FINNISH WATER BEST PRACTICES

FACTS AND DEVELOPMENTS OF FINNISH WATER.

Innovative Water Solutions

Water is a key area where Finnish expertise is globally well established and vigorously developing. | page 10

WHY **WATER** IS IMPORTANT TO **ME**.

Komeetta School is an international primary school in Espoo (Finland) offering education both in Finnish and in English. A 3rd grade English class – children of 8 and 9 years of age- were asked to write about the subject "Why Water is important to me." Here are some of their thoughts:

"I love water because it helps you. It almost helps you in everything. … Without water we would not live on earth."
–Eemil-

"… Water is beautiful, like the waterfalls, the sea and rainbows. …"
–Jason-

"… Also, I almost forgot the lovely clouds full of fantastic water."
–Haohao-

"… I love to play in the rain with my neighbour. …"
–Pinja-

"… It makes snow. It helps the animals and fish to live. It helps things to float. It keeps us warm when we're swimming. Water is very brave. …" –Sebastian-

"I love water because it is good for trees and plants, then we can breathe better. … In Finland the water is clean and the fishes don't die because the rivers and lakes aren't dirty."
–Jessica-

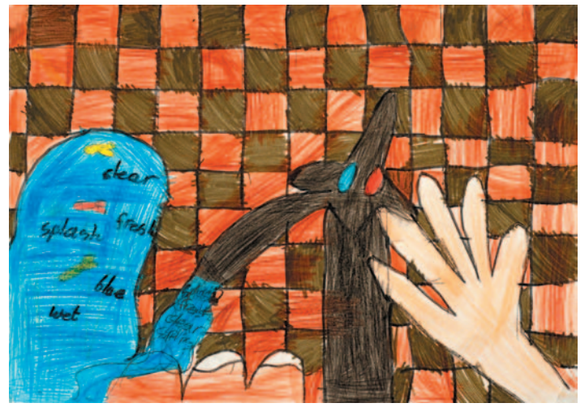
"… Because food grows on plants and plants need water to grow. …"
–Markus-

"I use water for drinking, showering and many other things. …"
– Isabel-

"… I am happy that I live in Finland because I can drink clean water. …"
–Alexandra-

"… Without water we wouldn't be able to cook some sauces and food."
–Mansha-

"… Water is also fun, you can splash in it, play in it, sing in it and dance in water. …"
–Sophie-



"Water is important to me because I would be smelly and dirty if I didn't have showers. …"
–Andrew-

"… Water is good because if I get hurt we put ice on the place that hurts. …"
–Max-

"… I love to swim and my horoscope is a fish so I am very close to water. …"
–Anna-

"… when I come home if other drinks have ended I can always turn on the tap and drink."
–Leo-

"Water is important to me because I have to drink many times a day. …"
–Jerry-

"… If there was no water in the world I would be sad because I love swimming. …" –Melissa-

"… We know water is important, but still we dirty it. We put oil and rubbish into the lakes, rivers and seas. If we don't stop dirtying the waters we will eventually die."
–Miira-

FINNISH WATER - THE BASICS FOR SUCCESS

Finland is among the few countries in the world fortunate enough to have sufficient clean water for drinking and other uses. However, this has not always been the case. In the 1960s, municipal and industrial nutrient loads deteriorated the quality of water bodies in Finland in large areas.

In Finland water bodies are highly vulnerable to human pressures. Therefore effective and proactive strategies and actions to preserve their status are needed. These include long-term goal setting, effective legislation, good governance, broad utilisation of research findings and co-operation with various stakeholders.

FINLAND – A LAND RICH IN WATER

Waters are an irreplaceable asset for Finland. More than 10% of the country's area is covered by rivers and lakes. Groundwater reserves are essential for both water supply and ecosystems. About 60% of Finland's municipal water supplies originate from reserves of groundwater. Finland's lakes, rivers and marine waters have important recreational values and they enhance residential environments.

Finland belongs to the few countries where access to water rarely causes problems. Renewable fresh water reserves are estimated to be over 20 000 cubic meters per inhabitant and the total water use is only about 2% of the total reserves.

