<tr>
<th>Box 3.1. Traditional research vs. action research</th>
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<tbody>
<tr>
<td>TRADITIONAL RESEARCH</td>
</tr>
<tr>
<td>• External approach</td>
</tr>
<tr>
<td>• Objective</td>
</tr>
<tr>
<td>• Phenomenon itself is not interfered with</td>
</tr>
<tr>
<td>• Phenomenon is observed objectively from the outside without affecting it</td>
</tr>
<tr>
<td>• &quot;How does it work?&quot;</td>
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Dick (2006) defines four methodologies that can be used in action research: i) participatory action research, ii) action science, iii) soft systems methodology, and iv) evaluation. This research applies mainly the soft systems methodology. Participatory action research would not work in this research because it requires active participation from key persons outside the
research group throughout the research. It is not feasible to expect that people working full-time at other jobs could do that. Action science is better suited for situations where the main emphasis of the research is on system dynamics based on communication flows and relationships. This research has a wider range of factors to deal with starting from the physical and engineering properties of water and wastewater services. Evaluation as an action research methodology is related to the soft systems methodology in that it deals with inputs or resources, transformations or activities, and outputs. Outputs are evaluated at various levels. Evaluation could be to some extent, and in fact is in some ways used in this research, while the main approach is that of soft systems methodology.

Figure 3.2 describes the position of the researcher in this research in relation to his experience from field activities and research projects, and his linkage with colleagues and experts from Finland and abroad.

Figure 3.2  Action research approach applied in this research

Action research has been criticised for the following reasons: i) it deals with a certain particular situation and is thus not easily generalisable, ii) the researcher may significantly affect the results, iii) the reliability of the results is doubtful, iv) the researcher’s roles as both an objective researcher and an active participant may be contradictory, v) application of the results can be very limited, and vi) independent variables cannot be controlled (Niskanen 2005).
3.2 Soft systems methodology

In systems design, modelling is of central importance since it is through this activity that the new system is visualised (Bergvall-Kåreborn, Mirijamdotter & Basden 2004). The aim of modelling is usually to represent a current situation as well as a new future situation that may be implemented, but the extent to which we develop our model is limited by our personal perspectives. The soft systems methodology (SSM) is a general and flexible theoretical framework suitable for problem solving in real world situations and in human activity systems that are more or less imprecise (Mannermaa 1992; Hukka 1998). The soft systems methodology was originally developed by Checkland (1984) for action research. The soft systems methodology approach is meant for tackling ill-structured problems in human activity systems. The special nature of human activity systems means that the systems studies dealing with them are always multi-valued, with many and often conflicting values to be explored (Hukka 1998). Jayaratna (1994, cited by Bergvall-Kåreborn et al. 2004) points that SSM builds on the interpretive or hermeneutic paradigm and “is a methodology which recognizes the role of the individual’s ‘world images’ and the influence of historical background on the interpretation of ‘reality’ “.

Dick (2006) defines the soft systems methodology as an inquiry process which stresses the notion of dialectic. One form of the inquiry process consists of three dialectics. In each dialectic the researcher(s) alternate between two forms of activity, using one to refine the other (Figure 3.3).

The process starts with the researcher immersing himself in the reality, doing what could be called participant observation. Next he tries to capture the essence of the system in a description, in terms of its most important functions. Then he switches between reality and his description of reality until he is content with his description of the essential functions. This is the first dialectic.

The second dialectic is between the description of the reality and the researcher’s imagination of an ideal. At this stage the researcher is expected to forget his experience of the reality and work from his description of its essential functions. He moves to and fro between essence and ideal, until he eventually is satisfied that his ideal achieves the essential functions of the system. The ideal, too, is conceived of in systems terms by devising an ideal way of transforming the inputs into outputs. Systems models help to suggest ways in which the different goals of the studied system can be achieved (Dick 2006).

The third step is to compare the ideal and actual. Comparisons may identify missing pieces of the ideal or better ways of doing things. This third dialectic brings up proposals for improving reality. This in turn leads to action which is a dialectic between plans and reality.
In fact, the series of dialectics by Dick resembles Kolb’s learning cycle (Kolb 1984). Kolb’s four element cycle consists of concrete experience, reflective observation, abstract generalisation, and active experimentation (Figure 3.4).

It is typical of the soft systems methodology that each cycle occurs several times. These iterations improve our understanding. If the poles of a dialectic do not match, the researcher needs to delve deeper into what he does not understand.

The inquiry system described above (Figure 3.3) is converted into soft systems analysis by using system concepts in defining the essence and the ideal. In systems terminology, the essence becomes the necessary functions which Checkland calls root definitions. To ensure their adequacy Checkland proposes what he calls CATWOE analysis (Smyth & Checkland 1976):

- Customers
- Actors
- Transformation (that is, of system inputs into outputs)
- Weltanschauung (or worldview)
- Owners, and
- Environmental constraints.
Bergvall-Kåreborn et al. (2004) clarified the CATWOE elements based on an analysis of a large number of publications and research projects as shown in Box 3.2.

**Box 3.2. CATWOE elements**

**Transformation, T**
Transformation presents the purposeful activity to be modelled, expressed as a Transformation process. Traditionally T has been understood as transformation of some input to some output:
\[ \text{Input} \rightarrow T \rightarrow \text{Output} \]
But this simple formulation has proved difficult in practical analysis, and presently the most commonly occurring statement is:
\[ \text{Need for } X \rightarrow T \rightarrow \text{Need met} \]

**Worldview, W**
Worldview is related to our worldview and beliefs and explains what makes T meaningful. Quite clearly W is closely related to the person’s own perspectives.

**Customer, C**
Customer is defined as the beneficiary or victim of the system’s activity. But here we must broaden our view and not limit our thinking of a Customer only to those directly affected by T. Often indirect impacts are vitally important for the real success or failure of the system. Thus the term ‘affectee’ would better describe what we really mean with a Customer.

**Owner, O**
The owner of the system is defined as a person or group that can stop T. In most studies the owner is represented by a person or group with formal power to stop the Transformation. In a broad sense Owners may range from CEOs to terrorists. As in the case of the Customer, we must have a broad view of the Owner. Within public organisations, such as municipal organisations, the Owner consists of the whole society – even though it is a much smaller group of people who has the real potential to stop Transformation process if the system does not meet their aspirations.

**Actor, A**
Actor is defined as one who effects Transformation.

**Environment, E**
Environment constraints refers to ‘elements outside the system which it takes as given’. Common E’s are: time and resources, existing structure, norms, modern technology, company resources, corporate objectives, and project definitions. But here as well one should think more broadly in order to be able to accommodate less straightforward E’s such as: high bargaining power of suppliers, loss of confidence of customers etc.

### 3.3 Methods

Whatever research methodology is used, some means to collect the information are needed. Action research allows for several different research tools to be used. Various methods, which are common to the qualitative research paradigms, are suitable also in action research. These methods include: keeping a research journal, document collection and analysis, participant observation recordings, questionnaire surveys, structured and unstructured interviews, and case studies (O’Brien 2001).

#### The Delphi technique

The Delphi technique has traditionally been used to reach an agreement, or a consensus about a question or view, without necessarily having people meet face to face. A Delphi interview can be conducted in the form of surveys, questionnaires, emails, etc. The essence of the Delphi technique is that it is not just a one-off method where the researcher sends out a questionnaire and collects and analyses the responses. The vital part of Delphi is that the researcher summarises the results and, based on the results, develops a new questionnaire for the respondent group. Their reaction can be to change their original view based on the arguments presented by
others or to provide additional information to justify their original opinion (Linstone & Turoff 2002).

Usually a Delphi survey involves four distinct phases (Linstone & Turoff 2002; Kuusi 2003):
1. Exploration of the subject under discussion so that each respondent can contribute additional information that he/she finds appropriate.
2. A process to reach an understanding on how the group views the issue, where they agree and disagree.
3. If there is significant disagreement, the disagreement is explored to bring out the reasons for the differences and to evaluate them.
4. Final evaluation after all previously gathered information has been initially analysed and the evaluation has been fed back for consideration.

A Delphi survey does not necessarily aim at reaching a consensus among the group. Instead of discarding an item of information in disagreement with other views, it can be used to gather more detailed information. The Delphi method uses a panel of carefully selected experts who answer a series of questionnaires. The key characteristics of the Delphi method are (Linstone & Turoff 2002; Kuusi 2003):
1. Iteration. There are several rounds in the survey, the results of each round of survey are clustered and sent back to the group.
2. Regular feedback. Participants comment on their own and others’ responses, and they can at any moment revise their earlier statements.
3. Anonymity. The identity of the participants is not revealed even after the final report is completed. This ensures honest and genuine views of the participants.

The Delphi method was originally developed at the Rand Corporation in the USA at the beginning of the Cold War in the 1950s. Later Delphi has been applied in other areas, in particular in questions related to public policy (Linstone & Turoff 2002; Kuusi 2003). Recently, the Delphi technique has been applied in two formats: i) the traditional involving paper questionnaires, or ii) a computerised version.

The grounded theory

The grounded theory was initiated as a countermeasure to the traditional deductive research approach which relied heavily on hypothesis testing, verification techniques and quantitative forms of analysis that were particularly popular in the social sciences at the time (Babchuk 1997). Grounded theory can be described as a research method where theory is developed from data, rather than the other way around. In the grounded theory approach, the researcher develops and applies the method based on an analysis of the information he/she has collected. The grounded theory is a suitable approach in research fields where only limited information is available or a completely new view is sought. The theory is based on step-by-step progressing analyses where phenomena are categorised and analyses build on each other (Karasti 2004).

The grounded theory research process has the following aims (Rantala 1999): i) to create theory rather than test it, ii) to give the researcher analytic tools to handle large amounts of information, iii) to help the researcher take into account alternative meanings of phenomena, and iv) to be simultaneously creative and systematic. During the entire research process the researcher tries to v) recognise, develop and analyse concepts, the building blocks of the theory.
The grounded theory was formally introduced by the sociologists Barney Glaser and Anselm Strauss in their book ‘The Discovery of Grounded Theory’ in 1967 (Glaser & Strauss 1967). Later on, the views of these two initiators of the theory diverged to some extent on how exactly the theory should be interpreted and utilised. Glaser has a more flexible approach which is guided primarily by the informants and their socially constructed realities, while Strauss is more concerned with validation criteria and a systematic approach (Babchuk 1997).

Elements of the grounded theory have been used in this research to some extent even though not as a systematic method.

Case studies

Case study is an ideal method when a holistic, in-depth investigation is needed (Feagin, Orum & Sjoberg 1991, cited by Tellis 1997). Case studies have been used in varied investigations, particularly in sociological studies. There is already wide experience from this method, and the procedures are as well tested as those of any other scientific field (Tellis 1997).

Yin (1994) recommends four stages for case study research:
1. design the case study
2. conduct the case study
3. analyse the case study evidence
4. develop the conclusions, recommendations and implications.

In this research, the municipal environment audit projects (MEA Projects) in Lithuania as well as the national context and city case studies of PRINWASS and WATERTIME research projects represent case studies. The outcome of these case studies has been utilised in Articles I and II (Lithuania) and Articles I and III (Finland) and particularly in Chapters 4 and 5 of this thesis. The researcher’s activities in Namibia in connection with a decentralisation support project can also be considered a case study contributing to Article II.

Literature survey

An extensive literature survey on the development of water and wastewater services has been an important base for this research as a whole. Other methods – case studies, the grounded theory and the Delphi technique – build largely on the knowledge gained from literature.

Literature surveys provided vital inputs to Articles I through IV as well to Chapters 4 through 6 of this thesis. Additionally literature has been utilised in the first three Chapters of the thesis – Introduction, Problem formulation and Methodology.

Table 3.1 summarises how different research methods have been used at various stages of this research.
Table 3.1  Use of different research methods

<table>
<thead>
<tr>
<th>RESEARCH STAGE</th>
<th>RESEARCH METHOD USED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Delphi technique</td>
</tr>
<tr>
<td><strong>Main Chapters</strong></td>
<td></td>
</tr>
<tr>
<td>4. Role of municipalities</td>
<td></td>
</tr>
<tr>
<td>5. Water and sanitation services</td>
<td>x</td>
</tr>
<tr>
<td>6. Discussion</td>
<td>x</td>
</tr>
<tr>
<td><strong>Articles</strong></td>
<td></td>
</tr>
<tr>
<td>Article I:</td>
<td></td>
</tr>
<tr>
<td>Finland and Lithuania</td>
<td></td>
</tr>
<tr>
<td>Article II:</td>
<td></td>
</tr>
<tr>
<td>Namibia and Lithuania</td>
<td></td>
</tr>
<tr>
<td>Article III:</td>
<td></td>
</tr>
<tr>
<td>Water services in Finland</td>
<td></td>
</tr>
<tr>
<td>Article IV:</td>
<td></td>
</tr>
<tr>
<td>Ontology</td>
<td>x</td>
</tr>
</tbody>
</table>

Note:
1) In chapters dealing with Finland and Lithuania

### 3.4 Composition of the research

The structure of the research and various research components are summarised in Figure 3.5. The main output of the research is the summary article presented in the middle of the graph. It draws on the four peer-review articles shown on the right as well as the various research projects and conferences presented on the left. The action research approach was predominantly utilised in connection with the research projects, even though it also contributed to the articles. Articles, on the other hand, were largely based on literature surveys but also on interviews and personal experiences of the researcher while working in Finland, Lithuania and Namibia.
Abbreviations:
- MEA = Municipal Environmental Audit
- VEHUPA = Finnish project of regional operation of water services
- PRINWASS = EU project on the involvement of private sector
- WATERTIME = EU project on decision making in 29 European cities
- CABLE = Decentralisation support project in Namibia
- UNRISD = United Nations Research Institute for Social Development, project on regulation and private sector

Figure 3.5 The composition of the research
4 ROLE OF MUNICIPALITIES IN EUROPEAN COUNTRIES

The tradition and structure of public administration in European countries vary greatly. The following is an introduction to the development and present role of local level (municipal) administration in a few European countries. The chapter does not intend to cover all fields of activities that local authorities are involved in, but intends to present some development trends which may explain how infrastructure services, water and wastewater services in particular, have been arranged in various countries. It tries to answer the question whether differences in local administration structures are responsible for differences in the ways water and wastewater services are organised. The research concentrates on the Northern and Central European countries of Finland, Sweden, Lithuania, Germany, the Netherlands, France and England. Even within this rather limited geographical area the structures and practices differ widely. One might expect the diversity to increase even more the further we move from Northern Europe and its cultural traditions. United Kingdom as a whole is referred to only occasionally; closer attention is paid only to England. Administrative patterns and ways of organising water and wastewater services in Scotland and Northern Ireland, in particular, differ substantially from those of England and would need to be explained separately.

4.1 Different heritages

Only two hundred years ago Europe was still a rural continent where just 12% of the population lived in towns and cities (Table 4.1). Industrialisation and urbanisation happened much earlier in England than in almost any other country. In 1800, England was still a predominantly rural country with three quarters of the population living in the countryside, but by 1900 the same share lived in towns and cities (Hughes 2002). In Finland urbanisation has been much slower, and the share of the population living in urban centres has risen from 8% in 1880, and 32% in 1950, to 61% in 2005 (Peltonen 2002; UN 2003). Finland and Lithuania remained predominantly rural societies much later than the other countries dealt with in this research; urbanisation accelerated only after World War II as shown by Figure 4.1.

Table 4.1 The proportion of urban population in Europe, 1300-2000 (Kangasharju 2004)

<table>
<thead>
<tr>
<th>Year</th>
<th>1300</th>
<th>1800</th>
<th>1850</th>
<th>1900</th>
<th>1950</th>
<th>2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Share of urban population</td>
<td>10%</td>
<td>12%</td>
<td>20%</td>
<td>38%</td>
<td>52%</td>
<td>75%</td>
</tr>
</tbody>
</table>

The role of local government and its relation to other public administration varies a lot in European countries. Dexia (2002b) classifies 15 older EU countries¹ into three categories: 1) federal states, 2) “regionalised states”, and 3) unitary states. In federal states, Austria, Belgium and Germany, the federated states (Bundesländer in Germany) play an important role in the administration and budget control on local governments. In “regionalised states”, Spain and Italy, regions have strong powers similar to federated states including legislative power. In unitary states (Denmark, Finland, France, Greece, Luxembourg, Ireland, the Netherlands, Portugal, Sweden and the United Kingdom), local governments have similar powers, but the degree of decentralisation varies. Most of these 15 countries have two tiers of local government, often the result of the division of responsibilities between the central and regional authorities.

¹ EU members before the accession of ten new member states in 2004
but some have just one (Austria, Portugal, Finland and Luxembourg), and some even three (France, Ireland, Spain and Italy) (Table 4.2). Different levels of local government do not supervise each other as a rule (except in the Netherlands). United Kingdom has features of a “regionalised state”; England, Wales, Scotland and Northern Ireland can be regarded as regions, but England does not have any regional local government tier, and the Welsh assembly does not have its own tax and legislative powers.

![Figure 4.1 The proportion of urban population in some European countries, 1950-2005 (UN 2003)](image)

In the ten most recent EU member states\(^2\), the local government structures have undergone changes during the last 15 years since the collapse of the influence of the Soviet Union around 1990 (Dexia 2003). The municipal tier was typically favoured during the early years of transition. People were fed up with centralised administration and wished to implement as wide decentralisation as possible. The average number of inhabitants per municipality in the ten new EU member states is typically smaller than in the older EU states. Lithuania is a strong exception with an average of 60,000 residents per municipality – the highest figure among all 25 EU member states (Dexia 2003). The new EU members are unitary states, with only Poland having a three tier local government system (Table 4.2). Czech Republic, Hungary, Latvia and Slovakia have two tiers of local government while Cyprus, Estonia, Lithuania, Malta and Slovenia have just one (Dexia 2004). It is understandable that Poland has one more local government tier because the country’s population is four times larger than those of the next largest new member states, Hungary and Slovakia.

\(^2\) Ten countries which joined EU on 1 May 2004
Table 4.2  Local government tiers in European countries in 2003 (Dexia 2004; Helgesen 2004)

<table>
<thead>
<tr>
<th>Country</th>
<th>1st tier</th>
<th>2nd tier</th>
<th>3rd tier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>2359</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belgium</td>
<td>589</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Czech Republic</td>
<td>6258</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Denmark</td>
<td>271</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Estonia</td>
<td>247</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finland</td>
<td>448</td>
<td></td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>36565</td>
<td>96</td>
<td>22</td>
</tr>
<tr>
<td>Germany</td>
<td>13854</td>
<td>323</td>
<td></td>
</tr>
<tr>
<td>Greece</td>
<td>1033</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Hungary</td>
<td>3158</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Ireland</td>
<td>85</td>
<td>29</td>
<td>8</td>
</tr>
<tr>
<td>Italy</td>
<td>8100</td>
<td>103</td>
<td>20</td>
</tr>
<tr>
<td>Latvia</td>
<td>547</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>Lithuania</td>
<td>61</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Luxembourg</td>
<td>118</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malta</td>
<td>68</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Netherlands</td>
<td>496</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Norway 1)</td>
<td>433</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Poland</td>
<td>2489</td>
<td>373</td>
<td>16</td>
</tr>
<tr>
<td>Portugal 2)</td>
<td>278</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slovakia</td>
<td>2920</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Slovenia</td>
<td>193</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spain</td>
<td>8106</td>
<td>50</td>
<td>17</td>
</tr>
<tr>
<td>Sweden</td>
<td>289</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>United Kingdom</td>
<td>434</td>
<td>36</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
1) Source: Helgesen 2004
2) Portugal has an infra-municipal tier (parishes)

There are, however, several exceptions to this straightforward division of local administration into one, two or three tiers each with its specified tasks and responsibilities. Some municipalities may hold the status of the first and second tiers of local government, and sometimes larger cities may also enjoy the status of a federated state.

In Germany, 118 major cities have combined city and district status. In Denmark, three municipalities – Copenhagen, Fredriksberg and Bornholm – as well as the island of Gotland in Sweden have combined municipality-county status. Sixty five major cities in Poland, seven municipalities in Latvia (including the capital Riga), 22 cities in Hungary, and Prague in the Czech Republic also hold both municipal and county status. Eight cities in Italy qualify as metropolitan cities and would consequently be eligible for municipality-province status, but so far only Venice has acquired that status (Dexia 2004). England has perhaps the most complicated local government administrative structure which is explained in more detail in Chapter 4.9.
In the federated states, the capitals and some other cities also hold the status of a state for historical reasons. They include Berlin, Bremen and Hamburg in Germany, Vienna in Austria, and Brussels in Belgium (Dexia 2004).

Mennola (1991) divided the Western European countries into three categories. The first one includes the northern welfare states, i.e. the Nordic countries, UK and the Netherlands. In these countries the role of regions and municipalities is to produce various welfare services meeting the standards decided at central government level. The budgets of municipalities are big and their staffs large, but their political power is often limited. The second category consists of federal states like Germany, Switzerland and Austria. These countries also have many typical characteristics of the welfare state, but the federal structure limits centralisation to some extent. There traditions are more important than in the Northern countries, and a much larger proportion of welfare services are produced by other than municipal organisations. The third group, the Latin tradition countries, includes the countries on the Mediterranean and Belgium. There local administration tradition is weak.

The importance of local authorities is emphasised by the European Union and the Council of Europe. The European Charter of Local Self-Government by the Council of Europe states e.g. (Council of Europe 1985):
- the existence of local authorities with real responsibilities can provide an administration which is both effective and close to the citizen;
- public responsibilities shall generally be exercised by those authorities which are closest to the citizen;
- local self-governments shall have the right and ability to regulate and manage a substantial share of public affairs under their own responsibility and in the interest of the local population;
- local authorities shall be entitled to adequate financial resources of their own, of which they may dispose freely within the framework of their powers;
- at least a part of the financial resources of local authorities shall derive from local taxes and charges of which they have the power to determine the rate;
- local authorities shall be able to determine their own internal administrative structures in order to adapt them to local needs and ensure efficient management;
- safeguarding and reinforcement of local self-government in the different European countries is an important contribution to the construction of a Europe based on the principles of democracy and the decentralisation of power.

The European Union has accepted and adopted the subsidiarity principle. Originally the concept of subsidiarity was introduced into EU vocabulary in the Maastricht Treaty of 1993, where it was agreed that the European Community shall take action, in accordance with the principle of subsidiarity, only if and so far as the objectives of the proposed action cannot be sufficiently achieved by Member States (Ross 1993). Later on the subsidiarity principle has been expanded to cover all levels of administration: decisions should be taken as close to the citizen as possible (EU Glossary 2005).

The structure of public administration varies greatly from country to country as is well indicated by the number of municipalities in different countries (Table 4.3). In France, the number of municipalities is extremely high and consequently the population of the great majority of municipalities is small. In relation to population, the Czech Republic and Slovakia also have a large number of municipalities. The Nordic countries (Denmark, Finland and Sweden) have
rather large municipalities as have also Belgium, Ireland, Lithuania, the Netherlands and Portugal.