Finland also shares river basins with three neighbouring countries and has long traditions in transboundary river basin cooperation.

PROGRESS IN WATER PROTECTION TOWARDS GOOD WATER QUALITY

Thanks to long term water protection work the pollution of water bodies from point sources declined in Finland through the 1970s and 1980s. A true success story is how municipal and industrial wastewater loads have decreased to a fraction of what they used to be. The use of modern technology has enabled the reduction of phosphorus and oxygen-consuming substances in municipal loads by 95%, and nitrogen by 60%. In water-intensive industries – such as the pulp and paper industry – water use and the amount of wastewater produced have decreased considerably, generating also energy savings. As a result of decreased discharges, water quality has improved considerably in many previously badly polluted areas.

LONG-TERM STRATEGIES TOWARDS GOOD WATER QUALITY

Long term target setting, proactive strategies and cooperation are important tools to improve water quality and water related ecosystems and to meet health requirements. In Finland, four national water protection programmes adopted by the government have been introduced since the early 1970s. These programmes specify quantitative water protection targets for priority sectors. Progress towards reaching these targets has been regularly monitored.

Based on the EU Water Framework Directive, the government of Finland adopted river basin management plans for seven regions in 2009. They were prepared through extensive cooperation between various stakeholders and interest groups. According to the plans, good water quality status can be maintained or reached by 2015 in more than 90% of the lake area under review, and in approximately 70% of the total river length. Improving the state of coastal waters will be slower, but the goal is still to achieve good water quality status by the year 2027 at the latest. With some exceptions, it is estimated that good status of all groundwater resources will be maintained or reached by 2015.

GOOD GOVERNANCE - FOUNDATION FOR SUSTAINABLE WATER MANAGEMENT PRACTICES

Sustainable use of water resources is based on comprehensive environmental and water legislation. In Finland, any activities or physical structures significantly affecting water bodies or groundwater resources are usually subject to permit. Individual permit consideration based on an application process has proven a workable approach in the Finnish conditions.

Typically, water supply and sewerage services are provided by municipal water utilities. In Finland, users' charges cover the costs associated with supplying clean tap water and treating wastewater. This is based on metering all water consumed and wastewater produced. Around 90% of the population have a piped water supply connection and around 81% have a sewer connection. Even in sparsely populated areas where there is no connection to a centralized sewerage system, wastewater must be treated in such a manner that it will not pollute the environment or become a health risk.●

WORKING TOGETHER FOR WATER

Finland has considerable expertise in water resources management and protection as well as in water-related technology, planning, construction, and research. Yet, our know-how builds not only on high-level expertise, but first and foremost on close collaboration among a variety of actors. Living in a country with only 5.4 million people, the Finnish actors are used to working closely together across sectoral borders.

Internationally, we seek to establish long-term, equal partnerships with our counterparts, building on mutual learning and sharing of expertise. Our experience indicates that this ensures solutions that are both long-lasting and sustainable.

IMPLEMENTING INTEGRATED WATER RESOURCES MANAGEMENT

Integrated water resources management (IWRM) is the dominant paradigm in contemporary water resources management. Finland has implemented such an approach for decades, aiming at win-win partnerships. It has also been the guiding principle in Finnish water legislation.

For example, the regional water resources development plans have been drafted in close collaboration with relevant stakeholders since the 1970s. Later on, we used this experience in the implementation of the EU Water Framework Directive as well as in our transboundary collaboration.

COMMUNITY-BASED WATER SUPPLY AND SANITATION

Finland has long experience in community-based approaches for water supply and sanitation. Co-operatives are still a common arrangement particularly in sparsely populated rural areas.

The experiences from water co-operatives provide important lessons for successful partnerships. First of all, community management typically leads to lower investment and maintenance costs when compared to individual on-site systems. While building on the capacity and interest of the local people, the rural communities can provide water services

Photo: Hagit Berkovich / Shutterstock.com

where well-established municipal water utilities are lacking. With new kinds of partnership – including contractors for selected operation and maintenance tasks – the co-operatives have also been able to respond to the requirements set down by new, stricter legislation.