Table 4.3 Number of municipalities in European countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Population (million)</th>
<th>Number of municipalities in size categories</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Number of municipalities less than 5 000</td>
<td>5 000–10 000</td>
</tr>
<tr>
<td>Austria a)</td>
<td>8.1</td>
<td>2 359</td>
<td>2 160</td>
</tr>
<tr>
<td>Belgium a)</td>
<td>10.2</td>
<td>589</td>
<td>90</td>
</tr>
<tr>
<td>Czech Republic b)</td>
<td>10.3</td>
<td>6 258</td>
<td>5 998</td>
</tr>
<tr>
<td>Denmark a)</td>
<td>5.3</td>
<td>275</td>
<td>119</td>
</tr>
<tr>
<td>Estonia b)</td>
<td>1.4</td>
<td>247</td>
<td>211</td>
</tr>
<tr>
<td>Finland a)</td>
<td>5.2</td>
<td>448</td>
<td>199</td>
</tr>
<tr>
<td>France a)</td>
<td>59.3</td>
<td>36 565</td>
<td>34 716</td>
</tr>
<tr>
<td>Germany a)</td>
<td>82.2</td>
<td>13 854</td>
<td>11 031</td>
</tr>
<tr>
<td>Greece a)</td>
<td>10.5</td>
<td>1 033</td>
<td>566</td>
</tr>
<tr>
<td>Hungary b)</td>
<td>10.0</td>
<td>3 135</td>
<td>2 854</td>
</tr>
<tr>
<td>Ireland a)</td>
<td>3.8</td>
<td>85</td>
<td>42</td>
</tr>
<tr>
<td>Italy a)</td>
<td>57.7</td>
<td>8 100</td>
<td>5 828</td>
</tr>
<tr>
<td>Latvia b)</td>
<td>2.4</td>
<td>547</td>
<td>498</td>
</tr>
<tr>
<td>Lithuania c)</td>
<td>3.4</td>
<td>60</td>
<td>1</td>
</tr>
<tr>
<td>Luxembourg a)</td>
<td>0.4</td>
<td>118</td>
<td>97</td>
</tr>
<tr>
<td>Malta b)</td>
<td>0.4</td>
<td>68</td>
<td>37</td>
</tr>
<tr>
<td>Netherlands a)</td>
<td>15.9</td>
<td>504</td>
<td>348</td>
</tr>
<tr>
<td>Poland b)</td>
<td>38.6</td>
<td>2 489</td>
<td>586</td>
</tr>
<tr>
<td>Portugal a)</td>
<td>10.0</td>
<td>308</td>
<td>33</td>
</tr>
<tr>
<td>Slovakia a)</td>
<td>5.4</td>
<td>2 920</td>
<td>2 778</td>
</tr>
<tr>
<td>Slovenia b)</td>
<td>2.0</td>
<td>193</td>
<td>95</td>
</tr>
<tr>
<td>Spain a)</td>
<td>39.4</td>
<td>8 106</td>
<td>6 961</td>
</tr>
<tr>
<td>Sweden a)</td>
<td>8.9</td>
<td>289</td>
<td>12</td>
</tr>
<tr>
<td>United Kingdom a)</td>
<td>59.6</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

Sources: a) Dexia 2002b, b) Dexia 2003, c) Statistics 2006a, d) Svenska kommunförbundet 2003a

Notes:
1) 10 000 – 40 000
2) 40 000 – 100 000
3) less than 10 000
4) In the United Kingdom local government structure is not uniform; thus the number of local government units is not comparable to those of the other countries.


4.2 Strong municipalities of the Nordic countries

In the Nordic countries municipalities have traditionally been and still are strong self-governance units at the expense of regional level administration (Le Gales & Lequesne 1998 cited by Mennola 1999, p.386). The importance of local level administration is clearly illustrated by the share of public sector employees at local level (Figure 4.2). One of the central pillars of municipalities’ self-governance is their own taxation power (Henning 2001, see also Figure 4.7). Local level (municipal) administration has been arranged in a fairly uniform way – the same legislation applies and administrative structures are similar in rural municipalities and large cities.
(Ryynänen 1997, p.146). In Finland the role of municipalities is relatively stronger than, for instance, in Sweden or Denmark, because in Finland the regional/provincial level administration is weak (Mennola 1999, p 386). So far, Finland has not introduced elected regional level councils like Sweden and Denmark (Council of Europe 2002). Thus, Finnish public administration consists, to a large extent, of only two tiers: state and local (municipal). The traditionally strong and independent municipalities have made strong regional level administration unnecessary. The relatively small population (5 million) compared to, for instance, the UK, Germany and France also naturally makes administration smoother.

![Public sector employees in some European countries (Dexia 2002a)](Note: In this graph employees of the federal states of Germany and Austria are also included in the central government figures.)

Figure 4.2  Public sector employees in some European countries (Dexia 2002a)

In Sweden and Denmark the number of municipalities was reduced dramatically between 1950 and 1970. In Finland it has not been reduced as much, only from 547 in 1950 gradually to 432 at the beginning of 2005. There have been political initiatives to carry out similar radical reforms as in other Nordic countries, but these have not received sufficient support. A recent study in Finland established that mergers of municipalities have not brought the financial savings commonly believed (Moisio & Uusitalo 2003). Regional self-government was established in one Finnish region covering nine municipalities with a total population of 84 000 people on an experimental basis. During the experiment, which will extend over two local elections in 2005-2012, some of the tasks of municipalities, such as health and social services and secondary schooling, will be the responsibility of the regional council. The experiment does not, however, affect water services arrangements (Leskinen 2004).
Table 4.4 Municipalities and regions of the Nordic Countries in 2000 (Henning 2001, Moisio & Uusitalo 2003)

<table>
<thead>
<tr>
<th></th>
<th>Denmark</th>
<th>Finland</th>
<th>Norway</th>
<th>Sweden</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>5.3 million</td>
<td>5.2 million</td>
<td>4.5 million</td>
<td>8.9 million</td>
</tr>
<tr>
<td>Number of municipalities</td>
<td>275 (89)</td>
<td>448</td>
<td>435</td>
<td>289</td>
</tr>
<tr>
<td>Number of regions</td>
<td>14 (5)</td>
<td>2</td>
<td>19</td>
<td>21</td>
</tr>
</tbody>
</table>

Notes:
1) Regions are administrative divisions of state administration but have also popularly elected county councils (with some exceptions).
2) Finland has no popularly elected regional councils, but indirectly elected bodies at the regional level with limited tasks; number and boundaries of districts of intermediate level state administration vary depending on the sector.
3) On 1 January 2007 (Heick 2006)

In Denmark, the present system of local government was established by the municipal reform of 1970, whereby the previous 1386 municipalities were reduced to 275, and the number of regional councils was reduced to 14 excepting the municipalities of Copenhagen and Fredriksberg. Municipalities and regional councils manage a growing number of tasks, and the national government is not involved in local or regional administration in practice. The overwhelming role of municipalities and regional councils compared to the central government in regional administration is well illustrated by the number of employees: in 1998 municipalities employed about 380 000 people, regional councils almost 130 000 people, while the central government’s regional administration was carried out by just 750 people. (Henning 2001)

In 2004 the Danish ruling parties agreed on a new local and regional level administration structure which is planned to be implemented in 2007. According to this plan, there would be only five regions instead of the present 14, and less than one hundred municipalities instead of the present 275. Municipalities would become larger and get more responsibilities while regions would lose some of their power to municipalities as well as the central government. (Pakarinen 2005; Heick 2006)

4.3 Finland

In Finland, local administration developed and was originally based on church parishes. However, by the mid-1800s it was found that a parish meeting chaired by the vicar could not deal with the ever increasing practical administrative tasks. (Ryynänen 1974) The Act on the administration of rural municipalities was passed in 1865 and a corresponding act for townships in 1873. These two acts created the foundation for modern municipal administration in Finland. In rural areas municipalities were formed based on the boundaries of parishes. Even though separate acts were passed for rural municipalities and townships, they were based on the same principles and were in fact largely identical.

The acts also listed the tasks of municipalities. These included establishing primary schools, provision of certain sanitation services, poor relief, construction and maintenance of certain public buildings and fire fighting facilities (Ryynänen 1974). These acts enabled municipalities to collect taxes; in fact, local taxation had existed already before these acts came into force.
The Act of 1898 gave fairly accurate guidelines for municipalities’ cooperation. This was considered necessary because there was no regional level self-administration in Finland.

The administrative structure of towns was renewed with the Act of 9 December 1927. Accordingly, towns had to establish the post of a mayor, a civil servant nominated by the town council. The town council still had the decision-making power, but a board was set up as the executive arm.

In 1948 the regulations for towns and rural municipalities were merged into a single act. In practice this did not make a big difference because the previous acts for towns and rural municipalities were fairly similar. One significant change was that now also rural municipalities were able to establish the post of a municipal manager who is a full-time civil servant (Ryynänen 1974). Since then the legislation related to municipalities has been renewed every now and then, but the main principles have not been changed radically.

Health care has been to a great extent the responsibility of municipalities. Since 1951 all municipalities had to have a municipal doctor, possibly jointly with a neighbouring municipality (Ryynänen 1974). During the last decades neighbouring municipalities have established joint health centres, which can be better equipped than the surgeries of individual municipalities. Health and social care constitute the biggest expenses for municipalities each responsible for about one quarter of a municipality’s budget outlays (Moisio & Uusitalo 2003).

The Act of 1898 called for municipalities to establish and organise primary schools in such a way that the distance a child had to travel to school should not under normal circumstances exceed five kilometres. Municipalities were also allowed to establish secondary and vocational schools and receive state subsidies as did associations which ran private schools. Schools are still run by municipalities, with only a few private schools operating. The public comprehensive school system seems to bear good fruit, because Finland has won top positions in international comparisons of school children’s literacy skills (OECD 2003a & 2004a). Finnish public educational establishments of a higher scientific level have also produced convincing results, for instance, in the form of the development work for Nokia mobile phones at our technical universities.

The first municipal companies were established in the 1880s when the biggest towns established water supply and electric utilities. Municipal grain mill and saw mill companies were also established (Katko 1997; Ryynänen 1974). One of the major reasons to establish piped water supply systems was the need to provide water for fire-fighting purposes. In the middle of the 19th century buildings in towns were still constructed wholly or partially of wood in the Nordic countries although fires had destroyed them frequently in earlier days (Herranen 2002).

Fire-fighting requirements for rural municipalities were understandably less stringent than for towns. Yet, the Fire Act of 1933 stated that even rural municipalities had to have a fire-fighting committee and a fire chief (not necessarily a full-time one). A full-time fire brigade became compulsory when the population of a town exceeded 8 000. (Ryynänen 1974)

Expansion of piped water supply put pressure on the development of sewerage systems. In Helsinki, the predecessors of modern sewers were open drainage ditches, the walls of which were strengthened with timber or stones. Later covered rectangular sewers were also built (Lehtonen 1994). By the 1890s, wooden sewers were replaced by brick or clay pipes. The Public Health Act of 1877 indirectly encouraged cities and towns to build sewers. In 1878 the City
Engineer of Helsinki set forth a waste management plan (Herranen 2002). At that time, flush toilets had not been introduced yet, and people used latrines typically located at the back of the yard. The plan suggested that solid waste from latrines be collected into covered barrels, specially built for this purpose, and transported outside the city to be used as fertiliser on farms. A similar barrel system was in use in several European cities. The second part of the plan consisted of a proposal to construct a sewer network. The purpose of the sewer network would be to lead away rainwater runoff, groundwater, and domestic wastewater from buildings.

During the last decades of the 19th century the merits and disadvantages of flush toilets were discussed in Helsinki and elsewhere. The barrel system was considered an ecological alternative, and due to the nutrient value of the waste, it might have been possible to continue operating the system on a commercial basis. In Sweden, the barrel system was mandated by law for some time (Herranen 2002). However, the triumph of the flush toilet began in Europe, initially in larger cities. It is interesting to note that already over a hundred years ago there was strong criticism against flush toilets and the nutrient value of excreta was highly valued. One can only wonder how things would have developed if the future problems caused by wastewater had been foreseen at the time and alternatives to flush toilets had been seriously developed.

The tasks of municipalities have increased dramatically since Finland gained her independence in 1917. This is partly due to the legislation putting new requirements on municipalities, and partly to municipalities’ own initiatives. Especially the big changes in the 1970s – creation of the comprehensive school system and new health care legislation – increased municipalities’ expenses (Ryynänen 1974). These specially mandated tasks were financed partly by the state through a grant system that was tied to expenditures. To some extent this development towards a Nordic welfare state actually limited local self-government. But since the 1980s the trend has been towards decentralisation and more freedom for municipalities to decide how to organise and implement the tasks assigned them (Kettunen 1999). Municipalities’ expenditure is presented in Table 4.5.

Table 4.5 Municipalities' expenditure in Finland in 2005 (Localfinland 2006)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Billion euros</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social welfare and health care</td>
<td>14.8</td>
<td>48</td>
</tr>
<tr>
<td>Education and culture</td>
<td>7.3</td>
<td>24</td>
</tr>
<tr>
<td>Other operating expenditure</td>
<td>4.2</td>
<td>14</td>
</tr>
<tr>
<td>Investment expenditure</td>
<td>3.0</td>
<td>10</td>
</tr>
<tr>
<td>Loan repayments</td>
<td>0.8</td>
<td>3</td>
</tr>
<tr>
<td>Other</td>
<td>0.4</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>30.5</td>
<td>100</td>
</tr>
</tbody>
</table>

Local authorities finance their annual expenditure with taxes, central government transfers, various charges, and sales revenues (Table 4.6). The power to levy taxes is considered one of the cornerstones of municipal self-government in Finland. Local income taxes paid by residents, real estate taxes and local government's share of corporate taxes account for almost half of all municipal revenues. Each local authority sets its income tax rate independently. The average income tax rate is 18 percent of taxable income. Unlike state taxes, municipal taxes are not progressive. Fees and charges account for about a quarter of municipal revenues. Most of the customer charges are collected for services such as water supply, waste disposal, power supply,
and public transport. Just under one tenth of social welfare and health expenditures are covered through customer and patient charges. Basic education is free. (Localfinland 2006)

Table 4.6 Sources of revenue for Finnish municipalities (2005 estimates) (Localfinland 2006)

<table>
<thead>
<tr>
<th>Source</th>
<th>Billion euros</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tax revenue</td>
<td>14.1</td>
<td>47</td>
</tr>
<tr>
<td>State subsidies</td>
<td>5.2</td>
<td>17</td>
</tr>
<tr>
<td>Operating revenue</td>
<td>8.3</td>
<td>27</td>
</tr>
<tr>
<td>Investment income</td>
<td>0.7</td>
<td>2</td>
</tr>
<tr>
<td>Loans</td>
<td>1.6</td>
<td>5</td>
</tr>
<tr>
<td>Other</td>
<td>0.5</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>30.4</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

The state grant system was changed from ear-marked, specific grants to block grants (Prättälä 1999). The new Local Government Act of 1995 essentially became a document of changes already implemented (Ståhlberg 1999). During the 1990s state grants to municipalities reduced significantly as can be seen in Figure 4.3. Central government grants local authorities financial assistance in exchange for a wide range of statutory services. The central government transfer system also evens out financial inequalities between local authorities and ensures equal access to services throughout the country. The variation in local tax rates would be considerable greater if the central government would not contribute to balancing out the differences in municipalities’ financial resources. Central government transfers account for less than one-fifth of all municipal revenues. (Itkonen, Rautiainen, Saarnivaara & Telakivi 1995; Kuntaliitto 2005; Localfinland 2006)

![Figure 4.3](chart.png)

Note: 2005 and 2006 figures are estimates

Figure 4.3 Development of municipalities’ tax income and state grants from 1980 to 2006 in Finland (Turkkila 2006)

Water and wastewater services have been traditionally provided by municipalities, at least in urban areas. Water supply and distribution have been on a commercial basis since the beginning
of centralised systems. All users have had water meters and have paid according to the volume of water used. Sewerage and wastewater treatment were until the 1960s often run separately from water supply and financed via municipal taxes. In 1974 national legislation established a wastewater fee which was expected to cover the costs of sewerage and wastewater treatment. Since then, urban water and wastewater services have largely been merged and are managed by the same municipal organisation almost everywhere.

The Water Services Act of 2001 states specifically that the responsibility for water services and their development lies with the municipalities. The act did not result in any major changes in earlier practices but emphasised the development of water and wastewater services in rural areas. Municipalities are not obliged to build and operate water services, but they have to ensure that these services are available or are developed when required by “a relatively large number of inhabitants or for health considerations or environmental protection”.

Since the establishment of the first urban water supply systems, securing the availability of fire-fighting water has been one of the basic criteria for dimensioning water distribution systems. In residential areas, the needs of fire-fighting have actually been the decisive factor – to satisfy domestic water needs smaller diameter pipes would have sufficed. The new Rescue Act (2003) clearly states that the provision of water for fire fighting purposes is the responsibility of the municipality, not the water utility. On the other hand, the Water Services Act does not include fire-fighting water as a responsibility of a water undertaking. Thus, a water utility does not in principle need to plan and build its water distribution system to satisfy the needs of fire fighting. Of course, it is sensible in many instances to secure the availability of water for fire-fighting purposes by building a water distribution network with sufficient capacity to satisfy also fire-fighting needs. Then, in principle, the additional costs of larger diameter pipes or other investments made to meet the needs of fire fighting should not be covered by water charges but by additional allocations from the municipality’s budget.

Placing responsibility for fire-fighting water on the municipality, not the water utility, makes sense because the water distribution system is not the only source of fire-fighting water. Finland has plenty of water courses which can be used as fire fighting water sources. In order to make the utilisation of these sources easier, and accessible also in winter time, special arrangements and structures may be needed. The geographical areas of responsibility of the water utility and the municipality are typically also different. The municipality is responsible for safety, including fire fighting, over the entire area of the municipality, while the water utility, regardless of its organisational form, is responsible only for water supply in its approved service area (Water Services Act 2001, Section 6). According to the Act, the service area of a water utility is approved by the municipality. A water utility’s service areas for water supply, wastewater sewerage and stormwater sewerage are also determined and approved separately. Typically these service areas do not cover the same geographical area; the water supply service area is usually the largest, the wastewater sewerage area is generally somewhat smaller, and the stormwater sewerage area is, particularly in rural municipalities, significantly smaller.

Even though municipalities have had a central role in the development of water and wastewater services, in many rural areas these services have been constructed and are operated by cooperatives or different types of loose consumer organisations (See Chapter 5.1.6).
4.4 Sweden

Local self-government has a long historical tradition in Sweden dating back to Medieval Times. Several hundred years ago the parishes were already responsible for the care of the poor (Svenska kommunförbundet 2003b). Industrialisation required formal regulation of local self-government which was achieved by the Local Government Ordinances of 1862 (Drangert, Nelson & Nilsson 2002). This act separated the tasks of the Church of Sweden from civil tasks at the local level. The Ordinance created about 2,500 independent economic units (cities and rural municipalities) based on the old parish boundaries. One of the major tasks of these new local authority units was the running of recently established elementary schools. At the regional level, the Ordinances established a new unit of self-government known as the county council (landsting) whose territory normally coincides with the national government’s regional administrative unit, the county (län) (Sweden 2005).

Equally important is the Swedish policy of public transparency which goes back to the Freedom of Press Law adopted already in 1766. The implication of this law is that any interested citizen has the right to check all public documents, including municipal documents, unless the document has been classified as secret. Transparency is the primary objective, and secrecy is the exception. The policy of public documents means, for instance, that public accounting is open for scrutiny. (Petersson & Söderlind 1993)

A typical feature of the Swedish administrative structure has been the large number of municipalities and their strong self-administration. For efficiency, the number of municipalities was reduced from 2,498 to 286 in the period 1952 to 1974. This also meant that the number of elected politicians at the local level was reduced from 200,000 to some 70,000. Municipalities have formed a democratic counterforce to the traditionally centralised administration exercised by the county. The county administrative board (länsstyrelse) coordinates the state's interests in the county. Its tasks have changed from active implementation to primarily coordinating, initiating and overseeing legislation. Today, the county administration’s responsibilities focus on social sector issues and land-use planning. The central government also has county-level regional offices for labour administration, roads, and the forestry and agriculture sectors. (Henning 2001; Lähteenmäki-Smith 2002)

In 2005 Sweden had 290 municipalities and 20 county councils (landsting) (Svenska kommunförbundet 2003a; Statistics Sweden 2004). Since 1974 the number of municipalities has slightly increased from 286 to 290 after some mergers made in 1974 proved unworkable. Each county council covers several municipalities, but neither is hierarchically above the other – both municipalities and county councils are entities for local self-government with responsibility for different activities (Svenska kommunförbundet 2003a). An exception is the municipality of Gotland, an island in the Baltic Sea, which has the responsibilities and tasks normally associated with a county council.

The 1992 Local Government Act defines the rules for the allocation of power and responsibilities in municipalities and county councils (Sweden 2005). The Act provides a framework for their activities and aims at strengthening local self-government. Strong emphasis has been placed on providing local inhabitants the opportunity to monitor and influence the decision-making process – which is well in line with the EU’s subsidiarity principle.

Municipalities are responsible for matters relating to their inhabitants and the immediate environment. Typically municipalities are in charge of primary and secondary education,
childcare, care of the elderly and disabled as well as for water, sewerage and streets. (Henning 2001; Lähteenmäki-Smith 2002; Svenska kommunförbundet 2003b)

The geographical area of a county generally coincides with that of the popularly elected county council (landsting). These councils are basically occupied with health care provision, which accounts for almost 90% of their activities, but the larger ones like the Stockholm county council also provide public transport and regional planning services. (Petersson & Söderlind 1993; Svenska kommunförbundet 2003b)

During the 1990s the tasks of county administrative boards were transferred to the elected county councils on a trial basis. State-directed county administration has in parts of the country been replaced by the idea of expanded self-governance at regional level, as was done in Denmark. (Henning 2001)

Swedish municipalities and county councils are responsible for providing a major part of all public services (See Figure 4.2). They have a considerable degree of autonomy and independent taxation power (See Figure 4.7) (Svenska kommunförbundet 2003b). Taxes are levied as a percentage of the inhabitants’ income. Municipalities do not levy property taxes – they fall to the state. Municipalities and county councils have a great deal of freedom in organising their activities as they see appropriate within the bounds of legislation. Their basic responsibilities are regulated by the Local Government Act and laws and statutes covering specific areas such as the Social Services Act, the Planning and Building Act, the Education Act, and the Medical Services Act.

The Swedish Public Water and Wastewater Plant Act clearly states that municipalities have the sole responsibility for providing adequate public water supply and wastewater treatment to secure the health of the urban population. Municipalities are allowed to subcontract private companies to operate and maintain parts of the water supply and sanitation service. The county boards are responsible for the municipalities fulfilling their legal duties. (Lannerstad 2003)

4.5 Lithuania

The history and local level administration of Lithuania are introduced in Article II. The following is a brief summary of the history of Lithuania.

The year 1236 is generally designated as the beginning of the Lithuanian state. During the following centuries Lithuania was under the domination of Poland but preserved her independent executive power and military, legal, and financial systems. In 1795 the Polish-Lithuanian Commonwealth split, and Lithuania was annexed by Russia. Lithuania remained under Russian rule until World War I but was occupied by Germany during the war. After World War I Lithuania gained independence in 1918, but what is noteworthy, is that the traditional capital city Vilnius and the surrounding region were occupied by Poland, and the capital was temporarily moved to the second largest city, Kaunas. The situation remained like this during the inter-war period until the dawn of World War II when, in 1939, Vilnius was again annexed to Lithuania. During the war Lithuania was first occupied by the Soviet Union, then by Germany, and then again from 1944 on by the Soviet Union. Lithuania became one of the fifteen Socialist Republics of the Soviet Union until the fall of communism in the Soviet Union. In 1990 Lithuania proclaimed independence, and in 1991 the country’s independence was internationally recognised. (Kiaupa 2002)
During Soviet rule since 1944 public administration became extremely centralised according to Soviet practise. In the early years Lithuania was divided into four administrative regions, “oblast” in Russian, and these regions further into districts, 87 in total. But in 1953 the administrative level of oblasts was eliminated altogether while the number of districts was reduced to 44.