We are also making use of our experience when collaborating with our partner countries –including among others Ethiopia, Kenya and Nepal– in applying community-based water supply, sanitation and hygiene (WASH) and promoting a Rights-Based Approach (RBA) to water. More information on these activities can be found in the section 'Partnerships for Development Cooperation'.

PARTNERSHIPS IN DEVELOPMENT COOPERATION

The water sector is one of the key areas of Finnish development cooperation. At present, Finland's main partner countries in the water sector are Ethiopia, Nepal and Vietnam. In addition, Finland has programmes in Kenya, Sudan, Somaliland, Zambia and the Palestinian Territories and regional cooperation programmes in the Nile and Mekong river basins, at Lake Victoria and in Eastern Europe, the South Caucasus and Central Asia.

In Ethiopia, Finland has successfully introduced an innovative funding mechanism called the Community Development Fund, which supports community managed projects for rural water management. In Eastern Europe, the South Caucasus and Central Asia (EECCA), Finnish water sector organisations work together with their partners to reduce water disputes inside and between countries and improve water supply and sanitation. This is done through FinWaterWEI, the programme for Finland's water sector support to the EECCA countries. In the transboundary Mekong river basin in Southeast Asia, Finland is collaborating with the regional Mekong River Commission as well as national government agencies in strengthening the capacity of the riparian countries to manage their shared water resources.

COOPERATION AROUND THE BALTIC SEA – IMPROVING WASTEWATER MANAGEMENT IN ST. PETERSBURG

Finland is promoting the protection of the Baltic Sea in close cooperation with neighbour countries. In Russia, for example, 20 years of cooperation between the St. Petersburg water utility (Vodokanal) and the Finnish government initiated major investments in wastewater treatment. Consequently the South West wastewater treatment plant, for example, was designed by Finnish and Russian engineering companies and constructed by Nordic contractors. The nearly 200 million euro project was implemented through a Public Private Partnership model and financed by a combination of grants, international loans, capital investments and local financing. It was the first completed project within the Northern Dimension Environmental Partnership initiative.

The most important asset, according to Vodokanal, has not been the technology or equipment, but the adoption of new ways to manage and operate the company. Finnish experts have trained operators and shared their experience in the operation of the utility, introducing new processes, maintenance management practises and working culture. Twinning cooperation with the Helsinki Water utility provided an opportunity to examine and learn from Finnish water supply and wastewater management models. As a result, Vodokanal has become the leading water utility in the whole of Russia.

WATER CAN CONTRIBUTE TO PEACE AND SOCIAL DEVELOPMENT

Better management of limited water resources is crucial for addressing the increasing threats caused by population growth, urbanization, pollution, overexploitation and impacts of climate change. Finnish experience gained in integrated water resources management and other cross-sectoral approaches can also be used in water resources planning in other countries.

Water plays a central role as a part of green economy. Water-related green technologies contribute to the achievement of the MDGs, particularly related to the access to safe drinking water and sanitation as well as to ensuring food security.

TOWARDS WATER SECURITY

In all its international efforts, the Finnish water sector aims to promote water security. Water security is understood as reducing risks related to the well-being of individuals and communities, and as minimising risks related to food security, energy security and other vital needs of societies.

Finland addresses water security at various levels, from households to communities and all the way to the national and regional levels. The community-based WASH programmes in Ethiopia, Kenya and Nepal, for example, focus on reducing the water related insecurity and vulnerability at the household and commune levels. The support to transboundary water management in the Mekong and Nile rivers and Central Asia reduces the risk of water-related conflicts between riparian states.

WATER DIPLOMACY

Water security is closely linked with the concept of water diplomacy. As a country of thousands of lakes and as a nation with an internationally high profile in conflict resolution and peace building, Finland is well placed to serve as a mediator in water related conflicts. Conducting water diplomacy requires full consideration of social and political processes linked to water. This is especially important in regions sensitive to crises such as many regions in Africa, the Middle East, the Caucasus, Central Asia and Latin America.