After Lithuania regained independence, public administration was reorganised. In 1990 a two-tier local government system was established based on Soviet period administrative areas. In this system lower level administrative units were classified as regional towns, urban settlements or localities, while upper level units were either regions or cities. These two levels comprised a total of 581 administrative units (Figure 4.4). From the beginning this system was criticised for introducing only slight modifications to the old structure and being too fragmented. (Beksta & Petkevicius 2000)

A new Law on Local Self-government was adopted in 1994. This law regulates the principles and functions of local governments. The aim of local government is to freely, democratically and independently regulate and manage public affairs and meet the needs of local residents following the constitution and the law. One of the basic principles of the law was to separate clearly the tasks and responsibilities of central and local governments.

The Law on Local Self-government created a two-level sub-national administration system:

a) counties, and
b) municipalities.

There are also neighbourhoods subordinate to municipalities, but neighbourhoods have only limited powers and cannot be classified as real local level administrative units (Puteikis, Astrauskas, Braxas & Gylys 1996).

The established ten counties are regional units of the central government that carry out activities assigned and supervised by the central government. At the local authority level, 56 municipalities were initially established largely based on earlier administrative units, and depending on the type of residential area, these municipalities were grouped under rural (44) and urban (12) municipalities (Puteikis et al. 1996). But this division into two groups was just a continuation of the old tradition, and there was no difference in their status. Later on, some municipalities were divided because they were not functional units, so that by 2003 the number of municipalities had increased to 61 (Dexia 2004).

The authority of municipalities is mainly based on the constitution and the Law on Local Self-government, originally adopted in 1994, but amended more than ten times since. There are also laws dealing with local council elections, territorial administrative units, etc. which also clarify the status of municipalities (Beksta & Petkevicius 2000).

The constitution grants municipalities the right to free and independent governance within the statutory limits. Also, the constitution gives the municipalities the right to draft and approve their own budgets, to establish local dues, and to levy taxes and duties (Beksta & Petkevicius 2000). The Law on Local Self-government and some other laws delegate some state functions to the municipalities. Issues that do not fall within the jurisdiction of state institutions but affect the local population are resolved by municipalities.
The major tasks of municipalities can be classified into three groups: a) education, b) welfare benefits, and c) provision of public utilities and infrastructure services (World Bank 2002). Education has been the single most costly service provided by municipalities (Table 4.7). Municipalities have been responsible for primary and secondary education, including salaries, construction and maintenance of school buildings, transportation, materials and supplies. The central government is responsible only for vocational and higher education.

Although municipalities are not subordinate to the central government, there are several areas where cooperation is needed. For instance, the government sets the direction of development in the fields of education, culture, health care and social security. In the technical and infrastructure fields the municipalities' responsibilities include (Puteikis et al. 1996):
- water and wastewater services, including the supply of hot water
- district heating
- gas distribution
- construction and maintenance of streets, including street lighting
- local public transport
- solid waste collection and disposal.

After Lithuania regained her independence and the responsibility for these services was transferred to the municipalities, these services have been provided by municipal enterprises.
Legislation does not limit provision of these services solely to municipalities: they can be outsourced to state and local government enterprises, joint-stock companies, private and non-profit companies, etc. (Beksta & Petkevičius 2000). Municipalities have been actively privatising especially their district heating operations. Earlier they could only sell a maximum of 30% of the shares of certain public enterprises, such as water and wastewater and heating utilities. But today public enterprises can be privatised completely.

In principle, Lithuanian municipalities have autonomy over their activities and expenditure, but in practise their autonomy is strongly limited by the absence of a separate tax base. Both the form and level of taxation are set by the national government, and the taxes are almost entirely collected by the central government (Chandler 2001). Taxes collected from municipalities are partially returned to cover the costs of municipalities’ activities. The government operates a complex inter-municipal revenue sharing system where richer municipalities support the poorer (Jankauskiene 2003). The major items of municipal expenditure, salaries and welfare payments, are subject to government control. A difference compared to some other countries, like Finland, is that municipalities play hardly any role in health care.

Table 4.7 Expenditures of Lithuanian municipalities in 2000 (World Bank 2002)

<table>
<thead>
<tr>
<th>Category</th>
<th>Million euros</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education</td>
<td>543</td>
<td>57</td>
</tr>
<tr>
<td>Welfare</td>
<td>139</td>
<td>15</td>
</tr>
<tr>
<td>Housing and public works</td>
<td>67</td>
<td>7</td>
</tr>
<tr>
<td>Culture and recreation</td>
<td>43</td>
<td>5</td>
</tr>
<tr>
<td>General administration</td>
<td>45</td>
<td>5</td>
</tr>
<tr>
<td>Fuel, energy and supplies</td>
<td>23</td>
<td>2</td>
</tr>
<tr>
<td>Transportation</td>
<td>21</td>
<td>2</td>
</tr>
<tr>
<td>Public order</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>Health care</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Other expenditures</td>
<td>54</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>956</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Figures in original publication in Lithuanian litas, exchange rate used: 1 EUR = 3.45 LTL

In 2002 the financing of municipal expenditure was reformed (Table 4.8). One of the targets was to increase the real power of municipalities over their activities. One of the measures was to make the government fiscally directly responsible for certain functions delegated to the municipalities. While these services will continue to be administered by the municipalities, the government will ensure that they are fully funded. Funding for these delegated functions is earmarked and distributed on the basis of sector-specific indicators. In education, the government distributes funding based on enrolment but takes into account e.g. the different situation in rural areas where the teacher-pupil ratio is typically higher than in urban schools. Thus, the main switch is from personal income tax-based funding to specific grants. (World Bank 2002; Jankauskiene 2003) Since 1994 Lithuania has taxed earned income at a flat rate of 33% minus a small monthly non-taxable amount (84 EUR in 2005) (Ernst & Young 2005). The income tax will be gradually decreased from 33% to 24% during the years 2006–2008 (Lisbon Strategy 2005).
Table 4.8 Lithuanian municipalities’ revenues by source (Chandler 2002)

<table>
<thead>
<tr>
<th>Source</th>
<th>2000</th>
<th>%</th>
<th>2002</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal income tax</td>
<td>726</td>
<td>76.5</td>
<td>318</td>
<td>32.0</td>
</tr>
<tr>
<td>Other taxes</td>
<td>95</td>
<td>9.9</td>
<td>86</td>
<td>8.6</td>
</tr>
<tr>
<td>Non-tax</td>
<td>32</td>
<td>3.4</td>
<td>20</td>
<td>2.0</td>
</tr>
<tr>
<td>Grants from state budget</td>
<td>91</td>
<td>9.6</td>
<td>569</td>
<td>57.3</td>
</tr>
<tr>
<td>Other</td>
<td>5</td>
<td>0.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>949</strong></td>
<td><strong>100</strong></td>
<td><strong>993</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Figures in original publication in Lithuanian litas, exchange rate used: 1 EUR = 3.45 LTL

4.6 Germany

Germany is a federal state with 16 relatively independent states (Länder) which have, for instance, the power to enact primary legislation (Council of Europe 2002, p. 68). Some states of this country of over 82 million people have a population equalling or greater than that of any Nordic country. The states are divided into regions and on the local level into two local government tiers: 441 districts (Kreise) and 13 854 municipalities (Gemeinden). Of the large cities, 118 hold the status of both a municipality and a district. The cities of Berlin and Hamburg have the powers of a state, and Bremen is another compact state consisting of only two cities, Bremen and Bremerhaven (Dexia 2002b). The German administrative system is relatively decentralised, and the Länder are responsible e.g. for education (schools as well as universities), justice (police and courts), and also most issues concerning water. In these fields of administration the Länder can set their own laws, within the bounds of the federal constitution and federal or EU framework legislation (Lanz 2004).

Water management law, like many other areas of German legislation, has evolved within the historical context of several regions joining together in 1871 to form one country. The result was a multi-tiered political structure which at its simplest has three levels. The constitution guarantees the autonomy of local authorities, and the interaction between the various levels of government is based on a strong tradition. From the very beginning, the high degree of local autonomy meant that local authorities were heavily involved in water and wastewater services. (Nunn 1996)

German public administration is based on a strong tradition of rule of law and reliance on values such as legality, equality and reliability. Local level administration in Western Germany underwent only minor changes in the first decades after World War II with the exception of significant amalgamation of municipalities in the 1960s and 1970s. Until the mid-1990s most municipalities did not experience financial difficulties, which have became quite common since then, partly due to the immense costs of German reunification. But already before the emergence of financial difficulties, the administrative structure of the local authorities started to change. This change was not introduced by higher administrative levels but was initiated by local level administration which was not satisfied with the highly centralised authority in resource allocation. Local city managers felt that they could not impact on the ‘end product’ they were responsible for. (Reichard 2004)
4.7 The Netherlands

The administrative organisation of the Netherlands is strongly decentralised. There are three major levels of government: national, provincial and local. One of the key characteristics of governance is the subsidiarity principle (Schwartz 1999). The principle implies that responsibilities are decentralised to the lowest possible government tier which has the capacity to execute the responsibility. Some indication of the importance of different levels of government can be drawn from the number of people employed by various administrative sectors in 1993 (OECD 1997):

- central government 117 000
- provinces and Water Boards 21 000
- municipalities 186 00
- police and defence 144 000
- education 371 000.

The Netherlands is divided into 12 provinces. The provinces are responsible for the application of national regulations in their territories. A special feature of the Dutch water sector is that it has its own administrative level – the Water Boards (Waterschappen) – separate from the three standard levels of public administration. Water is the only policy sector in the Netherlands for which separate functional administrative arrangements have been made in the constitution. (Kuks 2006)

At the local level there are 536 municipalities (in 2000). The number of municipalities has come down from 1 209 in 1851 and 994 in 1960. There are 64 municipalities with a population of less than 5 000 people. Roughly half of the population in the Netherlands live in municipalities with a population of more than 25 000. (BIPE 2001)

The present Dutch public administrative pattern of a unitary state derives from the Constitution drafted around 1850. The unitary system is not as much based on hierarchical steering as on mutual adjustment and institutionalised interdependence of the three tiers of government. To the ordinary citizen, the provincial government is significantly less important than local government in policy implementation and service provision. (Hendriks & Tops 2004)

The links of the water cycle consist of typical utility activities; water supply, sewerage and wastewater treatment services have been established for the public good (Kuks 2006). These services were originally established by public authorities. According to the Dutch Constitution, municipal services related to public health are to be provided by regional or municipal public authorities. Municipalities can, however, delegate the provision of the services to a public company or other public organization (EUREAU 1997; BIPE 2001).
4.8 France

France has long had fragmented local government. From the French Revolution to present, the country has been divided into more than 36,000 municipalities that are responsible for many types of local service provision and other government functions (Jacobson & Tarr 1996). France has three tiers of sub-national government: 22 regions, 96 counties (départements) and more than 36,000 municipalities (Dexia 2002b). Regions and counties are deconcentrated levels of state administration to handle certain territorial services (Barraqué, Bertland & Cambon 1998). The number of municipalities is exceptionally large, and thus it is quite understandable that the smallest municipalities commonly cooperate in fulfilling their responsibilities. The smallest municipalities have only a couple of hundred residents, and almost 35,000 municipalities have a population of less than 5,000 people (See Table 4.3). There are a total of more than 15,000 separate public water supply systems and close to 12,000 sewerage systems (Morange 1993; FTPO 1994).

The French administrative system has traditionally been rather centralised. From 1982 onwards, wide-reaching political reforms were launched that translated into a series of decentralisation laws. The first decentralisation law of 1982 defined the responsibilities of different local government tiers and the transfer of central state tax income to local governments to cover implementation costs. Before 1982 decisions made by municipal councils were implemented only after approval by the chief administrative officer at the county level (préfet), appointed by the national government. After 1982 the only role of the préfet has been to control that decisions comply with legislation. Municipalities also gained more independence with respect to the contracts they conclude. (Dexia 2002b; Lamothe 2003)

Municipalities are more or less based on ancient parishes, and they have practically never undergone any fusion or concentration process. By population they are the smallest in Europe (Table 4.3). Financially French municipalities are weak and cannot levy taxes directly. The central state collects local taxes and redistributes them to the local level through an equalisation process (Barraqué et al. 1998).

In France municipalities are responsible for organising their own drinking water supply and wastewater systems. The other tasks of municipalities include management of community facilities and primary school buildings (but not teachers’ salaries which are paid by the state), kindergartens, streets, urban transport, solid waste collection, social housing, town planning, culture, sports, and part of police functions. Counties are responsible for social welfare (health, children’s social care, help to the disabled and elderly), construction and maintenance of secondary schools, the road network, and funding for rural facilities. Regions have broader responsibilities for economic development, regional planning, and infrastructure. (Dexia 2003).

Three main types of water management are at work at the municipal level. The first type is a system of direct management involving the mayor and municipal council, where the municipality is in charge of the whole management system. In the second type several municipalities form an intermunicipal association which takes care of the water services, or municipalities create a multipurpose association which manages not only water but also some other services. The third type is a delegation system whereby the municipality or association of communities allows a private firm to manage the water and wastewater system. Delegation can be based on a lease (affermage) or concession. In a leasing arrangement, the municipality bears the initial investment costs and commissions management tasks from a private operator. The operator is paid for the water supplied and pays, in return, the municipality rent on the plant it uses. In a concession
arrangement, the private operator builds and runs the plant itself, and is entitled to keep the total amount charged from users. More than 40% of French municipalities have chosen direct management for drinking water supply systems, while 80% of the population is supplied by a delegated management system. As concerns wastewater systems, 40% of the population is served by delegated management. (FTPO 1994; Clark & Mondello 1999; BIPE 2001; Lamothe 2003)

Since 1993 several laws have been passed in order to introduce more competition, transparency and stakeholder involvement in water service provision. The so-called “Sapin” law of January 1993 states e.g. that: contracts are no longer allowed to run forever, and municipalities must publicly seek operator candidates before signing a contract. Later on, requirements for increased transparency in decision making and availability of information to the public and establishment and consulting of advisory committees representing various stakeholders were added. (Lamothe 2003; Lobina 2004)

4.9 England

In England the structure of local administration is more complex than in most countries. What has confused the picture even more is that administrative structures have been radically changed several times during the last 50 years.

A uniform two-tier system of local government was established across Great Britain by Acts: in 1963 for London, in 1972 for Wales and England excluding London, and in 1973 for Scotland. Outside the major urban areas, services were provided by two tiers of councils in England: Counties covered a population of 500 000–1 500 000, and Districts (4–14 in each County) each covered a population of about 100 000. Additionally, parish and town councils cover areas smaller than Districts (up to 30 000 people but usually much less). They have very limited responsibilities for local services and environmental improvements, and they do not exist in large towns and cities. The two tiers were replaced by a unitary system of local government in London and the metropolitan areas of England in 1986. Further reorganisation into unitary authorities took place in Scotland and Wales in 1996, and a number of unitary authorities were introduced in parts of non-metropolitan England from 1995 to 1997, although much of the two-tier system remains (see Figure 4.5). Significant changes have taken place in the functions that local authorities perform and the style in which they operate. The leading principle has been to shift the role of local authorities from providers of services to having responsibility for securing their provision. The assumption during Thatcher's rule was that the private sector would provide the services more efficiently while local authorities should guarantee such services if the market is unable or unwilling to do so. (Cullingworth & Nadin 1997; Byrne 2000; Edkins 2003)

For long, water services in England followed a pattern largely similar to most other European countries. Services were taken over by local authorities from the late nineteenth century onwards, although mixed patterns developed with some individual authorities running water companies, some large inter-municipal operators, and a surviving handful of private water-only companies. In the London area, several private companies supplied water to citizens until the first years of the 1900s. In 1903 the Metropolitan Water Board was created by an act of Parliament and took over the water services in the London area. Local authorities appointed members to the Board (London’s Water Supply 1953). Interestingly enough, one of the key arguments for taking water services from private companies into public hands was: “... a public
authority can raise the large capital needed in the future at a cheaper rate than private companies”.

In 1974 the water service in England and Wales was reorganised and 10 unitary regional water authorities (RWAs) were created. Each of these RWAs covered a river basin area, and thus the arrangement was already in line with present EU water management principles. The authorities were appointed by the government, not by municipalities, and were thus no longer accountable to local government. In 1989 these RWAs were privatised. (Lobina & Hall 2001)

As concerns other infrastructure services, English counties are responsible for refuse disposal, transport and fire-fighting services while districts take care of refuse collection and local highways (Edkins 2003).

In England the balance between local government funding from local sources vs. the central government has varied over the last seventy years (Figure 4.6). The balance changed dramatically in the early 1990s after non-domestic rates were removed from local council control. Nowadays only one quarter of local council income is derived from local taxes. This does mean in practice that for every 1% increase in spending, councils, on average, need to increase the council tax by 4%. Thus, local councils rely heavily on government grants, and the formulae used in grant distribution become crucial. This means that local authorities need to spend a great deal of time briefing MPs or in developing the case for favourable formula changes. (ODPM 2003)
4.10 International comparison of local level revenues

In the Nordic countries, the concept of municipality has remained highly stable over the last 150 years. Municipalities have more or less the same responsibilities within each country, and they carry out their tasks in fairly similar manner. In Denmark and Sweden, the number of municipalities decreased radically in the 1970s, but the tasks remained the same. In France, the number of municipalities is very large, over 36 000, and the population sizes vary greatly from just a few hundred upwards. Understandably, the structure and administration of these municipalities varies greatly depending on population size and density.

There has been an international trend towards greater influence of central government over local level administration. According to Byrne (2000, p. 348): “Grants to local government have increased substantially in this century (1900s). ... One consequence of such grant aid is that the central government increases its control over local authorities. This appears to be a worldwide phenomenon and is perhaps an inevitable feature of modern society”. However, countries are different and development paths are not the same everywhere.

In England the trend has clearly been towards collecting a smaller share from local sources (see Figure 4.6) while in Finland the trend has been the opposite – the support from central government to local authorities has clearly decreased during the last decades. In 1990 central government support covered close to 40% of municipalities’ expenses in Finland, but in 2001 only about 25% (Kuntaliitto 2003). This Finnish policy seems to have worked; in many international comparisons (e.g. World Economic Forum’s Current Competitiveness Index and Growth Competitiveness Index) Finland has scored well and is among the top countries (World Economic Forum 2005).
How local level activities are financed varies a lot from country to country in Europe (Figure 4.7). In the Nordic countries as well as in France, Austria and Spain municipalities finance most of their activities with their own income while in England and the Netherlands the practice is entirely different: own revenue forms only a minor part and the majority of financing consists of grants from the government.

![Bar chart showing municipalities' revenues in some European countries](image)

Notes:
1) Data for 1998 or 1999
2) Own revenue = own tax revenue plus other own revenue
3) Borrowing excluded, ranges from 2 to 12%

Figure 4.7 Municipalities’ revenues in some European countries (Dexia 2002b)

The relative weight of local government in the economies of different countries is clearly illustrated by Figures 4.8 and 4.9. Figure 4.8 shows local public expenditure's share of GDP in most European countries. Figure 4.9 shows local public expenditure's share of total public expenditure in the same countries. Both figures clearly demonstrate the importance of the local level in the Nordic countries.
Figure 4.8  Local public expenditure’s share of GDP in European countries (Dexia 2004)

Figure 4.9  Local public expenditure as share of total public expenditure in 2001 (Dexia 2004)
4.11 Conclusions

In the few European countries discussed in this chapter, the administrative structure, sources of revenue, and municipal level duties vary a lot. In all these countries, except for England, the responsibility for arranging water supply and sewerage services is by law vested in municipalities. How municipalities then fulfil this duty varies – there are different practices even within a country.

In the Nordic countries, administration at the municipal level, as well as the way water services are organised, has not seen any dramatic changes during the last 150 years. There has been some gradual development, but the basic principles have remained largely the same; municipalities are still rather independent self-administrative units, and they have a central role in water and wastewater service provision. Some apparently big changes have taken place, like the radical reduction in the number of municipalities in Denmark and Sweden in the 1970s. Yet, the responsibilities of municipalities have remained fairly similar. A contrasting example is England, where local level administration has experienced more than one thorough reform during the last 30 years. Similarly, water services have been reorganised fundamentally twice during the last 30 years; first ten regional water authorities were formed in 1974 which were then fully privatised in 1989. One explanation for these different development patterns are the different political structures and traditions of UK/England and the Nordic countries. In the UK’s basically two-party system radical changes may be expected when the opposition comes to power, while in the multi-party democracies and coalition governments of the Nordic countries political changes are less drastic.

In Germany, water and wastewater services have been and still are largely owned and operated by municipalities. There is a tradition of regional cooperation in some areas of water and wastewater services in special situations. In recent years some private water services companies have also been established.

In the Netherlands recovery of land from the sea and land drainage have been the backbone of the country's development and still remain vitally important elements, which makes it different from any other European country. Physical necessity rather than local level administration tradition has had the most important effect on the way water services are managed.

France has a large number of municipalities, and many of them are very small. Municipalities have certain duties, including water supply and wastewater services. Yet, until the early 1980s municipalities’ decisions had to be approved by a central government representative at county level. For small municipalities lease or concession arrangements have been attractive ways to fulfil the duty of water and wastewater service provision.
5 WATER AND SANITATION SERVICES IN EUROPEAN COUNTRIES

The aim of this Chapter is to look at the development of water and sanitation services in a number of European countries. As elsewhere in this research, the intention is not cover all of Europe but to concentrate on selected countries as explained in Chapter 1.3. Also here, Finland is dealt with in more detail than other countries because it is the main subject of the research. The other countries are included as a point of comparison in order to broaden the understanding how and why the development in Finland has been as it is.

5.1 Finland

5.1.1 Water services development

In Finland, municipalities are responsible for water and wastewater services (Water Services Act 2001). Finnish centralised water and wastewater services have been run by municipalities since the first piped water supply schemes were built in the late 1800s (Katko 1997; Herranen 2002).

At the ministry level, water sector responsibilities fall mainly under the Ministry of the Environment and the Ministry of Agriculture and Forestry. The Ministry of the Environment oversees the activities of the Finnish Environment Institute and Regional Environment Centres and is in charge of pollution control. The Ministry of Agriculture and Forestry is responsible for the use and management of water resources. The Ministry of Social Affairs and Health also gives recommendations for drinking water quality, and the Office of Free Competition within the Ministry of Trade and Industry oversees economical aspects also in the water sector (Article I, Figure 3).

When the first large piped water supply systems were built in Finland about one hundred years ago, surface water was the main source of supply. The share of groundwater remained below 30% until the 1960s, but in particular during the last 30 years, the use of groundwater for public water supply has continuously increased, so that by 2001 the share of surface water had decreased to 39% of the water supplied. (Katko 1997, p. 178; SYKE 2006)

The development of centralised water supply, sewerage and wastewater treatment has been remarkably fast in Finland. Yet, in 1950 only 25% of the Finnish population received piped water into their homes – by 1980 this figure had jumped to 90% (Figure 5.1). Drainage was slightly more common. The development took place later than in Sweden, but one should keep in mind the hard times Finland experienced in the middle of the 20th century. From 1939 until 1944 Finland was at war with the Soviet Union, except for a good year of interim peace. As a consequence of the war, Finland had to give up one tenth of her area to the Soviet Union and resettle more than 400 000 people from the ceded areas (Karjalan Liitto 2006). Additionally, Finland had to pay heavy war compensations to the Soviet Union. After the war, much of the population, especially in eastern and northern Finland, was extremely poor. In 1948 there were 20 000 children who could not go to school because they did not have proper shoes to wear in the Finnish winter (TV2 2006). Malnutrition was also common among children, and most deaths of children were due to diarrhoea as is the case nowadays in many developing countries. UNICEF organised an extensive aid programme for Finland in 1947 through 1951.
Finnish rural areas have a long tradition of private, consumer-managed water systems that operate on a small scale on non-profit basis (Katko & Nygård 2000). Municipally run water distribution and sewerage networks were built only in population centres while those living in rural areas had to come up with their own water supply and sewerage systems. If good quality water was not available close enough to the farm or house, people joined together to solve their water problem. A very common practise has been to establish a water cooperative (Article I, Figure 2). Cooperatives have also been established for other purposes such as grain milling. Even though Finnish municipalities have already since the end of the 19th century been responsible for a number of basic services for the citizens, in rural areas many communal projects have been implemented jointly with or without financial support from the state or municipality. For instance, the construction and maintenance of minor roads has been largely the responsibility of individual citizens. The total length of Finland's road and street network is 455 000 km, of which the Finnish Road Administration (a state agency) maintains 79 000 km and municipalities 26 000 km (Tiehallinto 2002; Suomen tieyhdistys 2003). The remaining 350 000 km are private roads, constructed, financed and maintained by the people living along the roads. The state subsidises the maintenance of the busiest private roads to some extent, but only 50 000 km of private roads carry sufficient traffic volumes to qualify to receive subsidies. Municipalities do also subsidise some roads.