With the experienced advantages of transboundary river cooperation, Finland has been internationally active on this issue. As long ago as 1966 the International Law Association adopted guidelines known as the Helsinki Rules –formulated in our capital – that formed the first internationally defined principles for the management of transboundary rivers. At the UN General Assembly in 1970, Finland proposed development and codification of rules for international watercourses. This process led to the adoption of the UN Convention on the Law of the Non-navigational Uses of International Watercourses in 1997. Moreover, the UNECE Convention on the protection and use of transboundary watercourses and international lakes –also known as the Helsinki Convention– has given us a very useful framework for transboundary cooperation. These experiences could also benefit other regions, to prevent conflicts over shared waters and to facilitate regional cooperation and prosperity.

Photo: Aarno Torvinen

INNOVATIVE WATER SOLUTIONS

The Finnish cleantech sector has a good global reputation and a leading position in many areas of application. Today, over one third of Finland's public R&D investment goes to the cleantech sector, contributing to the global success of Finnish cleantech actors. As a part of cleantech, water is a key area where Finnish expertise is globally well established and vigorously developing. Issues such as integrated water resources management, water and wastewater treatment, efficient industrial water processes as well as ICT related areas such as measuring, monitoring and controlling technologies, are of core competence in Finland.

The Finnish know-how network has an important role in finding solutions for global water challenges. Finland has a large number of small and medium size enterprises where specialised experts constantly develop water sector technologies and solutions. Networking SMEs for cooperation with larger companies and public sector stakeholders (e.g. authorities, research institutes) is a well proven recipe for delivering good results and comprehensive top-level solutions. Finnish actors are appreciated partners in international consortia, and are willing to further extend collaboration with new foreign companies and research institutions.

TOTAL WATER CYCLE MANAGEMENT – POWERED BY SMARTER WATER

Total water cycle management (TWCM) recognises that all elements of a water cycle and different uses of water are interdependent. An action taken in one part of the cycle has an impact on the other parts of the cycle. The TWCM approach also means considering water in different parts of a water cycle as a resource to the other parts, and matching water uses with water quality that is best fit for its purpose. Hence, TWCM facilitates sustainable development and planning by requiring that infrastructure planning must be linked with land use planning. To successfully implement the TWCM approach, different technology providers must work together with each other as well as with the authorities.

In order to understand and plan any actions affecting water cycle, it is crucial that the behaviour of water is monitored, forecast and managed throughout the whole cycle. This way it is possible to optimize water use and prevent disasters caused by, for example, extensive flooding.

Use of modern technologies will help the pursuit of optimization. In particular, combining water expertise with various ICT applications can significantly improve management of water resources, water assets and water-related risks. These 'smarter water' applications can accelerate solving many global water problems and will open up new opportunities in community water management, industrial water processing and use of water resources.

Photo: Rami Lappalainen, Unelmastudio Oy Ltd

In Finland we have a long history in successfully managing our waters, as well as a proven track record in high tech and ICT development. Today, highly developed ICT solutions for the water sector are in extensive use. Finland's approach to comprehensive solutions is headed by two globally recognised companies in the field: Vaisala has technologies and systems to observe and monitor water when it is still in its natural state, in the air, or rivers and lakes, while Kemira provides solutions for industrial and municipal water treatment and control. These two form cooperation networks with other companies and researchers, together aiming to solve global water problems.

CENTER OF WATER EFFICIENCY EXCELLENCE (SWEET)

Kemira and the Technical Research Centre of Finland (VTT) established the SWEET research center in 2010 to develop new technologies to enhance water usage and recycling, and to create more sustainable and energy-efficient solutions for water-intensive industries. Examples of the research areas include cost-efficient sea/brackish water desalination as well as wastewater reuse into drinking or process water, utilization of biomass resulting from wastewater treatment in production processes of energy and bioenergy, and decomposition of products. The funding for the center is approximately 120 million euros over 4 years, resulting in further investment activities in projects for piloting and proof on concept purposes.

HYDROLOGY AND WATER RESOURCES MANAGEMENT DATA SYSTEM

The Finnish Environment Institute (SYKE) and the Finnish Meteorological Institute are important actors within the water sector cooperation network. They have developed together an advanced hydrological service, which provides real-time information on water levels, discharges and many other hydrological variables in sea water, freshwaters and ground waters. The system also includes hydrological forecasting and flood warnings, which in Finland are particularly important during the spring period when melting snow can cause rapid flooding. The application is easily adaptable to other kinds of environment, to monitor and forecast different water aspects.