In rural areas, the population living outside piped water supply systems use groundwater from dug wells or boreholes in the Precambrian rock. A special feature of Finland is that there are numerous holiday residences (summer cottages) in rural areas - typically by lakes - which used to be inhabited only during summer holidays, but are nowadays increasingly used the year round. The total number of summer cottages is 450 000 (Kortelainen 2002). These buildings are outside population centres and thus have to rely on their own water supply systems. Private water supply systems include some 450 000 dug wells and 150 000 boreholes (SYKE 2006).

In international comparison, with regard to water services, Finland is blessed with abundant water resources and a relatively low population density, 16 inhabitants/km². The country's available water resources amount to over 20 000 m³/a per capita and only 2% of the water resources are used (Finnish Environment Institute 2006; Ministry of the Environment 2006). The water services infrastructure is relatively new and well maintained. The major investments, at least in built-up areas, have now been made. The quality of water in piped water supply
systems meets EU norms, but in rural areas many wells fail to meet EU criteria. Municipal and industrial wastewater treatment is of a high European standard (Article III, Figures 6 and 7; Figure 5.4). However, the watercourses in Finland are very sensitive; lakes are shallow and coastal areas are fragmented into thousands of islands. Thus, very effective wastewater treatment is required to preserve water quality, and increased nitrogen removal is widely required. But the biggest challenge is the reduction of pollution from agriculture. Discharges of phosphorus and nitrogen from agriculture were clearly larger in 1995 than from all residential and industrial point sources combined (Lääne, Pitkänen, Arheimer, Behrendt, Jarosinski, Lucane, Pachel, Räike, Shekhovtsov, Svendsen & Valatka 2002).

5.1.2 Water supply

In Finland the volume of water supplied by public water undertakings increased significantly until the mid-1970s but has remained fairly constant, at slightly over 400 million cubic metres annually, during the last 30 years (Lapinlampi & Raassina 2002a). But this is not the whole picture. Firstly, during that 30-year period, the number of people served by public water utilities has increased from 2.6 to 4.6 million. Secondly, the use of water per capita has decreased radically during the period (Figure 5.2). The clear drop in per capita consumption since the early 1970s has been a consequence of two factors: a) the introduction of a wastewater fee in Finland in 1974, and b) the worldwide energy crisis. Before the wastewater fee was introduced, sewerage and wastewater treatment costs were covered by municipal tax funds. The wastewater fee is based on the volume of water used, and when the fee was introduced, people saw their water bills more than double overnight. Hot water for washing purposes accounts for a significant part of the energy bill of an ordinary family. Thus, after the energy crisis and the sudden increase in the price of energy, water armatures, also cold water fixtures, have been improved to save water. Also, leakage control measures have been more systematically used by the Finnish water utilities.

![Specific Consumption l/capita/day](#)

Figure 5.2 Per capita water consumption in Finnish urban areas (Sources of data: a) 1900–1970: average of three largest cities Helsinki, Tampere and Turku, Katko & Pietilä 1996, and b) 1970–2001: Lapinlampi & Raassina 2002a)
In Finland each municipality typically has its own water and wastewater utility. The largest municipal water utilities are shown in Table 5.1. In addition to municipal utilities, there are various forms of supramunicipal cooperation, in particular for bulk water supply and wastewater treatment. In 2005 there were 21 bulk water supply utilities owned by municipalities (Ryynänen 2005, p. 47). The largest one is the Helsinki Metropolitan Area Water Company which supplies water to about one million people (20% of the population of Finland) in eight municipalities. This company is a pure bulk water supplier, while each of the municipalities has its own water utility taking care of water treatment and distribution within its own area.

Table 5.1 The largest water suppliers in Finland in 2004 (Pietilä 2005a)

<table>
<thead>
<tr>
<th>City</th>
<th>Population served</th>
<th>Water supplied million m³/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Helsinki</td>
<td>920 000 1)</td>
<td>80</td>
</tr>
<tr>
<td>Espoo</td>
<td>220 000 2)</td>
<td>20</td>
</tr>
<tr>
<td>Tampere</td>
<td>200 000 2)</td>
<td>20</td>
</tr>
<tr>
<td>Vantaa</td>
<td>180 000</td>
<td>16</td>
</tr>
<tr>
<td>Turku</td>
<td>175 000</td>
<td>17</td>
</tr>
<tr>
<td>Oulu</td>
<td>125 000</td>
<td>10</td>
</tr>
</tbody>
</table>

Notes:
1) Includes residents of neighbouring municipalities
2) Excludes water supplied to neighbouring municipalities

5.1.3 Wastewater treatment

The first wastewater treatment plants for urban areas in Finland were built in the 1910s. Until the 1950s, only few wastewater treatment plants were in use, and pollution control was based on the natural self-purification capacity of watersheds (Katko 1997). The Water Act of 1961 enabled authorities to set legal requirements and time schedules for water polluters (Katko, Luonsi & Juuti 2004). This put pressure on municipalities to reduce wastewater pollution loads, and the 1970s, in particular, was an extremely active period in wastewater treatment plant construction (Figure 5.3).

Almost all wastewater treatment plants are activated sludge treatment plants with biological-chemical treatment. The remaining few chemical treatment plants will be phased out in the near future (Article III, Figure 6). Table 5.2 lists the largest municipal wastewater treatment plants in Finland.
Public water and wastewater undertakings treated annually some 500 million cubic metres of wastewater in the late 1990s (Lapinlampi & Raassina 2002b). Treatment and disposal of wastewater sludge is an expensive part of the wastewater treatment process, sludge treatment may constitute even a third of total wastewater treatment costs. About one million cubic metres of wet sludge is generated which equals 160 000 tons of dry solids. The typical sludge treatment process is anaerobic digestion and drying by centrifuging. Some of the sludge is used in
agriculture but most is composted, sometimes together with collected bio-waste, and then used in landscaping.

Wastewater treatment plants perform relatively well in Finland. In 2001 the average removal rates of the primary pollutants were (Lapinlampi & Raassina 2002b):

- BOD$_7$ 94%
- Phosphorus 93%
- Nitrogen 44%

This data covers all wastewater treatment plants serving more than 200 people. Since 2001 treatment efficiency has improved partly due to tighter wastewater discharge permit requirements, and partly due to water undertakings' voluntary performance improvements.

In 2001 BOD and phosphorus removal rates clearly met the requirements of the EU Urban Wastewater Treatment Directive while nitrate removal needed improvement. There were about 90 wastewater treatment plants serving more than 10 000 people, some 20 of them having introduced nitrogen removal processes. The EU Directive requires a nitrogen concentration of less than 15 mg/l for plants with 10 000–100 000 p.e., and 10 mg/l for plants with more than 100 000 p.e. while the minimum reduction for wastewater discharges to sensitive areas subject to eutrophication is 70-80%. Water utilities and industries discharging wastewater have to apply for an environmental permit for their wastewaters. Typically, permits are granted for a five-year period, and so far the trend has been toward increasingly tighter requirements for wastewater effluent quality. Except for nitrogen removal, Finnish wastewater discharge permits are generally tighter than the requirements of EU directives.

As for the Baltic Sea, the Helsinki Commission, or HELCOM, aims at protecting the marine environment of the Baltic Sea from all sources of pollution through intergovernmental cooperation between Denmark, Estonia, the European Community, Finland, Germany, Latvia, Lithuania, Poland, Russia and Sweden. When HELCOM in 1992 drew up its list of the most important pollution sources, so-called “hot spots”, Helsinki was one of the 132 hot spots listed, mainly due to the nitrogen load discharged with wastewater (HELCOM 2006). Since then, nitrogen removal at the wastewater treatment plant has been significantly improved, and in 2004 HELCOM removed Helsinki from the list of hot spots. In 2005 BOD$_7$ and phosphorus removal rates were over 97% and that for nitrogen about 90% (Helsinki Water 2005).

The largest water user in Finland is and has been the pulp and paper industry which uses four times more water than the 5.2 million residents of the country. Consequently, the initial wastewater pollution loads from this industry have been much larger than the pollution from residential sources. But the Water Act of 1961 gradually pressured forest industries to reduce their loadings to watercourses (Lehtonen 1994). The development has been remarkable – since 1970 their production has more than doubled while the total loadings to receiving waters have been reduced to less than one twentieth (Figure 5.4). Thus, the load per one ton produced has fallen to just two percent compared to 1970.
Unlike in several other countries, the Finnish state does subsidise the construction or improvement of larger wastewater treatment plants. The responsibility for financing lies entirely on the municipalities and their water utilities and companies. There are some state subsidies available for the improvement of water services in rural areas, or to support cooperation between rural municipalities in the water sector. In 2004, the Ministry of Environment allocated a total of about 5 million EUR annually to support water and wastewater services in rural areas while the Ministry of Agriculture and Forestry also made available about 5 million EUR annually to support water and wastewater schemes in rural areas. Thus, in 2004 the total state support to water and wastewater services in Finland was only 10 million EUR, a mere 4% of the total annual investments of around 240 million EUR in the early 2000s. (Lapinlampi & Raassina 2002a; Pietilä 2005a)

In most urban areas of Finland public water and wastewater services are functioning well and no drastic improvements are required. The tendency to increase the share of groundwater or artificial groundwater in water supply against surface water will continue; in Turku and Tampere regional water supply schemes are being implemented. Nitrogen removal from wastewater has to be improved in a number of plants. Another future development in the field of wastewater treatment is that small wastewater treatment plants will be closed and wastewaters will be led to larger plants or, in some cases, new regional wastewater treatment plants will be constructed.

Rural areas will see much development in wastewater treatment and on-site sanitation during the next ten years. The Decree on Treating Domestic Wastewater in Areas outside Sewer Networks (2003) clearly states that the traditional solution of a three chamber septic tank is no longer sufficient for individual households or summer cottages and something more efficient has to be introduced by 2014. There are altogether 200 000–250 000 rural properties which have to improve their wastewater treatment facilities. It has been estimated that the cost of the improvements is in the region of 3 000 EUR per property. There are several options for improving wastewater treatment systems in rural areas. The main ones are:

- to extend traditional sewerage to areas so far not covered,
- to build an individual treatment facility for each property – the use of dry toilets would make the treatment of other wastewater much easier,
- to build small diameter pressurised sewerage, and discharge wastewater to centralised sewerage network.

The last alternative of pressurised sewerage has gained momentum in some parts of the country (VVY 2003). It is rather attractive especially if there is also the need to improve the water supply system since water distribution pipelines can be installed in the same excavation with the pressurised sewer pipe. That means large savings in the cold climate of Finland where the minimum installation depth of water pipes is two metres. Several pressurised sewerage schemes consisting of over 100 small pumping stations have been built so far.

5.1.4 Water and wastewater charges

In accordance with the Water Services Act of 2001, water charges should cover all capital investments in water and wastewater services as well as operating expenditures. Water services can, however, be subsidised by the municipality, the state, and the European Union in accordance with the Local Government Act (1995). The government support has been directed mostly to investments in smaller municipalities and important supramunicipal systems (regional or intermunicipal). Larger cities have never received any financial support for their water services from the state, except for some regional water supply schemes. No governmental subsidies are available for operations and maintenance, i.e. for operating expenditures. Earlier local taxes were also used for financing the construction of water and sewage undertakings. Financing of water services in Finland is described in more detail in Article III, Chapter 5.

Even though water undertakings seldom have problems with the availability of water, all the water sold is metered when delivered to the customers. Usually multi-storey residential buildings have only one meter; dwelling-based metering is rare. Single-family houses, on the other hand, always have their own meter. Both water and wastewater charges are based on water consumption. Most water and sewage undertakings have adopted also connection charges. The same is true for cooperatives and other associations. The most recent trend is that water undertakings introduce also a fixed fee independent of consumption.

Although the volumetric charge, in principle, could vary in different areas, undertakings, in practice, apply uniform service charges based on the quantity of water distributed. The Water Services Act of 2001 allows undertakings to collect fixed charges also on sewerage services. Earlier it was not possible to collect a fixed charge for wastewater services and sewerage charges were volumetric, based directly on the quantity of water used. According to recommendations, fixed charges should not usually exceed one third of the total amount of fixed and volumetric charges (VVY 2001).

The revision of the pricing structure in Finland was justified also as it partly corrects the previous discrepancy in the cost recovery practice. In most water undertakings the bulk of the revenue (over 90%) used to come from variable income (revenue based on volumetric charges according to water use) and only a small portion (less than 10%) from fixed sources. On the other hand, the actual cost structure of water undertakings is just the opposite. The majority of the costs (80-90%) are fixed and fairly independent of the volume of services rendered, such as interest and depreciation, and personnel and administration expenditures. The recent
amendments aim at increasing the share of revenue from fixed charges to 25-35% of all water services revenue (Pietilä 2005a).

According to the Finnish Water and Waste Water Works Association (VVY 2005), in the beginning of 2005 the average volumetric water charge was 1.03 EUR/m³ and wastewater charge 1.55 EUR/m³ (Article III, Figure 12). In addition to these volumetric charges, a small fixed water charge is also collected, which in 2005 was around 50 EUR/year for one-family houses. In 2005 most water undertakings did still not charge any fixed wastewater fee, but those that did commonly collected, on average, 50 EUR/year from each one-family house. Fixed charges are clearly smaller per household in blocks of flats. The charges include 22 % VAT.

In Finland stormwater collection and disposal was typically the responsibility of the water and wastewater undertaking even before the Water Services Act of 2001. The costs of these activities are in most cases covered by wastewater charges. Only ten or so undertakings did charge a separate stormwater fee in 2005, but the trend is that separate stormwater charges will be introduced more widely (VVY 2005). The question whether stormwater and drainage should be excluded from the responsibilities of water and wastewater undertakings, and covered by other means, was also raised in 2005 (Kiuru 2006).

5.1.5 Public-private and public-public cooperation in water and wastewater services

Finland has long and extensive experience from public-private cooperation in the water supply and sewerage sector, although perhaps not of the type that it is too often understood to be (i.e. from private finance initiative projects). Outsourcing of the services, especially non-core operations, of public water undertakings is very extensive in Finland (Figure 5.5). The contract period is purposely relatively short, such as three years, in order to maintain real competition. Too long contract periods can eliminate potential competitors and thus reduce competition in the next round. Finnish public procurement legislation, which is based on an EU directive, requires municipal public utilities to arrange competitive bidding on investment projects larger than 5.2 MEUR, and on annual service or goods purchases exceeding 0.2 MEUR (MTI 2006). Private companies incur nearly 100 percent of the capital expenditures of Finnish water systems. It can be argued that in Finland, where water utilities are publicly owned, the elements of private sector competition are far better utilised than e.g. in England, where the water sector is 100 percent privatised.

Figure 5.5 shows a rough long-term estimate of the share of private sector involvement in water service provision in the Finnish City of Tampere with a current population of 200 000. For most of the period since the late 1700s until 2000, the city boards or utilities in charge of water and sanitation services bought a large share of their goods and services from the private sector or other city departments. Only in the 1920s and the 1940s, the share of bought services remained considerably low which is explained by the relatively low investment rate during those periods (Katko & Juuti 2005). The low investment rate, particularly during the latter period, was naturally due to World War II and the economic hardships just after the war.
In actual operation and maintenance, private sector services have mainly been procured for pumping stations and sludge treatment. The most commonly outsourced services are (Vehmaskoski, Pietilä & Seppälä 2002):

- Detailed design
- Construction
- Wastewater sludge treatment
- Equipment and material supply
- Repair workshop services
- Laboratory services
- Other non-core services (such as transportation, machinery leasing, automation, instrumentation and control, computer services, office and real estate services, etc.).

However, municipal companies do not outsource all activities that they could. For instance, Helsinki Water considered engaging a private contractor to replace consumer meters that are taken out to be checked every five to ten years, but decided to leave this task to its own staff. The company wanted to show its ‘face’ to its customers since the plumber replacing the meter is more or less the only representative of the water company the customer comes into contact with due to the presently practiced electronic billing. This also enables the plumber to collect valuable first-hand feedback from customers (Pirinen 2001). In Finland, the reading of water meters by water utilities’ staff is getting rarer. Many utilities send a stamped postcard to customers once a year, and ask them to fill in the water meter reading and mail it back to the company. Alternatively they can phone in the reading, send a text message by mobile phone, or send the
reading via the Internet. The meter reading is then checked in connection with the meter replacement and occasionally in between.

Figure 5.6 describes how both municipalities and private sector are involved in water and wastewater service provision in Finland.

Figure 5.6 Involvement of private sector in water and wastewater service provision in Finland

In addition to municipal water undertakings, which cover about 90% of public water supply, there are a large number of other forms of organisations, mainly small, operating water and wastewater services. In practice, Finnish water and sewerage undertakings can be classified into three main categories based on organisational and functional model:

1. Small private water associations (partnerships, water cooperatives) serving rural communities and sparsely populated areas within municipalities,
2. Municipal undertakings (utility companies, joint stock company) serving urban and rural centres,
3. Supramunicipal (intermunicipal and regional) undertakings (federations of municipalities, joint stock company).

The first, and by September 2006 the only, actual private operator contract was signed in July 2002 for rehabilitation and operation of a municipal-industrial wastewater treatment plant in Haapavesi town. A local dairy and Haapavesi town awarded a 12-year contract to a project company, with majority private shareholding, to rehabilitate and operate the treatment plant. The value of the rehabilitation is about 2 million EUR. (Saarinen 2002; Seppälä 2003)

5.1.6 Water cooperatives

In the rural areas of Finland cooperatives have been, and still are, a common means of organising water supply. Water cooperatives have a long history in Finland – the first were established
already one hundred years ago (Katko 1996). Rural municipalities established piped water supply systems to cover the built-up centres of the municipalities, but they could not afford extending water distribution to sparsely populated, predominantly farming areas, outside the centres. Particularly Western Finland has large areas where groundwater resources are scarce, there are very few lakes, and river water is often not of good quality due soil conditions. The flat topography was favourable for farming, but cattle required large volumes of water of good enough quality. Thus people joined their forces to draw water from distant sources since it made sense to work together for a common goal. Cooperatives had been earlier established for other common undertakings and became commonplace also in water supply.

Some Finnish cooperatives are quite large as they serve more than 10 000 people. In many rural municipalities the water cooperative is the only water service organisation which also supplies the centre of the municipality as the municipality itself has no water supply unit.

In the beginning water cooperatives were typically established for water supply and distribution purposes only, but over the years many cooperatives have expanded their services to sewerage and wastewater treatment. The municipality of Vihanti is an example of innovative water and wastewater service arrangements based on the people’s own initiatives. Cooperatives still play an important role in 2006, even though many of the activities are now carried out by a bulk water supply and service company. The water and wastewater service arrangements of Vihanti are described in more detail in Figure 5.7 and Box 5.1.
Vihanti is a Finnish rural municipality with a population of 3,500 people, of whom roughly half live in the urban-type centre of the municipality. The traditional farming-based economy was complemented by mining activities from 1950 until 1992. Vihanti is located in Western Finland 600 km north of Helsinki and 70 km south of the City of Oulu, which is the major city in the region. Until the end of the 1940s there were no organised water supply and wastewater services in Vihanti with the exception of a public well and a main sewer in the middle of the village. (Kotila 1989)

The first centralised water distribution and sewerage system was built by the mining company in the village of Lampinsaari when mining activities started in the early 1950s. Water for the village and mining activities was taken from a groundwater source close to another village called Alpua. The mining process needed a large volume of water (over 5,000 m³ daily) which caused the groundwater table to sink considerably. As a consequence, some private wells dried, and the mining company had to extend the piped water supply to the affected houses. Thus, quite a few people in Alpua got piped water supply free of charge. By the end of the 1950s, about 1,000 people were connected to piped water supply in the villages of Lampinsaari and Alpua. (Kotila 1994)

Elsewhere in the municipality centralised water supply started in 1957 when Vihanti Water Cooperative was established to serve the municipality’s central township. The scheme included both water supply and sewerage, but not wastewater treatment. The initiators of this cooperative were residents of the township, and initially there were 28 members in the cooperative, all private persons. The municipality of Vihanti joined the cooperative only a few years after its establishment even though the municipality owned some properties, such as an old people’s home, within the operating area of the cooperative. (Kotila 1994)

During the 1960s and the 1970s several other water cooperatives were established in the municipality, especially around Alpua, where water was available from the mining company’s pipeline. By 1985 altogether twelve water cooperatives operated within the municipal boundaries. By the mid-1990s almost 100% of households in the municipality either received piped water or could be easily connected to centralised water supply (Kotila 1994). Figure 5.7 illustrates how water and wastewater services have been organised in Vihanti.

The municipality of Vihanti took over the sewer system of Vihanti Water Cooperative in 1971 and built also a wastewater treatment plant. In the village of Lampinsaari a sewer system and wastewater treatment plant were built and operated by the mining company. A third sewer system and wastewater treatment plant were built in Alpua by the municipality and started operation in 1990.

The municipality of Vihanti is blessed with relatively large groundwater resources, and in order to utilise these, the three largest water cooperatives and the municipality established a private company, Vihanti Water Ltd. in 1977. The company supplies water to the local cooperatives, industry and currently also to five neighbouring municipalities. In 1994 the sewer networks and the three wastewater treatment plants were brought under Vihanti Water Ltd (Kotila 1994). Since 2005 wastewaters from Lampinsaari and Alpua have been conveyed to the central treatment plant and their treatment plants were closed down. In 2006 a trunk sewer from Vihanti to Raahen, some 40 kilometres away, is under construction, and from 2008 all wastewaters discharged into the sewer network of Vihanti will be treated in the new wastewater treatment plant in Raahen planned to serve a population of roughly 35,000 people in Raahen and Vihanti. (Kotila 2006)

Presently Vihanti Water Ltd also has management contracts with the three largest cooperatives to operate and maintain their water supply, distribution and sewerage systems. These cooperatives also have their own groundwater intake facilities which are operated and maintained by the staff of Vihanti Water Ltd. The cooperatives, however, buy the bulk of their water from Vihanti Water Ltd. In addition to these three large water cooperatives, there are six smaller cooperatives in the surrounding areas. (Kotila 2006)
5.1.7 Recent and future major projects

Finland has seen a gradual development towards larger units in wastewater treatment, especially in the Helsinki metropolitan area. In the 1970s the City of Helsinki, with a population of about half a million, had 11 wastewater treatment plants. Since 1994 all the wastewaters of the city have been treated in a single treatment plant which also purifies the wastewaters from five neighbouring municipalities, thus serving a total population of 750,000 people. The longest conveyance distances to the treatment plant are in the region of 50 kilometres which seems to be the maximum viable distance in Finnish circumstances (Helsinki Water 2006). Both in water supply and wastewater treatment there intentions to establish larger units also elsewhere than in the metropolitan area.

Turku regional water supply

The City of Turku (population 175,000 people) and seven neighbouring municipalities established a bulk water supply company called Turku Region Water Ltd. The Aurajoki River remains the raw water source of Turku still in 2006, but the quality of the river water is not good. Not only impurities caused by human activity but also the natural quality of the water present a problem. To overcome the problem, a plan was devised to produce artificial groundwater with cleaner surface water in an area some 70 kilometres north of Turku. A special regional water supply company started its operation in 2002, and the scheme is planned to be operational in 2007. The capacity of the system is just over 100,000 m³/day. The total construction costs are 96 million EUR, of which pipelines account for 68 million EUR, the water intake and treatment system for 11 million EUR, the artificial groundwater production facilities for 11 million EUR, and the underground rock reservoir for 6 million EUR. (Turun Seudun Vesi 2006)

Turku regional wastewater treatment plant

The City of Turku and five neighbouring municipalities have established a company to build and operate a regional wastewater treatment plant to be built underground, in bedrock, more or less in the centre of Turku. Construction started in May 2004, and the treatment plant is expected to be in operation in 2009. The plant is designed for a population of 280,000 people. The required treatment efficiency expressed as removal rates is: BOD₇ 95%, phosphorus 95%, suspended solids 90%, and nitrogen 70%. The cost estimate for the plant is 85 million EUR. (Turun seudun puhdistamo 2006)

Tampere regional water supply

The City of Tampere (population 200,000 people) and eight neighbouring municipalities established in 2002 a bulk water supply company, Tavase Ltd. These municipalities use mainly surface water as their water source, but by 2010 the aim is to build an artificial groundwater recharge system to be the main source of water for this region. The planned volume of water to be pumped is 50,000–55,000 m³/day. The total costs of this bulk water supply scheme are estimated to be 32 million EUR, of which water transfer pipelines account for 70%. (Tavase 2004; Pirkanmaan ympäristökeskus 2006)
Tampere regional wastewater treatment plant

In the region of Tampere, which covers 33 municipalities, a long term water and wastewater services development plan was completed in 2005 (Pirkanmaan ympäristökeskus 2006). The plan covers the period until 2020. In 2006 the City of Tampere has two wastewater treatment plants located in built-up areas, one of them very close to the city centre. Wastewaters from three neighbouring municipalities are conveyed for treatment at these plants. According to the plan, the plants will be closed by 2020. The development plan discusses different alternatives for wastewater treatment in the Tampere region, the number of treatment plants required and their location. One alternative is to build just one wastewater treatment plant for the entire region. It is almost certain that the central treatment plant will be built underground in rock. A rough estimate of the construction costs of the central wastewater treatment plant is 200-250 million EUR. Construction could start around 2010-2012, and the plant could be taken into operation by 2020. (Pirkanmaan ympäristökeskus 2006)

5.2 Sweden

Until the second half of the 19th century improved fire protection and accompanying lowered insurance tariffs were strong driving forces for piped water for town councils and property owners (Drangert et al. 2002). Severe cholera outbreaks in Stockholm and Gothenburg in the middle of the 19th century killed a large number of inhabitants, and these unfortunate events sped up the construction of water distribution networks conveying good quality water (SWWA 2000). As a negative consequence of improved and increased water supply, wastewater volumes increased causing oxygen depletion, odour and health risks in the receiving water bodies. To improve the situation, wastewater treatment plants were built: first just simple mechanical treatment units, in the 1950s biological treatment, and in the 1970s chemical treatment by means of precipitation (SWWA 2000).

During the intensive urbanisation period in 1960-1980 the national government gave economical support to municipalities in need for the extension of water and sewer networks and for the construction of wastewater treatment plants. During the 1970s state support was limited to wastewater treatment plant construction only, but support was available to all municipalities. Since 1980 this kind of state support to water and wastewater facilities has ceased. (Eriksson 1994)

In Sweden about 7.7 million people, close to 90% of the total population, receive their water through centralised water supply systems. There are slightly over 2000 publicly owned water works, of which about 200 use surface water, 1 700 groundwater and close to 150 artificial groundwater as their raw-water source. Measured by volume, 51% of supplied water is surface water, 26% is groundwater, and 23% is artificial groundwater. (SWWA 2000)

About one million people live in rural areas outside centralised water supply systems who use 400 000 private wells for their water supply. Additionally, there are another 400 000 summer cottages using their own individual water supply.

The largest water producer in Sweden is Stockholm Water Company which serves the capital and more than 300 000 people in the neighbouring municipalities (Table 5.3). There is extensive cooperation between municipalities through a number of formal associations but also through more loose collaboration based on bilateral agreements or on an ad hoc basis especially in the
Stockholm area. There is a clear trend both in that area and other parts of Sweden towards increased cooperation, regional as well as municipality-municipality.

Table 5.3 The largest public water suppliers in Sweden in 2003 (Pietilä 2005b)

<table>
<thead>
<tr>
<th>City</th>
<th>Population</th>
<th>Population served</th>
<th>Water supplied million m³/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stockholm</td>
<td>765 000</td>
<td>1 150 000</td>
<td>131</td>
</tr>
<tr>
<td>Sydvatten 3)</td>
<td>480 000</td>
<td>700 000</td>
<td>70</td>
</tr>
<tr>
<td>Gothenburg</td>
<td>480 000</td>
<td></td>
<td>62</td>
</tr>
<tr>
<td>Norrvatten 1)</td>
<td>500 000</td>
<td></td>
<td>45</td>
</tr>
<tr>
<td>Malmö</td>
<td>270 000</td>
<td>270 000</td>
<td>28 4)</td>
</tr>
<tr>
<td>Uppsala</td>
<td>180 000</td>
<td>180 000</td>
<td>19</td>
</tr>
<tr>
<td>Linköping</td>
<td>135 000</td>
<td>135 000</td>
<td>14</td>
</tr>
</tbody>
</table>

Notes:
1) In Stockholm and ten neighbouring municipalities
2) Public company owned by Malmö and 12 other municipalities
3) Public company owned by 13 municipalities, partly bulk water supply only
4) 80% of water bought from Sydvatten

Sweden has 2000 publicly owned sewage treatment plants which treat about 1 500 million cubic metres of wastewater annually. The largest municipal wastewater treatment plants in Sweden are listed in Table 5.4. All 7.7 million people living in urban areas are connected to a sewage plant. Sweden started wastewater treatment early, and the major developments in biological and chemical purification took place in the 1960s and 1970s. Nearly three quarters of the municipal wastewater discharged along the coasts of Sweden underwent nitrogen removal in 2000 (SWWA 2000; Wastewater treatment in Sweden 2003)

Wastewater discharge permits state the maximum allowable concentrations of pollutants in the residual water entering the receiving water. Typical limit values are: organic matter (BOD₇) 10-15 mg/l, phosphorus 0.2-0.5 mg/l and nitrogen 10-20 mg/l (SWWA 2000).

Treatment plants produce 230 000 tons of sludge annually expressed as dry solids. The sludge contains 6 000 tons of phosphorus which could be used as fertiliser on farmland. That amount of phosphorus would be sufficient to fertilise up to eight percent of the arable land. However, the never-ending debate about the risks of related soil contamination continues. Even though Sweden does have very rigid standards, far beyond the corresponding EU directive, only 30% of the produced sludge is used in agriculture. (SWWA 2000)

About half a million dwellings, and roughly the same number of holiday homes, in Sweden are not connected to centralised sewerage (Wastewater treatment in Sweden 2003). Around half of these households have just a septic tank for sludge separation as a treatment method which does not satisfy the present wastewater treatment requirements.

In 1999, the total costs of running the publicly owned water and wastewater facilities in Sweden were 1 500 million EUR (including 25 % VAT). Of this total, 42% may be assigned to the production and distribution of drinking water and 58% to the collection and treatment of sewage. The value of all the assets may be estimated at 55 000 million EUR, of which 38 000 million EUR or 70% is infrastructure, i.e. the pipe network. (SWWA 2000)
Table 5.4 The largest municipal wastewater treatment plants in Sweden in 2003 (Pietilä 2005b)

<table>
<thead>
<tr>
<th>City</th>
<th>Population served</th>
<th>Wastewater treated million m³/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stockholm</td>
<td>970 000</td>
<td>135</td>
</tr>
<tr>
<td>Gothenburg</td>
<td>480 000</td>
<td>120</td>
</tr>
<tr>
<td>Ryaverket wastewater treatment plant</td>
<td></td>
<td>2)</td>
</tr>
<tr>
<td>Käppala wastewater treatment plant</td>
<td>400 000</td>
<td>53</td>
</tr>
<tr>
<td>Malmö + 4 municipalities</td>
<td></td>
<td>4)</td>
</tr>
<tr>
<td>Sjölunda wastewater treatment plant</td>
<td>550 000</td>
<td>50</td>
</tr>
<tr>
<td>Himmerfjärd wastewater treatment plant</td>
<td>250 000</td>
<td>40</td>
</tr>
<tr>
<td>Uppsala Kungängsverket wastewater treatment plant</td>
<td>150 000</td>
<td>6)</td>
</tr>
<tr>
<td>Linköping</td>
<td>120 000</td>
<td>15</td>
</tr>
</tbody>
</table>

Notes:
1) Three wastewater treatment plants in Stockholm serve also neighbouring municipalities
2) Includes 25 million m³/year from six other municipalities
3) Wastewater load of 510 000 p.e, serves 11 municipalities north of Stockholm
4) Treats 550 000 p.e of wastewater, including that of 270 000 people in Malmö
5) Treats an extra industrial wastewater load of 35 000 p.e., serves several municipalities south of Stockholm
6) Uppsala and two other municipalities

Stockholm's wastewater treatment was still on the municipal 'hot spot' list of the Helsinki Commission (HELCOM) a few years ago, mainly due to the nitrogen loads, but improvements as requested by HELCOM have been carried out and Stockholm is now off the list. Gothenburg's municipal wastewater treatment was still on HELCOM's 'hot spot' list as of August 2005. (HELCOM 2006)

From 1998 to 2002, the Swedish government supported massively an environmental programme called the Local Investment Programme (LIP). A total of close to 700 million EUR was granted to 211 programmes in 161 municipalities – an average of 25% of the investment costs were subsidised. In order to qualify for LIP funding, a scheme had to have positive environmental effects in the form of reduced discharges, recycling of materials, more efficient energy use, etc. Water-related activities received around 10% of the subsidies. (Kåberg & Jürgensen 2005)

Sweden and Finland both have a long and wide-ranging tradition of cooperation between municipalities and private consulting, maintenance or construction companies. A large part of the services and materials needed to operate municipal facilities are put out to private tender. On average, around two thirds of services and goods are bought from the competitive private market. In Stockholm, 73% of goods and services needed to operate municipally owned water and wastewater works are bought through open competition. Most of the related contracts are short-term and are renewed annually or biannually.

Management contracts are rather new to Sweden; the first such contract was signed only a few years ago. Most of them concern small municipalities, and the contract periods are short, typically three plus three years. Delegated management has been the subject of intensive
discussion in Sweden. The concepts proposed, especially by foreign companies, have so far not been considered attractive enough.

In 1993 the water and sanitation services of six Swedish municipalities – including Vaxholm and Åre – were organised according to the management contract model (Mattisson 1997). In Malmö, companies, including one French company, vied for the management contract at the beginning of the 1990s, but the final decision was to continue operations as a municipal water utility (Gustafsson 2001).

In 1998 Karlskoga municipality sold 49% of the shares of its multi-utility company to the Finnish energy company Fortum. This multi-utility company owns and operates also the water and sewage services. (Holmqvist 2004; Karlskoga Energi & Miljö 2005)

In 1997 Norrköping established a multi-utility company as the municipal water and wastewater utility was merged with the energy company, the waste company, and the municipal street and park construction unit. In 2000 this company was sold to Sydkraft, an energy company that, again, was owned by the German EON Energy AG. Thus, for a while, water services were provided by a multi-utility company, but since March 2005 Norrköping Water Company has again been an independent company and 100% owned by the municipality. (Holmqvist 2004; Norrköping 2006)

In 1989 Sweden’s first municipality owned limited company, Roslagsvatten AB, was established. There is a strong trend within the public water sector towards formation of limited companies. In 1995 the number had reached 17. In recent years the number has further increased reaching 36 in September 2002, Karlskoga and Norrköping included. A majority of them are multi-utility companies engaged in fields such as electricity, waste, road building and district heating.

In June 2001, Vivendi (presently Veolia Water) won the first contract in Scandinavia for outsourced water services in Norrtälje (Gustafsson 2001).

### 5.3 Lithuania

Lithuania's available freshwater resources have been estimated at around 25 billion m³/year which amounts to about 7 000 m³/year per person (Vandens klubas 2002). The groundwater resources are also fairly large, about 1 200 million m³/year (BEF 2000). Lithuania relies entirely on groundwater for potable water supply. Public water companies draw their water from underground aquifers while in rural areas about 0.7 million people get their water from 350 000 dug wells (Lithuanian Water Partnership 2002). Industry uses mainly surface water. Groundwater use is only 10-15% of available groundwater resources. Agricultural water use is minimal. Huge volumes of surface water are used in the energy sector for cooling purposes. If cooling water is excluded, Lithuania uses less than 1% of its available surface water resources (Statistics 2006b).

The quality of borehole water typically meets health standards. The quality of water in the shallow wells in rural areas is not always up to quality standards. The most common problems are contamination with bacteria and nitrogen compounds. Some aquifers in the western part of Lithuania contain fluoride in excess of the recommended maximum level for drinking water. According to an analysis by the Geological Survey of Lithuania, 2.4 % of the population...
consume water that does not satisfy the above quality criterion (Lithuanian Water Partnership 2002).

Water consumption in Lithuania is measured with consumer meters. Water use increased steadily until the late 1980s but dropped dramatically during the 1990s (see Figure 5.8). One of the major reasons for the decrease in water use is the structural change of industry. During the Soviet period, Lithuanian industry was geared to serve the needs and markets of the Soviet Union; only limited exports to the West took place. When the Soviet Union collapsed at the end of the 1980s, the markets for Lithuanian products largely disappeared, and products made to Soviet standards were not compatible on western markets. As a result, industrial enterprises had to cut down their production and many went bankrupt. Industrial water use has dropped to nearly one fifth since 1990. A second reason for the decrease in water consumption is the new method of charging residential users for water. In the past, people paid for water according to a monthly fixed norm consumption depending on the standard of housing. Since the mid-1990s people have increasingly had water meters installed, even for individual flats, in order to pay for their real water use. (National Report on Sustainable Development 2002; Pietilä 2004)

![Figure 5.8 Supply of water by public water utilities in Lithuania, 1989–2004 (Vandentvarka 2006)](image_url)

During the Soviet rule in Lithuania (1944-1990), water supply and sewerage were the state's responsibilities. The state water and wastewater company had 14 regional subsidiaries for the administration and operation of the systems (Pietilä 2005c). Each subsidiary, again, had subdivisions. In rural areas people used their own wells, as they still do to a large extent. Rural areas also had collective farms which had their own water supply and sewerage systems, and in most cases also wastewater treatment. These systems were operated by the farms themselves and were not part of the state water utility.

After Lithuania regained her independence in 1990, responsibility for public water supply and sewerage transferred from the state to municipalities (Roman 2002). Municipal water companies
were established by reorganising the regional state water companies of the Soviet period. Forty-five water companies were formed of the 14 companies and their 86 subdivisions (Pietilä 2005c). The number of companies (45) is smaller than the number of municipalities (61) because some water companies operate the water supply and sewerage systems of more than one municipality.

The great majority (over 90%) of the water and wastewater services are provided by 45 municipal utilities. These companies are responsible for both potable water and wastewater services (water supply, distribution, sewerage and wastewater treatment). But there are also a large number of other smaller water suppliers (cooperatives, residential groups, agricultural companies, municipal companies, other companies, schools, etc.). In 2000 there were 1,330 individual suppliers of drinking water delivering over 10 m³/d or serving more than 50 people, and 80 larger utilities extracting over 1,000 m³/d or serving more than 5,000 people (Lithuanian Water Partnership 2002). In 2000 there were close to 900 sewerage systems. More than 80 wastewater undertakings fall under the EU Wastewater Directive as their discharges exceed 2,000 m³/d. The wastewater discharges of the seven largest cities constituted about 67% of all discharges. The overall length of the water distribution pipelines is 9,200 km, and there are 5,800 km of sewer lines (Vandentvarka 2006). Stormwater drainage is only seldom the responsibility of water companies but is taken care of by the streets departments of the municipalities.

State water companies during the Soviet period were independent units in the sense that they had all the necessary staff, machinery, equipment and facilities for operating water and wastewater services from the source of drinking water to sewer outlets. Municipal water companies inherited this model and were thus, particularly during the early years of municipal companies, self-supporting managing without the services of private companies as is shown in Figure 5.9. Presently the staff of municipal water companies continues to decrease while use of the services of private companies is on the increase. (Kaunovandenys 2005, Vilniaus vandenys 2004)

**Figure 5.9** Role of municipalities and private sector in water and wastewater services in Lithuania

A major source of revenue for financing is user fees on potable water and wastewater services. The water companies of Lithuania are independent financial units expected to operate on the
income they generate. During the 1990s water use dropped in many areas to one third of what it used to be. This was, of course, advantageous since there was no need to expand the systems as existing capacity was sufficient. But, on the other hand, it is not economical to run over-dimensionalized systems. As fixed costs have been estimated to account for 70 to 80% of the costs of water supply and sewerage, excessive systems result in high unit costs (Abromavicius 1999).

Water tariffs calculated by the municipal company have to be approved by the municipal council (Law on local self-government 1994). Yet, municipalities are not independent in their tariff setting because tariffs have to be approved also by the National Control Commission for Prices and Energy.

In 2004 the average water and wastewater charge in Lithuania was about 1.1 EUR/m$^3$ (Vandentvarka 2006). The larger share (about 60%) of the fee went toward sewerage and wastewater treatment costs and the remaining 40% toward water supply and distribution costs. The water charge is mostly the same for all types of users and independent of the volume consumed. In addition to a volume-based water and wastewater charge, there are only nominal fixed charges. In 2002 water and wastewater charges accounted for 1.5–2.8% of households’ disposable income (ALAL 2003).

Many Lithuanian water companies are struggling to earn enough to keep their operations running and have hardly any funds for capital investments. But capital investments are needed, even when the systems are large enough to cope with demand. Many structures are old and need renovation or even complete replacement. As a consequence of decreased flows, machinery is often over-dimensioned and uneconomical to run. Often only 25–30% of the capacity of the systems is needed (LVTA 2002). Water quality also needs upgrading in many cases, and the efficiency of wastewater treatment has to be improved.

The State budget has been the main domestic source of funding for environmental protection. Since 1999 the funds allocated to municipalities to finance their environmental activities have come from the Privatisation Fund and been transferred directly to municipalities. So far, the great majority of environmental investments have targeted wastewater systems, in particular improvement of wastewater treatment facilities (Lithuanian Water Partnership 2002).

Taxes on the use of the state's natural resources are the most significant sources of State budget revenue from “environmental sources”. A permit is required for the abstraction of both surface water and groundwater (Law on taxes on state natural resources 1991). Each legal or natural person who extracts water in such quantities that a permit for the use of natural resources is required, has to pay a tax to the state. Municipal water companies also need to pay such tax. The power industry also has to pay a small tax on the use of water for cooling as well as on hydro-electric power stations. (Speck, McNicholas & Markovic 2001).

Each entity discharging more than 5 m$^3$/d of wastewater has to pay a pollution charge even if the quality of the effluent meets requirements. The payment is based on the environmental load which depends on the amounts (tons) of BOD, suspended solids, phosphorus, nitrogen and oil products discharged. If the quality of the effluent does not meet the requirements set in the environmental permit, a non-compliance fee (fine) has to be paid. This fee is several times higher than the basic pollution charge in order to encourage the entity to improve its treatment efficiency and thereby reduce the pollution load.
The majority (70%) of the revenue from pollution charges is returned back to municipal nature protection funds (Semeniene & Stanikuniene 2003). Each municipality has its own nature protection fund. Legislation sets some basic requirements and limitations on the use of these funds, including that they must be used for nature protection purposes, but otherwise municipalities can independently decide on the use of the funds.

Since 1997 the income from pollution charges and fines has decreased because wastewater treatment has improved; existing plants have been improved or completely new plants have been taken into use. The most significant single improvement in the wastewater treatment sector in the whole country during the last decade was the inauguration of a wastewater treatment plant for the city of Kaunas in 1999 (Vandentiekis Kaune 1999). Earlier the wastewaters of Kaunas were discharged into the Nemunas River untreated. In Vilnius the development of wastewater treatment has also been remarkable: in 1979 the annual water pollution load from the city was 27,000 tons of BOD whereas in 2002 it was only 400 tons (Pietilä 2005d).

Since 2002 the reorganisation of Lithuania's water and wastewater services has been discussed in connection with the preparation of a new water act. The establishment of regional water companies has been proposed: five companies based on river basins, or ten companies – one in each county. One reason behind the reorganising of water services into regional companies has been to promote social equity – to have equal water tariffs over larger areas (Kundrotas 2003). Water tariffs would be the same within the area of each company regardless of where the consumer lives. In practice, this means that water users in larger cities or areas where water services are cheaper to produce subsidise users in remote or otherwise more expensive areas (Beveridge & Guy 2003; Seimas 2004).

In July 2006 a new water supply and wastewater act was approved by the Lithuanian parliament (Act X-764, Geriamojo vandens tiekimo in nuotekų tvarkymo įstatymas). According to the Act, water supply and wastewater services remain the responsibility of municipalities, and these services have to be provided by public (municipal or supramunicipal) undertakings. A license is required for public water and wastewater service provision, and just one water and wastewater undertaking is allowed in each municipality. This requires merging the numerous existing small undertakings with larger units. Regional water and wastewater undertakings are the plan for the future. The new Act sets a tough target for water and wastewater service coverage: by 2014 public water and wastewater services have to cover 95% of the population in each municipality.

5.4 Germany

In Germany, as well as most European countries, the pressure to establish public water supply was created by epidemics caused by polluted water. By the 1850s cholera outbreaks had convinced society of the importance of improved water supply and sanitation. In some cases private companies were given concessions to start public water supply or were invited to plan and construct such systems. Often these companies were British. Yet, water supply was soon taken over by municipalities, and municipalities also established companies for gas and electricity distribution. These municipal companies, Stadtwerke, soon became important revenue sources for municipalities – during the first decade of the 1900s the profits of these companies accounted for 10-16% of municipalities’ revenue. (Klenke 1999)

Private companies showed hardly any interest for centralised sewerage due to the large investments involved. A law enacted in 1900 obliged municipalities to prevent the hygienic
hazards caused by wastewater. For several decades, due to health policy reasons, municipalities did not charge fees for treating wastewater covering the costs by municipal taxes (Klenke 1999).