REMOTE CONTROL AND MONITORING BY RADIO MODEMS

Waterworks and sewage processing plants are often in remote locations, or cover a large area. Therefore, a data network for plant control and management needs to be flexible, easy to expand and reliable. One of the smart cost effective solutions for this is radio modems by SATEL, an innovative Finnish SME. With the modems, data transfer supports network management in a straightforward way. Radio modems fit particularly well with automation systems and help in keeping interruptions to a minimum in water treatment and distribution.

LOW-COST, RAPID, MINIATURISED SOLUTIONS FOR WATER QUALITY ASSESSMENT

Monitoring water quality is becoming more and more important because of depleting water resources, water price increases and pollution. Instead of conventional laboratory testing, rapid field tests are in many cases needed. The WATERCHIP project, headed by the Technical Research Center of Finland (VTT), is developing innovative, low-cost, miniaturised, rapid and specific test concepts for water quality assessment. This is done by combining manufacturing technologies – printing and injection moulding together with micro-fluidics – with biological and chemical detection of certain impurities and pollutants in water.

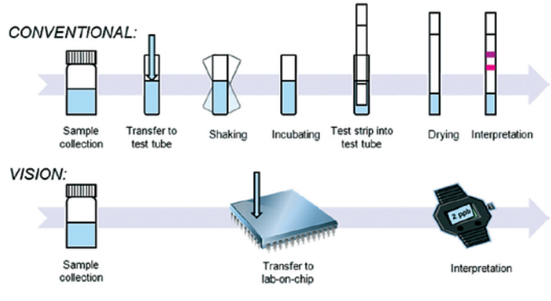


Image: When using lab-on-chip devices, the liquid sample travels automatically through the device and gives the analysis result directly, instead of several phases and a lot of manual operation used in conventional testing.

See wider display and more examples and details of Finnish know-how at www.finnishwaterforum.fi

KEY ACTORS IN FINNISH WATER SECTOR DEVELOPMENT AND COOPERATION

FINNISH WATER AND CLEANTECH SECTORS

Finnish Water Forum | www.finnishwaterforum.fi

Finnish Water Forum (FWF) is a joint network of the Finnish private and public water sectors. It serves as a platform where commercial enterprises, government and non-government organizations, scientific institutions and water-related associations can consolidate their water knowledge to find solutions for global water challenges. If you are looking for a Finnish water partner, please do not hesitate to contact FWF.

Cleantech Finland | www.cleantechfinland.com | www.solved.fi

FUNDING FOR RESEARCH AND DEVELOPMENT

Finnish Funding Agency for Technology and Innovation – Tekes | www.tekes.fi

Academy of Finland | www.aka.fi

RESEARCH PROGRAMS AND INSTITUTES

Center for Water Efficiency Excellence – SWEET | www.kemira.com

Strategic center for science, technology and innovation focusing on energy and environment sectors – Cleen Oy | www.cleen.fi

Technical Research Centre of Finland – VTT | www.vtt.fi

Finnish Environment Institute – SYKE | www.environment.fi

Finnish Meteorological Institute | www.fmi.fi

Geological Survey of Finland | www.gtk.fi

Agrifood Research Finland – MTT | www.mtt.fi

National Institute for Health and Welfare – THL | www.thl.fi

UNIVERSITIES doing water sector research and development in Finland and in international networks include

Aalto University | www.aalto.fi | www.wdrg.fi

University of Helsinki | www.helsinki.fi

Tampere University of Technology | www.tut.fi

University of Oulu | www.oulu.fi

Lappeenranta University of Technology | www.lut.fi

University of Jyväskylä | www.juy.fi

University of Eastern Finland | www.uef.fi

University of Turku | www.utu.fi

MINISTRIES that have a role in water governance and also support sector development include

Ministry of Agriculture and Forestry | www.mmm.fi

Ministry of Employment and the Economy | www.tem.fi

Ministry of the Environment | www.environment.fi

Ministry for Foreign Affairs of Finland | www.formin.fi

Ministry of Social Affairs and Health | www.stm.fi