In rural areas, the policy was already in the second half of the 1800s to create larger units, covering several municipalities, for water supply. Around 1910, in the district of Württemberg with 457 municipalities, water distribution was implemented by 47 utilities. In some cases cities with special water problems opted for cooperation with neighbouring municipalities. In North Rhine-Westphalia local groundwater was unavailable because of coal mining, and therefore the municipalities created joint organisations, such as Gelsenwasser, for water supply purposes. During the 1930s an important argument in favour of creating larger water utilities was to improve living conditions in rural areas, and thus limit migration from the countryside to cities. In the 1960s the coverage and level of water and wastewater services in rural areas was improved with massive support from the state (up to 90% of the costs), and by 1975 93% of the population were already connected to public water supply (Klenke 1999). Even though there are several large regional water and wastewater service providers, the total number of public water or wastewater undertakings in Germany is large. Depending on the criteria for a public water service provider, there are about 6 700 water supply companies and from 7 000 to 8 000 wastewater collection and disposal utilities. (Knothe, Kramer & Mohajeri 2003; Lanz 2004)

The German Constitution prescribes that the responsibility for supplying drinking water rests with local authorities as part of their task to ensure the basic living conditions. In that respect, the Constitution grants municipalities an exceptionally high level of independence vis-à-vis state authorities, the federal and regional governments (Lanz 2004). In Germany water supply has traditionally been organised on a commercial basis, and it has been subject to taxation; currently the VAT on investments is 7%. On the other hand, wastewater collection and disposal which has become an obligation of municipalities and is exempted from profit tax, property tax and value-added tax (Knothe et al. 2003). The investment costs of wastewater treatment have to a large extent been covered by the state. Due to different taxation practices, water and wastewater services have been provided by separate organisations as is shown in figure 5.10. Recently there has been a tendency to combine these activities into a single unit. In West Berlin, the water and wastewater utilities were united in 1988 into a single utility, Berliner Wasserbetriebe. After the unification of Germany the management responsibility for the water and wastewater utility of East Berlin (Wasserversorgung und Abwasserbehandlung Berlin) was handed over to West Berlin water utility (Berliner Wasserbetriebe) in 1990 (Klenke 1999; Lanz 2005; Lanz & Eitner 2005). Formally these two utilities were merged in 1992.

In 1999 the Berlin water company was privatised as the city sold 49.9% of the shares to a consortium of private companies, which gained full operational control. The reason for the privatisation was not to enable supplying better or cheaper water to Berliners but the severe financial difficulties of the city. In the mid-1990s the municipality-owned Berliner Bankgesellschaft went bankrupt leaving the city with huge long-term liabilities. A second reason for the privatisation was the strong ideological motivation of some politicians to privatise as many public enterprises as possible. (Lanz & Eitner 2005)

In Hamburg water and wastewater services have been provided by two separate municipal utilities: potable water supply has been the responsibility of Hamburger Wasserwerke (HWW) and sewerage and wastewater service has been provided by Hamburger Stadtentwässerung (HSE) (Vehmaskoski et al. 2002). From the beginning of 2006 these two utilities have been under joint management and now operate under the name Hamburg Wasser. However, HWW and HSE remain legally autonomous units. The organisational form of HSE is a public institute
(Anstalt des öffentlichen Rechts), and it is exempted from taxation. HWW, in contrast, is a 100% communally owned limited liability company subject to value-added tax, even though at the reduced rate of 7% (GWI 2005). In 2006, initiated by a strong public pressure by the population, the city state of Hamburg passed a law banning privatisation of Hamburger Wasserwerke.

Figure 5.10 Water and wastewater services in Germany

5.5 The Netherlands

The first Water Boards in the Netherlands were established in the 13th century for flood protection and land drainage. These Boards are the oldest democratic form of government in the Netherlands (Kuks 2002). Their number was 3,500 in the mid-1800s, and still 2,600 in the 1950s. Since then, mergers have reduced their number to 25 in 2005 (de la Motte 2004; Kuks 2006). In addition to the original drainage task, Water Boards are responsible for wastewater treatment. Until 1970 wastewater treatment was the responsibility of municipalities as sewerage still is (Vehmaskoski et al. 2002; de la Motte 2004).

The Dutch Water Boards receive revenues from two charges:
   a) charge for drainage and water control
   b) pollution charge.

The pollution charge is calculated on the polluter-pays principle with industries and institutions paying according to the quantity and quality of their wastewater discharge while households pay a sum based on their metered consumption (BIPE 2001).

Groundwater resources are limited in the Netherlands, and the regions are vested with the power to issue permits to abstract ground water for the production of drinking water (Kuks 2006).

When public water supply started in the Netherlands in the middle of the 19th century, most companies were under direct private management. Between 1850 and 1920 water services were dominated by private companies but were since progressively taken over by municipalities and operated as public utilities (World Bank 2003). When the pressure increased to expand public
water supply also to rural areas, private companies were in many cases not interested and were bought by the municipalities. By the time the public sector took over, the principles of economic management of water services had become well embedded in the political system. Arms-length management of public utilities by municipalities became the norm. Until the 1970s water utilities were predominantly under direct public management but have since then become publicly owned companies operating under private law.

Water supply and distribution, sewerage and wastewater treatment are managed and operated on a decentralised basis. Water supply and distribution are the responsibility of publicly owned water companies. Municipalities provide sewerage while drainage is the task of regional Water Boards (Waterschappen) (Kuks 2002; Vehmaskoski et al. 2002). Since the adoption of the Surface Water Pollution Act in 1969 and the Waterbord Act in 1992, wastewater treatment has been the responsibility of the Water Boards (Kuks 2006).

Dutch water companies are owned by municipalities and regions. A 1997 government paper stated clearly that water supply concessions would only be given to publicly owned companies (Blokland 1999), and in 1999 the cabinet decided to exclude drinking water supply from free competition and to maintain the monopoly held by the water supply companies (Kuks 2006). In 2004 the parliament passed a bill which prevents any privately owned company from providing drinking water services to the public. According to the law, water supply companies or cooperatives have to be 100% publicly owned (Hall, Lobina & de la Motte 2004). However, this bill does not cover sewerage or wastewater treatment.

Nearly all water companies in the Netherlands are constituted as “Naamloze Vennootschap” (N.V.), equivalent to the British Public Limited Company (PLC), the American Stock Corporation and the French Société Anonyme. These water PLCs are autonomous for-profit organisations under commercial law, even though the sole shareholders are municipalities, sometimes together with the provincial governments. Water PLCs are operators of water services. The Dutch practice, however, differs from the French delegated management in that the operator is owned by public rather than private shareholders. Also, in the Netherlands the public water PLC is a permanent concessionaire while its French counterpart is a temporary concession holder. Keeping the ownership solely in public hands ensures that the public interest is safeguarded. (Hartvelt 1997)

The number of water companies in the Netherlands has decreased dramatically during the last decades. In the 1950s there were more than 200 water companies, by 1990 the number had been reduced to 60, and the mergers continued so that in 2000 just were 20 left, and in 2004 only 11. An even smaller number is planned for the future, maybe as few as 4 water companies. (BIPE 2001; ten Elshof 2001; de la Motte 2004; Kuks 2006)

Water companies are not subsidised by any public authority which means that users pay the 'real price' for their water. Water charges include a fixed and a variable component, and almost all users have a water meter. Municipalities control water prices, there is no national regulator, but the quality of drinking water is overseen by the Ministry of the Environment. (BIPE 2001; Kuks 2002)

Sewerage is the responsibility of municipalities in the Netherlands (Kuks 2006). Because sewers are laid under streets and roads maintained by the municipality, it seems logical to give municipalities a leading role in sewerage. Most systems are combined, but if there are separate stormwater sewers, municipalities are responsible for them as well (Perdok & Wessel 1998).
the construction and maintenance of sewers private companies are widely utilised so that 80% of the money flows to the private sector (ten Elshof 2001). The costs of sewerage are covered either by sewerage charges or by property taxes (BIPE 2001; Kuks 2006).

The need of drainage and flood control due to special topography initiated water management in the Netherlands much earlier than in other countries. Until the 1960s, one of the main goals in relation to water quality was the prevention of salination due to saltwater intrusion through sluices or saline or brackish water seepage. From the mid-1960s other water quality aspects such as pollution caused by industrial and domestic wastewaters started to receive more emphasis. Also, the increased use of water for industrial and domestic purposes as well as the need of cooling water created a need for more comprehensive control of both water quality and quantity. In 1968, the First National Policy Document on Water Management was published. This document was the first attempt towards integrated water resources management. It was revised a few times, and the Fourth National Policy Document on Water Management came out in 1998. (De Bruin & Schultz 2005)

Wastewater treatment was slowly introduced after sewerage systems became more widespread in the 1930s. Since municipalities had constructed sewer systems, they were also the early initiators of wastewater treatment together with the provinces. The Surface Water Act of 1969 transferred the responsibility for wastewater treatment to Water Boards (de la Motte 2005a). Still in the 1970s, half of the wastewaters were discharged untreated. The Fourth National Policy Document on Water Management of 1998 states that the responsibility for the treatment of wastewater from households and small businesses is a government task (Kuks 2006). Large companies can treat their own effluent or have it done by third parties.

5.6 France

Starting with private provision of water at the local government level, and maintaining it from the middle of the 17th century onward, France evolved toward public ownership and private provision of water services through different type of management and lease contracts (World Bank 2003). The issue of fire fighting did not come up as an important reason for developing
piped water supply in France because wooden buildings were not as common as further north in Europe.

In France, the role of private companies was most dominant in Europe before the full privatisation in England and Wales in 1989 (Barraqué et al. 1998). Private companies have evolved and been extensively involved particularly in potable water service provision largely due to the small size of French local authorities. French municipalities may set up a joint entity (syndicat intercommunal) and transfer some of their responsibilities, such as water supply, to this unit in order to e.g. gain economies of scale and thereby ensure more professional running of the services (Lamothe 2003). But in spite of this possibility to join forces, the French water sector is still highly fragmented: there are over 34 000 water services (potable water and wastewater systems) (Table 5.5).

Table 5.5  Water and wastewater services in France (Lamothe 2003)

<table>
<thead>
<tr>
<th>Number of services</th>
<th>Water supply</th>
<th>Wastewater</th>
</tr>
</thead>
<tbody>
<tr>
<td>serving one municipality</td>
<td>16 337</td>
<td>17 972</td>
</tr>
<tr>
<td>'syndicat'</td>
<td>10 853</td>
<td>12 236</td>
</tr>
<tr>
<td>mixed</td>
<td>4 093</td>
<td>2 175</td>
</tr>
<tr>
<td>1 409</td>
<td>3 561</td>
<td></td>
</tr>
<tr>
<td>Municipalities with no service</td>
<td>114</td>
<td>15 107</td>
</tr>
</tbody>
</table>

Thus, almost half of French municipalities do not have a centralised sewerage and wastewater treatment forcing people to rely on their individual wastewater disposal systems. However, the municipalities without wastewater services are small, and thus involve only a small share of the population.

The operational organisation of water and wastewater services in France is the municipalities’ responsibility. A municipality can choose to run the services by itself, or establish a 'syndicat' with neighbouring municipalities and transfer responsibility to it. The services may be run by a public operator (régie) set up by a municipality or a 'syndicat', or running can be delegated to a private company (Table 5.6). (Lamothe 2003)

Table 5.6  Public and private water service operation in France (Lamothe 2003)

<table>
<thead>
<tr>
<th>Number of municipalities</th>
<th>Population served</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drinking water supply</td>
<td></td>
</tr>
<tr>
<td>- régies</td>
<td>48%</td>
</tr>
<tr>
<td>- delegation</td>
<td>52%</td>
</tr>
<tr>
<td>Wastewater treatment</td>
<td></td>
</tr>
<tr>
<td>- régies</td>
<td>62%</td>
</tr>
<tr>
<td>- delegation</td>
<td>38%</td>
</tr>
</tbody>
</table>
5.7 England

In England water services were developed until the 20th century predominantly by private companies. In London, the period of private undertakings began in 1581 when City Corporation granted the use of the first arch of London Bridge to Peter Morris for a term of five hundred years (London’s water supply 1953). He installed a water wheel in the arch to pump water up into a tower from where it was distributed by lead pipes into the eastern part of the City. During the next centuries, several water companies were established in London which competed fiercely for customers so that pipes of several companies could run along a single street. Over the years the companies merged so that by the middle of the 19th century the number had been reduced to eight, each serving predominantly a specified area.

In a large city like London such a fragmented water supply structure proved unable to secure reliable and safe water supply to all residents. Since the 1850s attempts were made to bring London’s water supply under a single public body. The City of London established in 1897 a commission to examine the future needs of London’s water supply, and in 1899 the commission concluded that: "the concentration of the undertakings into the hands of one authority was desirable" (London’s Water Supply 1953, p.11). A public utility called Metropolitan Water Board was then established in 1903 to take care of London’s water supply. At that time water was supplied to close to seven million people in London. Private water companies were taken over by municipalities also elsewhere in England, so that by 1901 the share of municipal water supply undertakings had reached 90% in larger provincial towns (Hassan 1998).

Before the Industrial Revolution, the main role of sewerage was to provide local drainage and prevent flooding. People were left to dispose of their foul waste as they saw fit. The supply of water was followed by the installation of water closets and cesspits. Sewage became an increasing problem for the growing urban population. Rivers were an important source of drinking water, but due to increasing sewage discharges, the quality of the water in the rivers deteriorated. The sewerage systems were, on the whole, constructed and operated by local authorities as part of public services which they provided at the time. Local authorities obtained their revenue through a levy on every household and commercial, agricultural and industrial property based on the rateable value of the property. Thus, the local authority’s income was not based on taxation or proceeds from sales as in many other countries (Rees & Zabel 1998).
From 1900 until 1973 municipalities were predominantly in charge of water and wastewater systems in England, with the exception of about one fifth of the population that was supplied water by non-municipalised private companies (Semple 1994; de la Motte & Lobina 2005). These private companies were only water companies, while the wastewater services in their operational areas were provided by the municipalities. There was a wide range of individual organisations responsible for water and sewerage services. In 1915 there were over 2000 water supply undertakings in England and Wales, but this number fell to 1186 by 1945 through regrouping, amalgamations and take-overs. Further mergers occurred in the 1950s as a result of the government policy of concentrating water supply activities. The number of sewerage undertakings, however, remained at around 1400 until 1974 (Rees & Zabel 1998).

In 1973 the water sector in England and Wales was thoroughly reorganised. The local authorities were divested of their responsibilities, and ten regional water authorities (RWAs) were formed (Semple 1994; de la Motte & Lobina 2005). These new RWAs were based on river catchment areas, and they took over the work previously carried out by 157 water undertakings, 1398 sanitary authorities, and 29 river authorities (Hassan 1996b). Twenty-eight private companies, which supplied water to 25% of the population, were excluded from the restructuring and continued operations (de la Motte 2005b). The new RWAs were legally responsible for the whole of the water cycle – in addition to water supply and sewerage services, their responsibilities included water resources planning, pollution control, fisheries, land drainage, flood protection, recreational use of watercourses, and certain functions related to conservation (Semple 1994). Thus, in this respect, the RWAs were in line with the present EU policy of river catchment area-based water management. The RWAs were public boards, with members drawn from local government and partly directly appointed by central government, to whom the RWAs were responsible, financially and operationally. But gradually municipal representation on the boards of RWAs was reduced, and in 1983 completely abolished (de la Motte & Lobina 2005). Thus the water and wastewater services managed by local authorities prior to 1974 were nationalised to a large extent without any compensation to the local authorities.

However, even after the creation of ten RWAs, which in principle were in charge of the entire water cycle, including sewerage, the local authorities still played an important role. For reasons of technical convenience and their significance to local government with regard to its public health and land-use planning functions, district councils were given the responsibility of conducting sewerage business as agencies for the RWAs. But contracting out sewerage work to district councils meant that the financial and technical management of a significant part of the RWA business escaped their effective control. In 1982, 95% of all sewerage systems were still run by district councils (Hassan 1998). Most coastal outfalls, certain trunk sewers and all wastewater treatment plants were the direct responsibility of the RWAs.

Then, in 1989, these RWAs were privatised and replaced by 10 private water and sewerage companies which became owners of all water systems and property of the RWAs. The shares of these new companies were sold in the stock market, with special discounts being offered to the public to ensure political acceptance. However, 29 water companies remained separate from these new 10 large companies, so that 25% of the population in England and Wales continued to have their water (but not wastewater) needs provided by these small companies. The number of these water-only companies has decreased due to amalgamations to 16 by 2006 (Semple 1994; Rees & Zabel 1998; de la Motte 2005b; OFWAT 2006). Figure 5.13 shows how public bodies are sidelined in water and wastewater services in England.
The prime motivations behind the decision to privatise were political and financial. During the 1980s the conservative British government had set itself the political objective of privatising the public services wherever practicable, based on its belief that the provision of services is best, and most economically, carried out by the private rather than the public sector (Semple 1994). The conservative party was in power in the UK from 1979 until 1997. During this period virtually all formerly nationalised industries were privatised – telecoms, electricity, gas, water, railways, coal, iron, steel, etc. (Price & Young 2003). Water as well as electricity were already regionally organised in England and Wales, and therefore their selling off was easier. On the whole, the responsibility for welfare services in England now rests on a wide range of public, independent and private organisations, whose structural ties to the wider society, state and democratic and political processes is weak by comparison to the earlier network of strong ‘intermediate institutions – trade unions, local government, community and professional organisations – that mediated relations between the state and civil society until they were swept away by the Thatcher revolution (Hutton 1996). Political authority, and the values and relationships upon which political authority rests, have been replaced by a complex system of regulation, inspection, performance management and audit which has bred the new quasi-profession of auditors, regulators and inspectors that administer and manage (Cooper and Lousada 2005).

Another major consideration was that of finance. Whilst the government did not directly finance the RWAs, their borrowing was subject to government control, and the total amount of public sector borrowing was strictly limited for macro-economic reasons. At that time, as concern for the environment was rapidly increasing, and new EU Directives called for massive investments in water services, the government was forced for economic reasons to limit capital expenditures which would not have allowed reaching the environmental objectives. One solution could have been to loosen the government's financial control and allow the RWAs to raise their own finance on the market without limiting their public sector borrowing. But this was seen as unacceptable, and in any case it was not in line with the government’s political aspirations (Semple 1994; Hassan 1998). The selling off of the water authorities was contested more fiercely than the sale of any other of the four major utilities (water, gas, telecoms, electricity), both in parliament and in the country at large (Price & Young 2003). The chief argument presented in favour of the sale was that consumers would reap benefits through greater efficiency. In order to prevent these new
companies from misusing their monopoly in the market, a strong regulatory system was established (Hassan 1998; Rees & Zabel 1998; Byatt 2004).

5.8 Conclusions

The development of centralised water and wastewater services has been closely linked with urbanisation. When cities grew and large number of population concentrated in urban areas water sources within the cities became polluted causing epidemics such as cholera outbreaks. Early developed major cities such as London has had piped water distribution systems since the late 16th century. During the 19th century centralised water supply and sewerage systems were built to major cities throughout Central and Northern Europe. Typically the first water distribution systems were built by private companies, but by the beginning of the 20th century cities had taken over the responsibility for water supply from private enterprises.

When piped water distribution became more widespread, the volume of wastewater to be discharged increased significantly, and the need to develop sewerage systems became acute. It was difficult to establish and run sewerage on commercial basis and thus the responsibility stayed with municipalities. Even though municipalities are typically responsible for sewerage and wastewater treatment, in several countries the state has financially supported in particular construction of wastewater treatment plants. Also, central government and its environmental authorities have promoted water pollution control by requiring municipalities as well as industries to build wastewater treatment plants. Construction of wastewater treatment plants has intensified in particular since the 1970s.

From the beginning of the 20th century until the late 1990s the organisational set-up of water and wastewater services remained rather stable – municipal utilities or companies were in charge of these services. There were, however, some exceptions from this common practise. In France there is already a long tradition that in particular small municipalities enter into an agreement with a private company to manage and operate water and wastewater systems based on long-term concession or lease contracts. The development of this practise can be, to a great extent, explained by the large number of municipalities. Many French municipalities have a population of only a couple of hundred people and it would be difficult for such small entities to organise independently water and wastewater services. Another striking deviation from the common practise is England, where water and wastewater services were reorganised into regional water authorities in 1974. In 1989 these public water authorities were then totally privatised.

There has been discussion also in other countries on the reorganisation of water and wastewater services in order to improve the efficiency and increase the role of private sector in service provision. Liberalisation of water services has been discussed also in the EU. The leading principle since the establishment of the EU has been free trade between the member states. Yet, water services differ substantially from consumer goods provision, and it has been understood that the same commercial principles are not valid for a natural monopoly service such as water. Thus, the EU will probably not require opening up the water sector to private service providers.

In the countries covered in this research very little changes have actually taken place during the last ten years. Table 5.7 summarises water and wastewater service arrangements in the countries covered in this research. There are only some examples of complete privatisation such as Berlin – however, the reason to privatise in Berlin was not to improve water and wastewater services but to get money to the debt burden city. Elsewhere there have been a limited number of various
lease or concession contracts, but these have not been spread. Water services are regarded as such basic services that they should not be left for private markets to exploit. When municipalities have typically had central role in the provision of water and wastewater services, and as a whole people are satisfied with the level of the service they receive, there is no political pressure towards privatisation. Rather other way round, there has been political pressure in a number of countries and localities to safeguard that water services remain in public hands.

Table 5.7 Water and wastewater service arrangements in some European countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Responsible for service provision</th>
<th>Owner of the capital assets</th>
<th>Responsible organisation for service provision</th>
<th>Water supply and distribution</th>
<th>Sewerage and wastewater treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finland</td>
<td>municipality</td>
<td>mainly municipality¹</td>
<td>municipal undertaking²</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sweden</td>
<td>municipality</td>
<td>municipality</td>
<td>municipal undertaking³</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lithuania</td>
<td>municipality</td>
<td>municipality</td>
<td>municipal undertaking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Germany</td>
<td>municipality</td>
<td>municipality</td>
<td>municipal undertaking⁴</td>
<td>municipal undertaking⁴</td>
<td></td>
</tr>
<tr>
<td>Netherlands</td>
<td>municipality, region and Water Board⁵</td>
<td>municipality, region and Water Board</td>
<td>regional company</td>
<td>municipality &amp; Water Board</td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>municipality</td>
<td>municipality</td>
<td>private undertaking⁶</td>
<td>municipal or private undertaking⁷</td>
<td></td>
</tr>
<tr>
<td>England</td>
<td>regional private undertaking</td>
<td>regional private undertaking</td>
<td>regional private undertaking⁶</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:
1) in cooperatives the owners are service users
2) additionally a large number of cooperatives and also regional undertakings
3) additionally regional undertakings in particular for wastewater treatment
4) additionally regional undertakings
5) regional companies are responsible for water supply and distribution, municipalities for sewerage and Water Boards for wastewater treatment
6) majority of water services are operated by private undertakings, but also directly by municipalities or jointly by municipalities
7) wastewater services are operated directly by municipalities (or jointly by several municipalities), or operation is delegated to a private undertaking
8) additionally several private undertakings for water services only
6 DISCUSSION

6.1 Municipalities and water services

6.1.1 Water and wastewater services as unique services

Undoubtedly, water and wastewater services are basic requirements for all human activity. We humans need a certain volume of water daily to stay alive. It is also commonly accepted that reasonable living conditions imply some volume of water available for personal hygiene and washing clothing as well as appropriate sanitation facilities. This special nature, or ontology, of water and sanitation services is more deeply discussed in Article IV.

One of the special features of water and wastewater services compared to other infrastructure services is that water is clearly a local resource to be mined, processed and distributed locally. Water services are often mistakenly taken to be similar to energy services. Fuels like oil, coal and gas can be transported economically over long distances. Even electricity can be distributed over thousands of kilometres at affordable costs.

Due to the local nature of water and wastewater services the subsidiarity principle – decision making at the lowest appropriate level – is very well applicable to them. On the other hand, decentralisation has gained support from the economists as well. According to ODPM (2003): “Economic theory supports decentralisation as far as possible, because local choice over services will increase efficiency because local governments have better information about and can be more responsive to their residents’ needs than central governments. Decisions about spending are made by a level of government that is closer and more responsive to local needs and more likely to reflect people’s choices.” Thus, even in England, where the role of the local government has over the years been largely reduced, the importance of decentralised decision making is recognised.

The CATWOE process can be used to structure a systematic model of the reality of the present system. CATWOE means dividing the functions of the system and its processes into components and analysing them (Seppälä 2004). Table 6.1 summarises the components of water and wastewater services in Finland based on a CATWOE analysis.
Table 6.1  CATWOE analysis of water and wastewater services in Finland

<table>
<thead>
<tr>
<th>Customers</th>
<th>People, institutions, commercial and industrial enterprises as service users</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actors</td>
<td>Personnel of water and wastewater undertakings, political decision makers, central government and regional authorities, in case of cooperatives also the members of the cooperatives</td>
</tr>
<tr>
<td>Transformation process</td>
<td>Water and wastewater service provision</td>
</tr>
<tr>
<td>Worldview</td>
<td>In Finland people are used to and expect good quality water and wastewater services, these services are regarded as basic services of the society, and people commonly agree that these services should also in the future be provided by public organisations</td>
</tr>
<tr>
<td>Owners</td>
<td>Individual people as members of society, represented by elected bodies</td>
</tr>
<tr>
<td>Environmental constraints</td>
<td>National and EU laws and regulations, their supervision and control, available water sources, limitations on financing of activities, profit requirements</td>
</tr>
</tbody>
</table>

6.1.2 Overall responsibilities of municipalities

The tasks and duties of municipalities as well as the division of responsibilities between the central government and municipalities vary greatly within Europe as was discussed in Chapter 4. The way municipalities finance their activities varies also from country to country.

Finnish local authorities have a high level of autonomy guaranteed by the Constitution. Because Finland has no intermediate level self-government with the power to legislate over municipal affairs, all municipalities are governed by a uniform set of rules independent of their size or geographic location within the country. Municipalities’ tasks and services can be broadly divided into two categories: i) statutory tasks assigned to municipalities, and ii) services municipalities have decided to perform as self-governing bodies (Figure 6.1). (Association of Finnish Local Authorities 1993; Itkonen et al. 1995; Rasinmäki 1997)

The highest authority on the municipal level is the municipal council which residents elect in free and democratic elections every four years. The council is the decision-making authority as concerns municipal finances and operations. The size of the council is in proportion to population size; the smallest council has 13 councillors and the largest one 85.

The municipal executive board, which is appointed by the municipal council, does preparatory work on matters to be discussed at the council. The board is responsible for the municipality’s day-to-day administration and financial management. In Finland, the municipal manager is an official appointed by the local council, who serves under the municipal executive board.

According to the Local Government Act, municipalities are responsible for providing welfare services for their residents and promoting sustainable development within their administrative areas. Health care, social welfare and education constitute a major share of municipalities’ responsibilities as is demonstrated by their large share of municipalities’ expenditure as shown in Table 4.5.
Figure 6.1 Municipalities’ responsibilities in Finland

The range of the statutory tasks of municipalities has been increasing since Finland gained her independence in 1917. Some functions are so precisely defined and regulated that municipalities have little discretion over how to carry them out. Others are more loosely defined, and the long-term trend has been towards less central government control over municipalities’ activities. The most important statutory services provided by municipalities are (Itkonen et al. 1995; Kuntaliitto 2005):

- **Educational and cultural services**
  - they run the country’s comprehensive and upper secondary schools, vocational institutions and polytechnics
  - they provide adult education, art classes, cultural and recreational services, and run libraries

- **Health care**
  - hospitals are mainly administered and maintained by municipalities
  - they provide preventive and primary care, specialist medical care and dental care
  - they promote a healthy living environment

- **Social welfare services**
  - they provide child day-care, welfare for the aged and disabled, and a wide range of other social services
  - many municipalities also arrange housing and other services for refugees under cost-sharing agreements with the central government

- **Planning and building**
  - planning and zoning of the municipal area
- strategic and regional planning in cooperation with other municipalities
- they supervise land use and construction in their area
- Fire and rescue services
- Infrastructure
  - water supply, wastewater collection and treatment, waste management, street and road maintenance and environmental protection

Several studies show that Finns attach great value to municipal services and prefer using them (Article III, Figure 3). Many municipal services can already be accessed over the Internet, and more online services are becoming available.

In 2003 Finnish municipalities and joint municipal authorities employed close to 430,000 people, which is about one-fifth of Finland’s workforce (Figure 6.2). About four-fifths of municipal employees work in health care, education and social services. As municipalities do not need to manage everything on their own, it is often more viable to provide services jointly with other municipalities, or outsource certain services or activities to private enterprises. It is estimated that in 2004 municipal water and wastewater undertakings employed around 5,000 people and had an annual turnover of 800 million euros (MMM 2005).

In order to provide a variety of services, municipalities often set up a separate organisation, a joint municipal authority or federation, to perform joint functions. There are some 230 such federations in Finland. Joint authorities or federations often provide educational, social and health-care services. Several municipalities can together establish a joint health centre or vocational institutions. Joint authorities include regional councils, which define regional policy, and hospital districts, which are responsible for specialist medical care.

![Figure 6.2 Public sector personnel in Finland (Sources: Association of Finnish Cities 1991, Vainio 2003, Commission for Local Authority Employers 2006)](image-url)

Note: In this graph until 1930 municipalities’ employees are included in state personnel.
6.1.3 Urban vs. rural water services

In 20th century Europe public water distribution and sewerage networks were expanded to most urban areas, but in many countries people living in rural areas had to rely on their own water supply systems. Wastewater disposal was also their own responsibility. Public water undertakings found it too expensive to expand their networks to sparsely populated areas. If good quality water was not available in the vicinity, people living close to each other established a common water supply system and divided the costs among themselves. The legal form of this common undertaking could vary, but in any case the individual water users remained owners of the undertaking.

Wastewater discharge in rural areas has remained more dispersed than water supply. Until the last decades of the 20th century, the focus in water pollution control was large point source polluters such as towns, cities and industries. This is understandable because most people in European countries live in urban areas (Table 4.1 and Figure 4.1) and hence create the largest pollution load together with industry. But when wastewater treatment plants were built for these large point sources, the relative share of the pollution load from rural areas and non-point sources increased. The traditional individual wastewater treatment systems in rural areas, typically septic tanks, have very low purification efficiency, and are far from filling the present requirements for wastewater treatment. Tighter environmental standards have put more pressure on people in rural areas to improve their wastewater disposal systems. State-of-the-art individual treatment plants are rather expensive to build and may be difficult, and also rather expensive, to operate.

An attractive alternative is then for rural residents to cooperate with their neighbours and build a common wastewater treatment system, or to extend their sewerage network so that wastewaters can be discharged into the existing sewer of a near-by wastewater utility. In some countries public funding in the form of grants or loans has been made available for this kind of environment improvement schemes.

The aim of municipal water undertakings in Finland is to cover their costs with user charges although their physical structure varies greatly. Both the water and sewerage networks of small towns and rural municipalities are significantly longer per person served than those of cities as can be seen from Figure 6.3.
Note. Communities have been grouped according to size based on volume of water distributed as follows:
- “VILLAGES”, less than 100 000 m³/a
- “RURAL TOWNS”, 100 000 – 500 000 m³/a
- “TOWNS”, 500 000 – 3 million m³/a
- “LARGE TOWNS”, 3 - 6 million m³/a
- “CITIES”, more than 6 million m³/a

Figure 6.3 The length of water and sewer network per person in Finland in 2003 according to community size (MMM 2005)

Similarly, the volume of water sold per length of pipe (m³/m) varies according to the size of the population centre served - larger utilities sell almost ten times more water per length of pipe than small ones (Figure 6.4). It has been estimated that water and sewer networks alone constitute 80% of the assets of the undertakings (Vehmaskoski et al. 2002). Thus, rural utilities are financially in an unfavourable situation compared with their urban counterparts because they have to build and maintain their, often large, networks with relatively smaller income than utilities in densely populated urban areas. Of course, in rural areas where less water is used, the sizes (diameters) of both water and sewer pipes are smaller. Yet, the cost of piping accounts for only a small share of the total construction costs of a water and/or sewer pipeline. Pipe size also has only a minor influence on maintenance costs.

Because of the significant differences in the physical structures of the undertakings, one should be careful about drawing conclusions on their efficiency. It is, of course, easy and attractive to measure and compare utilities based on the price of water (EUR/m³) but such over-simplification may be, and often is, misleading.
Communities have been grouped according to size based on volume of water distributed as follows:
- “VILLAGES”, less than 100 000 m³/a
- “RURAL TOWNS”, 100 000 – 500 000 m³/a
- “TOWNS”, 500 000 – 3 million m³/a
- “LARGE TOWNS”, 3 - 6 million m³/a
- “CITIES”, more than 6 million m³/a

Figure 6.4 Volume of water sold per length of pipe in Finland in 2003 according to community size (MMM 2005)

6.1.4 Cooperatives

Cooperatives date back to the industrialisation of Europe in the first half of the 19th century. France saw the emergence of the first worker cooperatives while handicraft and farming credit cooperatives were initially established in Germany and Denmark. Towards the end of the 19th century, various service cooperatives for housing and health care emerged throughout industrialised Europe (Pellervo 2003). In Denmark, at the beginning of the 20th century, virtually all the needs of rural communities were met by cooperatives (Birchall 2004).

Consumer cooperatives trace their origins back to the Rochdale Society of Equitable Pioneers who in 1844 set up their store in Rochdale, England. At that time, retailing was practiced by small shopkeepers who often charged high prices for poor quality. The basic aim of the Society was to run their store with honest principles, correct weights and measures, sell quality products at cost price plus expenses, with no profit being taken. Decision making was based on the one member, one voice principle with female members having equal rights. Thus, the basic principles of today’s cooperatives were established (Pellervo 2003; Birchall 2004; Ruiz-Mier & van Ginneken 2006). Table 6.2 summarises the main features of cooperatives and limited companies.
Table 6.2 Basic principles of cooperatives and limited companies (based on Juutinen, Stenström & Vuori 2002, modified by the author)

<table>
<thead>
<tr>
<th></th>
<th>Cooperative</th>
<th>Limited company</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ownership</td>
<td>Members</td>
<td>Shareholders</td>
</tr>
<tr>
<td>Administration and</td>
<td>Democratically run by members</td>
<td>Often run by largest shareholders</td>
</tr>
<tr>
<td>decision making</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decision making power</td>
<td>One member, one vote (typically)</td>
<td>Based on shareholding</td>
</tr>
<tr>
<td>Owner of assets</td>
<td>Cooperative</td>
<td>Shareholders</td>
</tr>
<tr>
<td>Profit distribution</td>
<td>To members based on their use of</td>
<td>Based on shareholding</td>
</tr>
<tr>
<td></td>
<td>cooperative’s services</td>
<td></td>
</tr>
<tr>
<td>Principal goal of</td>
<td>To promote economic and business</td>
<td>To generate profit and increase</td>
</tr>
<tr>
<td>activities</td>
<td>interests of members</td>
<td>shareholders’ wealth</td>
</tr>
<tr>
<td>Share capital</td>
<td>Not fixed</td>
<td>Fixed</td>
</tr>
<tr>
<td>Selection of owners</td>
<td>Cooperative selects its owners</td>
<td>Company can be taken over</td>
</tr>
<tr>
<td>Legal basis of activities</td>
<td>Co-operatives Act and</td>
<td>Companies Act and company by-laws</td>
</tr>
<tr>
<td></td>
<td>cooperative’s own rules</td>
<td></td>
</tr>
</tbody>
</table>

Cooperatives were introduced to Finland around 1900. Particularly in rural areas the situation was favourable for the emergence of cooperatives because of a long tradition of neighbourly help and self-sufficiency. An act on cooperatives was passed in 1901 by the Finnish Senate. At the time Finland was not yet an independent country but had a rather autonomous status in the Russian Empire. This more formal and, to some extent, market-oriented movement soon gained ground in the rural areas suffering from economic and social problems. By 1926 the number of cooperatives had exploded to over 5 000 – at their height in the 1930s there were some 6 000 cooperatives in Finland. (Pellervo 2003)

Cooperatives still play a significant role in Finnish economic life. A large number of them operate in sectors such as banking and insurance, the retail trade, and food production. One of the largest banking groups in Finland is a cooperative with over 30% market share (Karjalainen 2004). More than half of Finland’s adult population are members in at least one cooperative. Currently Finland is one of the leading countries in the world in cooperative activity together with the United States, Canada, Sweden, Spain and Japan. The EU has over 130 000 cooperatives with more than 80 million members (Pellervo 2003).

On a world scale, measured by market share, agricultural cooperatives are the most common. In Europe, cooperatives are dominant in certain agricultural sectors. In milk distribution the market share of cooperatives is 52% in France, 72% in Slovenia, 80% in Belgium, 75% in the Netherlands, 90% in the United Kingdom, and 99% in Norway. In France, cooperatives have 60% of the market for table wine. In Denmark, cooperatives process 93% of dairy products and 96% of pork. (Birchall 2004; Ruiz-Mier & van Ginneken 2006)

Even though Finland is in general blessed with plentiful water resources, there are some regions in the country where water is not easily available everywhere, or the water is not of good quality. Since the late 19th century people in rural areas have cooperated and built common water supply systems. Often the cooperation was based just on verbal agreement.

The first registered water cooperative in Finland was established in 1907 in Pispala, which is now part of the City of Tampere (Katko 1996). In the early days, wooden pipes were used to
convey water. No financial support from the government was available for water services before the 1950s – people had to do everything on their own. Over the years, especially in the case of larger systems, cooperation was organised within the formal framework of a water cooperative so that by 2002 the number of water cooperatives had increased to 970 (Muukkonen, Pietilä & Katko 2003).

In Finland, the law on cooperatives was renewed and adopted in 2002 (Co-operatives Act 2001). The new law modernised the practises of cooperatives in order to make this form of organisation more suitable and attractive for conducting various economic activities. A cooperative can operate very much like a private enterprise while holding on to the original basic principles of cooperatives of serving their members (Pellervo 2003).

In Finland, the number of water cooperatives has started to increase rapidly in recent years, and this trend is expected to continue. One of the major reasons for the interest to establish new cooperatives are the tightening requirements for wastewater treatment of buildings located outside areas of centralised sewerage. As an alternative to improving individual wastewater treatment systems, people have found it economically attractive to join together and establish a cooperative to collect and discharge wastewaters either to the cooperative’s own treatment plant or to a municipal water utility’s sewerage system. In recent years, most cooperatives have built water distribution and sewer networks simultaneously. In the past the reasoning was mainly the other way round - people who were in the need of better water supply decided to establish a cooperative, and then sometimes used the opportunity to build also a sewerage system.

The size of water cooperatives in rural areas depends on the local circumstances. Rather opposite examples in this respect are the municipalities of Kangasala and Pornainen. Kangasala is an old municipality with a long and strong local identity. Kangasala, with a population of 26 000 (in 2005), is a neighbouring municipality of the City of Tampere with 200 000 people. Thanks to the vicinity of Tampere, Kangasala has grown steadily over the last fifty years – more than half of the working age population of Kangasala work in Tampere. The entire area from the centre of Kangasala to the border of Tampere is built-up urban area with centralised water and wastewater services. Of the total population of Kangasala, 22 000 are connected to a centralised water and sewer system.

The recently finalised Kangasala Water Services Development Plan (Viatek 2004) proposed that 19 water and wastewater cooperatives be established in the rural areas to improve the level of the services. These cooperatives would not cover the entire population currently outside centralised systems, since some remote properties would be left to rely on their own individual systems. It should be noted that these cooperatives would serve not only houses which are in permanent use but also roughly the same number of free-time houses used mainly during the summer.

Presently the establishment of roughly ten of these cooperatives is seriously discussed (Kytövaara 2006). Why such a large number of cooperatives are proposed for a relatively small population can be explained by the structure of water and wastewater networks in Kangasala. Major water and sewer lines already exist or will be built in the rural areas of the municipality. Villages near to these lines can get water and discharge wastewater utilising these main lines. A village cooperative only needs to build its own water and sewer system and get connected to the municipal water utility. The networks of neighbouring municipalities are typically so far from each other that there is no sense in connecting them to each other – either physically or administratively.
Pornainen, located 40 kilometres north-east from Helsinki, has an entirely different approach. In 2006 the municipality has a population of 4,800 people. In recent years population growth has been relatively fast. The municipality’s centralised water and sewerage services cover only the very limited central, more densely populated, area of the municipality. About 1,200 people have both water and sewer connections while 300 people are only supplied water (Pietilä, J. 2005). The rest of the municipality’s population has relied on their own water and wastewater systems. The municipality has no intention to extend its water and wastewater networks much beyond the present coverage area.

A water cooperative extending also to a neighbouring municipality has operated since 1996 in the western part of the municipality. In 2003 two new cooperatives were established, one covering the northern, and the other the southern part of the municipality. Together, these cooperatives cover most of the municipality’s area, and two-thirds of the population, while only a few remote houses are left outside.

However, the municipality has not left these cooperatives and the population to fend for themselves. The municipality has agreed to supply water to and treat the wastewater of the cooperatives operating in the rural areas. Water supply via centralised networks is estimated to increase dramatically from the present 260 m³/day to 1,500 m³/day in 2020. Local sources are not enough to cover this additional need which is why the municipality has decided to build a 22-kilometre supply line from a neighbouring regional water company’s network. Wastewaters from the municipality’s as well as the cooperatives’ networks will be from 2008 onwards pumped to a main sewer line more than 30 kilometres away, their final destination being the central wastewater treatment plant of the Helsinki region. (Pietilä, J. 2005; Yli-Tolppa 2006)

6.2 Ownership and operation of water and wastewater services

6.2.1 Ownership of water and wastewater services

The ownership of water and wastewater services is commonly either public or private. The development of centralised water supply was generally launched based on private initiatives in the early stages during the 19th century (Hassan 1998; Juuti & Katko 2005). Cities did not have the experience nor the necessary staff to plan, establish and operate water services, and thus either a city administration approached a private entrepreneur, or a private company approached a city administration and proposed to plan, build and operate a water supply system (Katko, Juuti & Hukka 2002; Pietilä 2004). However, the private water companies were gradually taken over by municipalities. The typical reason was that municipal administration was not satisfied with the quality of service provided by the private operator (Hassan 1998; Herranen 2002). Another consideration was that as water supply and distribution were such key services, their development should have been managed by a single authority.

Sewerage systems were originally developed for drainage in urban areas. When centralised water distribution was expanded and the volumes of wastewater increased as a result, these drainage ditches and pipes assumed more the role of sewers. Sewer systems were seen as a necessity, but unlike water supply, it was not possible to make sewer operation into a profitable business which is why the ownership remained in public hands. With the expansion of water supply and sewerage, wastewater pollution increased and concentrated, and gradually the need to establish wastewater treatment facilities was met (Herranen 2002). As sewerage, wastewater treatment
was also not a profitable business and thus also remained a public duty to be financed with public funds.

A large number of possible public-private cooperation possibilities exist as indicated in Figures 6.5 and 6.6. Figure 6.5 illustrates the nature of public-private arrangements from two viewpoints: a) who is responsible for financing, and b) who is responsible for the management of the system. An extreme case – bottom left hand corner – is the water utility as a municipal department, where the municipality is fully responsible for financing while also being in full control of the utility. The other extreme – top right hand corner – is the private water company, where the public sector only has the role of a regulator.

Figure 6.5  Public and private players in water and wastewater sector (Saghir 2003)

Figure 6.6 shows the responsibilities assumed by the public and private sector in relation to different functions of water services in various types of public-private arrangements.

The introduction of private service providers to the water sector necessitates putting a control and regulation system in place to prevent the private providers from misusing their monopolistic market situation. Two types of control mechanisms are needed: a) quality control (drinking water quality, service level, wastewater treatment requirements), and b) price control. These functions remain largely public or quasi-public responsibilities since they cannot be based on business principles (Tomkins & Wharton 1996). Creation and running of these control mechanisms constitute additional costs to be paid by the service users in one way or another.

When it comes to privatisation of public utilities – regardless of the form of privatisation - the distribution of risk is a key issue. If and when a private company is entering into a business it wants to safeguard itself against any possible risks. In case of water services these risks may be e.g. technological, demand related, competition, currency, payment, political and regulatory risks. In developing countries the risks are considered typically much higher than in industrialised countries, and consequently these higher risks are balanced against higher return
for investors, which in turn are seen in higher water tariffs. The less risky the investment is the more attractive it is for a private company. The governments can intervene to reduce the risks in order to make the investment more appealing to the private sector. But the risk does not disappear anywhere, it is only shared between the public body and private investor. Thus the key question here is: “What level of efficiency gain is required to cover the additional costs that privatisation brings?” (Bayliss & Hall 2002)

<table>
<thead>
<tr>
<th>Setting Performance Standards</th>
<th>Asset Ownership</th>
<th>Capital Investment</th>
<th>Design &amp; Build</th>
<th>Operation</th>
<th>User Fee Collection</th>
<th>Oversight of Performance and Fees</th>
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<tbody>
<tr>
<td>Fully Public Provision</td>
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<tr>
<td>Passive Private Investment</td>
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<tr>
<td>Design and Construct Contracts</td>
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<tr>
<td>Service Contracts</td>
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<td>Joint Ventures</td>
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<tr>
<td>Build, Operate, Transfer</td>
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<tr>
<td>Concession Contracts</td>
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<td>Passive Public Investment</td>
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<td>Fully Private Provision</td>
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Figure 6.6 Allocation of Public/Private Responsibilities across Different Forms of Private Involvement in Water Services (OECD 2003b)

Figure 6.7 illustrates various forms of water and wastewater service provider ownership grouped under public or private. There are also a number of forms of joint public-private ownership. In Finland, the overwhelming majority of water service providers, as shown in Figure 6.7, fall under ‘local undertaking’, ‘cooperative’, and ‘individual on-site services’. Additionally, there are several regional bulk water supply companies, some regional sewerage or wastewater treatment utilities, and one regional water and wastewater company. These regional companies and utilities are almost entirely owned by the municipalities. In a few cases municipalities have made joint arrangements for water supply or wastewater treatment with large industrial companies.
Figure 6.7 Breakdown of ownership of water and wastewater service providers

Although there has been much discussion over the least decade about privatisation of the water sector, the overwhelming majority of water services worldwide are publicly managed, with the exception of a few countries and some cities outside the subject area of this study. It is commonly estimated that 95% of people with water supply are served by the public sector (Rodriguez 2004; Hall & Lobina 2006). The well-known exceptions to the worldwide practice are France, where the majority of potable water services and also a large share of wastewater services are operated by private companies under various management or concession contracts (Barraqué et al. 1998; Lamothe 2003), and England and Wales, where regional water authorities were fully privatised in 1989 (Rees & Zabel 1998).

Some former Soviet block countries in Central and Eastern Europe have also introduced private companies in one form or another into their water sectors, the Czech Republic being an extreme example with extensive private sector involvement (Medd, Fay & Marvin 2003). There are also some major cities where water services (e.g. Manila) (Esguerra 2006) or both water and sewerage services (e.g. Buenos Aires) (Casarin 2006) have been operated by private companies on long-term concession contracts, even though in both cities the private operators have faced serious difficulties and are considering withdrawal (Hall & Lobina 2006; Lasso 2006). In some cases, cities and private companies have formed a joint private-public company to own and
operate the water and sewer services (e.g. Berlin, Tallinn) (Knothe, Kramer & Mojaheri 2003; Lanz & Eitner 2005; Hukka, Seppälä & Teinonen 2005).

Total annual investments in water and wastewater projects throughout the world from 1990 to 2004 are shown in Figure 6.8. These figures are based on the total value of projects including private investment but also include the public funding components. The majority of the investments, 27 billion USD, have gone into concession projects, while only 20% was targeted for ‘real’ privatisation (divestiture). Projects in Europe and Central Asia constitute less than 10% of the total volume. The big variations from year to year are explained by some large projects in certain years. For instance, the Manila concession accounted for most of the total 1997 investment (5.7 billion USD). (World Bank 2006)

![Figure 6.8 Total investment in water and wastewater projects including private contribution in 1990-2004. Figures also include public investment in the projects (World Bank 2006)](image)

There is a huge need for increased financing in order to be able to achieve the targets of the Millennium Development Goals of halving by 2015 the proportion of the world’s population without sustainable access to safe drinking water and basic sanitation facilities. It has been estimated that it would require doubling the current 60 billion USD expenditures on the developing and emerging countries (WEHAB 2002; Rana & Kelly 2004). International financing is certainly a valuable component helping to achieve the goal, but the largest share, estimated at 80% to 90%, of water sector financing nevertheless comes from domestic sources – primarily public.

Bilateral donors have recently (1999–2002) allocated on average some 6–9% of their total aid, around 2 billion USD annually, to the water sector divided roughly 50–50 between grants and loans (Tipping, Adom & Tibaijuka 2005). World Bank lending to water supply, sanitation and flood protection projects amounted to slightly over one billion USD annually during 2000–2004 (Rana & Kelly 2004). A big question mark for the future is how to increase the funding for water and sanitation, because over the last ten years or so, both bilateral donors’ and the World
Bank’s commitments have remained more or less at the same level, and private sector investment has been rather decreasing.

### 6.2.2 Operation of water and wastewater services

There are numerous alternatives for operating water and wastewater services. Traditions vary by countries, and practices vary within countries. Differences may be based on differences in ownership structure, but the same type of ownership does not guarantee that operating practices do not vary. The size of the water undertaking is an additional reason for differences. Figure 6.9 summarises various operational options. The two main categories presented are public and private operation, but as can be seen there are also many mixed forms of operation.

![Diagram of various forms of water and wastewater services operation](image)

Figure 6.9 Various forms of water and wastewater services operation

It is now more and more commonly accepted that the ownership of water and wastewater infrastructure does not determine the efficiency of the services provided (Tomkins & Wharton 1996; OECD 2004b; Kuks 2006). Both publicly and privately owned utilities may be efficient. Competition is more important for efficient supply of water and wastewater services than ownership (Hassan & Nunn 1996). There is no universal rule according to which all municipalities should organise their activities (Blomgren 1994). In Finland, the water and wastewater infrastructure is owned by municipalities or, in the case of cooperatives, directly by the users. Municipal water undertakings utilise the services of private companies based on competitive bidding as discussed in Chapter 5.1.5. When contracts are re-tendered, typically every three years, there is real competition between the service or goods providers, and private sector competition is used to benefit the water utility. In the case of long term concession or lease contracts (typically run 20 years), the gains in efficiency benefit rather the contractor than
the utility (Kulmala 2001). Finnish water cooperatives nowadays also frequently outsource their maintenance tasks either to private service companies, contractors or a local municipal water utility.

Seppälä, Hukka and Katko (2001) have introduced a customer-oriented public services management model, Figure 6.10. Although this model stresses the importance of the customers, it also highlights the value of formal ‘rules of the game’, such as the state as a facilitator, and the authority and power of appropriate organisations. Customer-oriented management model is not that different from market-oriented management model in that respect that in both models the organisation’s response to the behaviour of the customer or client is vital.

Figure 6.10 Key elements of a responsive public service model (Seppälä et al. 2001)
### 6.2.3 Increasing financial pressures on municipal water utilities

Public sector organisations have faced financial difficulties worldwide. Publicly owned infrastructure assets have been sold to finance public spending – one of the largest privatisation waves swept over England during Prime Minister Thatcher’s conservative rule in the 1980s as discussed in Chapter 5.7. Berlin water utility was privatised in 1999 to make up the budget deficit of the city (see Chapter 5.4). The reason for privatising Tallinn water utility was much the same (Hukka, Seppälä & Teinonen 2005).

The business environment has become tougher during the last decades. Tainio (1999) concluded that: “The American capital market-driven financial system and the related ‘shareholder view’ has rapidly been penetrating the world economy. They have set up new criteria for a financially effective corporation. The ‘ideal type’ of corporation contains a re-engineered and downsized organisation, sharply focused business portfolio, stock option-based managerial incentive systems, capital-based performance criteria, and generous dividend policies.” Since 1999 this trend has become even more obvious also in the Finnish economy.

Finnish water and wastewater services are of a relatively good level compared with almost any other country. The quality of water supplied to customers meets the European Union requirements, and wastewater treatment also meets most EU requirements. Improvements and investments in treatment facilities are already largely made, and water tariffs, especially in larger towns, more than cover the operational and capital costs. The municipalities of Finland increasingly expect their water utilities to turn a profit to cover the expenses of other sectors. Already profitable utilities are requested to increase their profits. In Finland there is no active water tariff regulatory authority such as in England, but the regulation is done passively by the Competition Authority (Hukka & Seppälä 2004). Increasing pressures for water utilities to increase their profits have changed the opinion of the managers of largest water utilities more positive towards the establishment of a water price regulatory authority (Vinnari 2006). Rural utilities with large networks and few consumers have been subsidised by municipalities, but now also they are expected to manage on their own income. Thus, regardless of the financial situation they are in, utilities are facing pressure to increase their efficiency.

One recent organisational arrangement aimed at increasing municipalities’ incomes has been to merge municipal energy and water undertakings. Municipal energy companies have since their establishment operated on the business principle and have generated profits for their owner municipalities. According to this new merger arrangement, the energy company buys the water utility with a loan from the municipality. The deal would be financed partly by increasing water charges and, thus, water users would in fact pay again for the infrastructure they already own. The municipality would financially benefit from this arrangement in two ways: i) the energy company pays interest on the loan, and ii) the profit earned by the energy company is reduced and, consequently, also the tax to the state (Tiihonen 2006). Even though in this new arrangement the energy company’s contribution to the municipality gets smaller, the two financial gains mentioned more than make up the loss. This arrangement is typically ‘sold’ to the public and the decision makers by touting the synergy benefits, which are rather questionable, even though the prime motive is to increase the municipality’s income.
6.3 Challenges of the water and wastewater sector in Finland

The main future challenges facing the Finnish water and wastewater sector are commonly seen to consist of (Mattila 2005; Kiuru 2006; Muukkonen 2006; Piippo 2006):

- pressures to increase efficiency either to earn a bigger profit or to reduce or do away with municipal subsidies
- how to secure sufficient funding for maintenance and renewals
- how to attract new workforce and maintain professional competence when 50% of the workforce will retire within the next ten years
- how to organise operation, maintenance and control of individual wastewater treatment systems in rural areas
- how to get rid of the sludge from wastewater treatment plants as EU regulations for sludge handling become increasingly tighter.

Municipalities have over recent years started to use their utilities, such as energy and water, more extensively as ‘milking cows’ to cover the expenses of other sectors. There are examples where the prime motive behind new organisational arrangement of water services has not been to improve the quality of the services but to increase the financial gains from the assets or operations. One such recent arrangement was to merge the energy and water utilities. In this manoeuvre a much larger energy utility (by turnover) bought the water utility and the service users will end up paying in user charges again for the infrastructure they already have paid for once.

At least 80% of the assets of water and wastewater systems consist of pipelines buried underground. In Finland, more than 70% of these structures have been built during the last thirty years (Lapinlampi & Raassina 2002a & 2002b). They are still in a relatively good shape, but underground structures also need periodical maintenance and increasing repair and renewal in the future. It is, unfortunately, too easy for political decision makers to postpone the investments required for these invisible assets because negligence is not immediately apparent. Using funds saved from water and wastewater system maintenance for other more visible activities is often too attractive for politicians.

In 2006 the overall trend in Finnish water and wastewater sector is expected to result in:

- establishment of inter-municipal water and wastewater companies serving several municipalities
- external pressures on municipalities to merge, and for the created new larger municipalities to also merge their water utilities
- a move towards larger wastewater treatment units – wastewaters from several municipalities will be treated in a single wastewater treatment plant
- at least in the next few years in the establishment of many new water and wastewater cooperatives in rural areas – typically the cooperatives will buy water from a municipal water utility and discharge their wastewater into a municipal sewer system
- increased cooperation between water undertakings to guarantee services in emergencies and exceptional situations.

Views on the future of water and wastewater cooperatives are far from unanimous. One extreme position is that water cooperatives should be seen only as a temporary solution and that cooperatives should be merged with larger water undertakings in the future. The other extreme is that water cooperatives are a good example of the subsidiarity principle – decision making and management at the lowest appropriate level. It seems that even Finland has not found a final
solution to the role of the water cooperatives. There are ample examples of cooperatives which have operated for several decades and seem to be able to cope with future requirements. In many cases these cooperatives have already outsourced their operational and maintenance activities either to larger water undertakings or private companies. That ensures that the activities are performed efficiently in a centralised fashion. On the other hand, there are also plenty of recently established cooperatives, and there is no guarantee that the individuals who have played a central role in the establishment and early years of the cooperative will continue to have the energy and time required by this common effort. If they step aside, will there be other active people to take over the duties once the prime problem of water supply and sewerage has already been solved.

One critical factor having a major effect on the organisational structure of the water and wastewater sector in Finland is development operation, maintenance and stand-by arrangements. It is important especially for smaller undertakings.

6.4 Review

Globally, water supply and sanitation services are provided by the public sector for an overwhelming majority of users. Yet, had an alien landed on earth and followed discussions in international water sector conferences or scanned through professional journals in the last few years, he would have inevitably assumed that private companies produce the vast majority of water services.

The one-sidedness of the information is obvious and partly understandable; it is not considered the duty of a public water company manager to attend international conferences to tell how a public water company operates. If he/she were to go, the water users would complain about their money being wasted. On the other hand, private companies wish to be visible whenever possible and use international conferences and professional journals actively to gain publicity. As researchers, we have come across several cases where critical scientific papers have not been published by international journals, claiming to be of high level, if not leaders. Such decisions have been based on peer-reviews made by representatives of private companies or multinationals who argued that the papers were 'political'. As if the privatisation, for instance, in England and Wales was non-political.

Yet, a fundamental difference clearly exists between the basic philosophies of public and private enterprises. Public undertakings are established to serve the needs of the population, typically in a certain geographical area, and they do not aim to increase substantially their share of the market as private companies do. Of course, private companies also aim to serve the needs of their clients and produce attractive services because winning customers is undoubtedly in their interest. Yet, the prime motive of private companies is to make a profit for their owners.

How water and wastewater services are organised is a highly political decision which reflects the values of the decision makers. The extremes are full privatisation, as in England and Wales in 1989, and full public control without any element of commercialisation as was the case in the former Soviet Union. Yet, it should be noted that both the English privatised and the Soviet public model are highly centralised – even in England, the tariffs have to be approved de facto by Parliament. Other options are public-private partnerships of various forms and with varying degrees of public vs. private involvement. The extremes do not seem to be attractive any more. Communism has largely collapsed and now even the former Soviet Union adheres to commercial principles. On the other hand, the privatisation in England and Wales took place almost two
decades ago, but their model of privatisation has been repeated hardly anywhere. Had complete privatisation proven a success, other countries would have had ample time to follow the example.

The international discussion on private sector participation has centred on two models: various forms of maintenance and operation contracts ("the French model") and total privatisation ("the English model"; see Figure 6.11). Often public-private partnership has been understood narrowly to cover only these models, while the third option, traditional forms of public-private cooperation where public utilities buy goods and services from the private sector have been considered inefficient and old-fashioned. The cases and examples brought up have typically represented large population centres such as Buenos Aires (6 million people) and Manila (11 million people). This has been quite understandable, because for large multinational companies the larger the population, the larger the business opportunities. Smaller cities, towns and rural areas have been left out. From the business viewpoint, they have not been attractive.

Figure 6.11 Main options for private sector involvement in water services production (based on WASH 1992 and Pietilä, Hukka, Katko & Seppälä 2005)

Figure 6.11 should not be misunderstood to present the division of tasks between the public and private sectors so that the further left on the axis we move, the smaller the private sector’s role in monetary terms. Typically construction projects are extensively implemented by private companies, and goods and services can also be bought almost exclusively from the private sector. The figure simply describes where the power to decide rests – the further to the right we move, the stronger the private sector’s say, and the further left we go, the more influence is carried by the public sector.
6.5 Assessment and self-evaluation

The scope of this inter- and cross-disciplinary research is rather wide. Therefore, it was difficult to decide what to include in it and what to leave out. Other selections than the one's by the author could also be justified.

The topic of this research is certainly important. Many countries seem to be discussing and debating how to re-organise their water and wastewater services. Such radical changes as the full privatisation in England and Wales in 1989 are unlikely in Europe. The fundamental changes in Central and Eastern Europe are also past, but gradual changes can be still expected in many countries.

The countries selected for closer look in this study were not chosen ‘scientifically’. The reasons for including just these countries were explained in Chapter 1.3. As anticipated, the experiences and practices of the countries differed which justified the selection and strengthened the hypothesis that there is no single answer to the research question, and that each country has its individual characteristics. All the included countries were from Northern or Central Europe, and it would have been interesting to include also some countries from Southern Europe. But as said earlier, the scope of the research was already rather wide, and the inclusion of a few more countries would probably have allowed less depth elsewhere.

The depth of the research in different countries was not identical. Finland was understandably dealt with in much more detail than other countries being the major target. But treatment of the other countries was not equal either. This was partly due to the researcher’s varying involvement in research and other activities in or with various countries.

Action research was chosen as the research paradigm as it is well suited for a research problem requiring a holistic approach. The situation in the water sector is not stable but evolves continuously which is why pre-set questionnaires or other fixed methods cannot be applied to the changing situations. Action research in its pure form should have included active participation of the target organisation in order to take into account changes in the behaviour of the target organisation or phenomenon. In this research, the target group is very large and heterogeneous, and the research question itself – the role of municipalities in water services – involves many actors at various levels. Thus, it would be too optimistic to expect any immediate changes from this kind of 'heavy machinery'.

Soft systems methodology stresses the dialectics between reality and theory. One aim of this research is to gain deeper understanding on how and why water and sanitation services have developed in various countries as they have. Another aim based on the above is to find suitable roles for various actors in the future. But the future cannot be based merely on past experiences. When dealing with human organisations we meet values, preferences, political motivations, etc. which may change over time in different places.

In this research the Delphi technique was not used in its ‘formal’ way by collecting written responses from the target group, analysing and summarising the responses, and sending the summary back to the target group for further feedback. Rather, elements of Delphi were used at various stages, with different groups and to different extent during the study. One could say that this research was a continuous Delphi process. The situation was somewhat similar to that with the grounded theory – this method was not used in its pure form, but rather as an additional tool to help to understand the phenomena.
7 CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusions

Municipalities have played a central role in the development of water and wastewater services throughout the world and seem to retain their role also in the future. Yet, the industrialised world has examples where the direct role of municipalities as water service providers has been reduced. Such exceptions are England and Wales where regional water authorities, in which local authorities were also originally represented, were totally privatised and thus local authorities completely sidelined. In the Netherlands, agglomeration of water service providers has taken place, but the municipalities are still represented in these large water companies, and on the other hand, sewerage is still a direct responsibility of municipalities. But in most countries municipalities still remain responsible for water and wastewater services.

Particularly during the last ten years, privatisation of water and wastewater services and the increased involvement of private companies in the provision of these services have been discussed a lot. Privatisation requests have been brought to the agenda outside water sector itself – by commercial and political interest groups. A common argument has been that public organisations are inefficient, while private enterprises are efficient. On the other hand in many countries municipalities have faced financial difficulties, and thus their activities are scrutinized carefully. Possibilities to streamline municipal administration have often studied in order to gain savings without lowering the level of services provided. Commercialisation of sectoral activities such as water and wastewater services has been seen as an option to downsize municipal administration.

As far as full privatisation of water services is concerned, there are only few examples of it so far, and the trend does not seem to move in this direction. Water services have been regarded as such important basic services of society that their ownership has been confined by law to the public sector (Lithuania, Netherlands, cities of Hamburg and Vienna), or the interest of the private sector has been extinguished by ruling that no profit-making is allowed (Austria, Denmark and Sweden). Elsewhere municipalities and political decision makers have realised that water and wastewater service provision is an attractive business with a guaranteed and steady client base, relatively constant sales and monopoly status; why give away such a secure business (Finland). Developing countries have a crying demand for investments to improve the coverage and level of water and sanitation services, but private companies are only interested in investing in large cities, and even there they have faced difficulties and are rather withdrawing than increasing their presence.

In many developing economies, particularly in Africa where many countries gained their independence in the 1960s, water services have been a state responsibility. In many countries water was also regarded as a basic right of citizens the state should provide – free of charge if the people could not afford to pay for it. Two crucial policy changes have taken place, however, in several developing countries during the last ten or twenty years: the policy of free water has been abandoned, and public administration has been decentralised. The centralised public administration structure has proved inefficient and unable to meet the needs of local people. Particularly in recent years, decentralisation has been the overriding trend in public administration reform. In water sector more responsibility has also been transferred to the local...
level. Thus, developing countries have started on a similar path in water services development as industrialised countries once did.

Referring to the research questions presented in Chapter 1.2, the following conclusions can be drawn based on this study:

i. In most European countries, which were investigated in this thesis, municipalities still play a central role in the provision of basic infrastructure services. In particular water supply, and often also sanitation services, have by law made responsibility of the municipalities, but that does not necessarily mean that the municipalities have produce these services themselves. Municipal water utilities widely use the services of private companies and outsource certain operations and activities. In some countries and cities water supply is regarded as such an important basic service that the ownership of the water supply and distribution infrastructure is by law confined to public bodies.

ii. During the early years of the development of centralised water distributions systems in Europe in the 19th century, private water supply companies emerged in many countries. Yet, by the early 1900s these private companies were taken over by the municipalities. Development of sewerage has always been the responsibility of municipalities, because it has not been attractive for businesses. Wastewater treatment has wider than local importance and consequently the central government has paid an important role in setting the requirements and in many countries also financially assisted treatment facility construction.

iii. The Nordic countries have a long and strong tradition of local level administration, and municipalities there continue to play a central role in the provision of these services. Municipalities often play a central role also elsewhere, but there are exceptions. In the Netherlands, land drainage has been and still is of vital importance for the continued existence of a large proportion of the built-up area. Consequently, traditional drainage organisations have shaped wastewater treatment arrangements. In France, the large number of small municipalities has created potential for private operators of water and wastewater services. In England, the role of municipalities in water and sanitation services was substantially reduced already in 1974 when regional water authorities were created, and the full privatisation in 1989 more or less completely sidelined municipalities.

iv. In Finland, the general level of both water and wastewater services meets high international standards, and in urban areas no massive investments are needed with the exception of improving the nitrogen removal efficiency of several wastewater treatment plants. Yet, in Finland municipal water and wastewater utilities do not cover the entire country and a large proportion of the population must rely on their own water and sanitation systems. In rural areas cooperatives have played an important role in the development of water services and are expected to be essential also in the improvement of wastewater discharge solutions in the future.

v. Water and wastewater services form a natural monopoly where full private competition is not possible as with many more tradable commodities. Some countries do not allow anyone to make a profit from providing water services. On the other hand, water and sanitation services have been subsidised in many countries, while internationally and within the EU the main principle is that the costs of water and sanitation services, including investments, should be covered with user fees. Thus, there is pressure on municipal water and wastewater undertakings to reduce costs and find new ways of performing their tasks, including increased use of the private sector in new and more efficient ways. Several countries continue to regard water services as such central basic services that they will also in the future remain in public ownership.
7.2 Need for further research

Water and wastewater services are highly capital-intensive and related decisions carry long-term effects. It is not possible to make any significant changes overnight with the exception of ownership and management arrangements. But ownership decisions also have long-term effects and can be almost irreversible. Public water and wastewater utilities are externally put under financial pressures to improve their performance. Municipalities as the owners of the utilities have realised that this monopoly service can be a profitable business, and where legislation allows, municipal water and wastewater utilities are required to turn a profit for the municipality.

Some possible issues worth further research are listed below:

i. Larger water and wastewater undertakings are commonly regarded as more efficient than smaller ones, but what are the real benefits of larger undertakings? What are the limits technically, economically, socially, politically and administratively? What will be gained or lost if the utility gets larger? What does the loss of influence of customers/consumers influence?

ii. Establishment of a supramunicipal water and wastewater company or utility. What are the decisive and important factors to be taken into account when planning a supramunicipal utility or company?

iii. In Finnish rural areas water cooperatives are common. What does the future of these cooperatives look like? What is the future role of recently established water and wastewater cooperatives?

iv. Different modes of private sector involvement in water and sanitation services. What are the real benefits of private sector involvement? What is the private sector’s appropriate role? How to secure the interests of the customers?

v. Water and wastewater services and local level decision making. Is the water user a customer, a client or a consumer? What are the pros and cons of removing decision making from the local level against the EU’s subsidiarity principle?

In any case, water and wastewater services are not just a technical arrangement. The product of the service – water good enough to drink, or wastewater efficiently enough treated not to pollute nature – emerges through technical processes. But which process should be used, who should plan it, construct it, and operate it? Where do we take the water from, where do we discharge wastewater, how do we treat wastewater sludge and where do we deposit it, how much should we pay for the service, etc.? These decisions have to be made at some stage – and there is no single correct answer.

7.3 Recommendations

Water and wastewater services are and will remain natural monopoly services, and thus commercial principles can be applied to them only partially. Another limitation is that competition should not occur beyond the point where service quality is endangered. On the other hand, water is commonly regarded as a basic necessity and the everyday needs of the people should not be sacrificed to the profit motive in this monopolistic situation. Decisions related to water and wastewater services often have long-term effects and may even be irreversible. Thus, these decisions should not be made to realise short-term gains.
The public sector should also in the future have a vital role in decision making related to water and wastewater services.

The major components of the water and wastewater infrastructure should remain in public ownership.

According to the good governance principle, decisions should be made at the lowest appropriate level in order to facilitate the participation of people in decision making on matters that concern them. Municipalities are governed by democratically elected bodies which basically function for the benefit of their residents. In Finland, municipal water utilities play a central role in the provision of water and wastewater services. But, in particular in recent years, municipalities have imposed ever increasing profit requirements on their water utilities in order to cover the costs of other services, such as health care. Legislation allows a ‘reasonable’ rate of return on capital, but in many cases the return has clearly been higher than ‘reasonable’.

Yet, this kind of ‘misuse’ of the monopolistic situation by a public utility is moderated by the fact that the additional profit is used primarily for the benefit of the residents of municipalities.

In Finland municipal energy companies and water utilities have sometimes been merged. A merger may result in synergy gains, but the prime motive has been to balance municipal budgets. The mergers have been financed partially by increased water tariffs in violation of legislation. The Water Services Act states that water charges should be sufficient to cover operational and investment costs in the long run, and that a reasonable rate of return on the capital is allowed.

Decisions related to water tariffs should be made more transparent.

Income from water and wastewater services should be used only to maintain and improve these services.

The expenses of municipalities’ other functions should be financed separately.

There is no single model or formula for how water and wastewater services should be organised – not even within a single country. At least in Finland, a country with broad experience from a variety of organisational arrangements, the central government should not force a single model on everyone, but rather try to encourage the development and application of arrangements best suited for each situation.

The experiences and benefits of different types of organisational arrangements should be fully utilised.

The arrangements should take into account not only economical and technical factors but also local participation, priorities and traditions, etc.
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