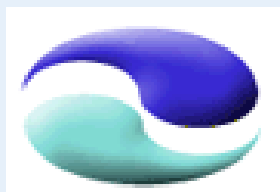


5th IWHACONFERENCE Tampere Finland 2007

Pasts and Futures of Water

University of Tampere 13 – 17 June 2007



IWhA

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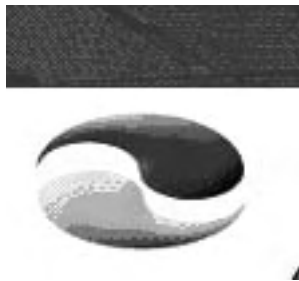
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5th IWHACONFERENCE
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Pasts and Futures of Water
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Iikka Hautamäki, Petri Juuti, Tapio Katko,
Riikka Rajala & Eija Vinnari (Eds.)

The International Water History Association

The International Water History Association (IWHA) is the leading global organization on water history. The biannual IWHA conferences in Aberystwyth, Wales (1999), in Bergen, Norway (2001), at the Bibliotheca Alexandrina, Egypt (2003), and at UNESCO in Paris (2005), were attended by scholars representing different disciplines who dealt with various aspects of water history ranging from ancient waterworks to sanitation in recent times, and from indigenous water symbolism to conflicts over water resources. IWHA aims to bring together historians, geographers, engineers, archaeologists, anthropologists and water managers and is committed to bridging the gap between academics and policy makers and the water management sector. IWHA strives to ensure representation from all world regions. (www.iwha.net)



On behalf of the organizers, we warmly welcome you to Tampere to witness how water history meets the future under the midnight sun.

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Adjunct Professor Petri S. Juuti, Chairman of the Organising Committee
Adjunct Professor Tapio S. Katko, Chairman of the Scientific Committee

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TAMPERE UNIVERSITY OF TECHNOLOGY

1. Greetings from The Patron of the 5th IWHACONFERENCE

As we all know, water is life. It is of vital importance to any kind of natural and human life, societies and economic activities. This has been noted for example in the World Water Development Report 2006, a joint effort of 24 UN organisations or agencies. Ever since the first human cultures and settlements water has been one of the basic requirements for development. Water resources development or water and sanitation services are in many ways related to the Millennium Development Goals – aiming at reducing by half the number of people without water, education, health and other basic services by 2015.

Undoubtedly, the challenge for proper water management is huge. If the current trend continues, two thirds of the world's population will be living with chronic water shortages and polluted water environments by the year 2050. In February 2007 the United Nations Food and Agriculture Organization issued a warning: in less than 20 years, 2 billion people will be completely without water and two-thirds of the world's people will not have enough.

The overview of the recent Human Development Report 2006 summarises the issue as follows: The global crisis in water consigns large segments of humanity to lives of poverty, vulnerability and insecurity. The scarcity at the heart of the global water crisis is rooted in power, poverty and inequality, not in physical availability. There is more than enough water in the world for domestic purposes, for agriculture and for industry. The problem is that some people -- notably the poor -- are systematically excluded.

In the last fifty years, national and international development efforts have failed to make available clean water, safe sanitation, and knowledge about hygiene to all. As a result, the frequency and severity of disease still saps the growth of both people and nations. With due recognition of the foreseeable challenge of the climate change, we should remember that the greatest environmental crisis is not something that might happen in the future. It is something happening right now to a third of the world's people: the lack of proper water supply, sanitation and related hygiene.

The world has some 270 international water bodies shared at least by two nations. Managing the transboundary rivers and the respective ground water areas will require proper rules and tools and the means to transform these into action. It is worth mentioning that one of the cornerstones of the related international water law, the so-called Helsinki rules, were accepted in this country in 1966. While recognising the challenges and conflicts of interest related to transboundary water bodies,, there is still good reason to believe that joint interests of the involved nations would pave the way for cooperation rather than conflict.

In international cooperation, professional associations such as the fairly recently established International Water History Association (IWHA) can have a positive impact on establishing contacts over borders, disseminating knowledge and finding joint means of solving water management problems, while also recognising that water is fundamentally a local resource. Building nations and establishing services will require high-level professionals such as yourselves.

The conference programme in Tampere 13 to 17 June, 2007 has some 40 sessions on a wide variety of topics: from Ancient Water Systems to various water use purposes like Groundwater, Hydropower to Religion, Legislation, Water Pollution Control, Water and Landscape, and Industrial Heritage as well as some geographically more specific regions or areas. In addition, three round-table panels will be organised on (i) Water and development cooperation (ii) Water services management: pasts and futures, and (iii) Israeli-Palestinian water management.

The participation of some 250 experts from over 50 nations attests to a worldwide interest in long-term thinking related to water management: what are potentially such strategies, principles and practices that could be widely applied and what are those to be considered locally. The conference is a very positive sign of inter- and multidisciplinary interests on managing water – and willingness to learn from the pasts for the presents and our futures. Searching more convergence between the pasts and futures is a must if we want to solve and ease the challenges and problems related to water.

In several international comparisons of the water and environmental sector, Finland has been placed near or at the top. Such indicators include, for instance, the Water Quality Index; the Water Poverty Index; the Transparency Index, and the Environmental Sustainability Index. Thus it seems that in addition to abundant water resources, Finland also possesses useful knowledge and experiences to be shared in international forums and cooperation. Considering the theme of your conference “Pasts and Futures of Water” I wish you fruitful discussions and a friendly and productive atmosphere for the event. Hopefully you will also have time to see how water is strongly linked to the cultural heritage of the host city Tampere - similarly to all the other communities in our global village.

President Martti Ahtisaari



2. Outlines for selected panels and sessions

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Archives on irrigation and water management

Mohammed El Faiz (University of Marrakech)

- The archives of water in Marrakech

Thierry Ruf (IRD)

- How to interpretate the old maps on irrigation schemes in Egypt and in Morocco

Jeanne Riaux (IRD)

- The theory of reproduction of water in Pyrénées-Orientales, south of France according to the archives

Carlos Sanchiz (UPV Valencia Spain)

- The archives of water and the history of institutions

ABSTRACT

The panel will discuss the kinds of documents, maps, reports, files, books that still exist in some professional places, public archives, users' communities archives and private archives. It will allow a kind of declaration to help people to conserve such documents and allow researchers to work on such material and exchange on concepts, methodologies and comparisons.

Global perspectives on social participation in water management

Organizers: Kate Berry, University of Nevada, Reno, US
Eric Mollard, IRD, Montpellier, France

Panelists: Eric Mollard, IRD, France
Sergio Vargas, Mexican Institute of Water Technology
Kate Berry, University of Nevada, US
Thierry Ruf, IRD, France
Julia Haggerty, University of Otago, New Zealand
Chuan Liang, Yunnan Academy of Social Science, China
Margreet Zwarteveen, Wageningen University, The Netherlands

ABSTRACT

In a growing number of scientific, management, industrial, environmental and journalistic circles, threats to water quantity, water quantity, surface water and groundwater are being studied, argued about, planned for, turned into educational materials, lamented over and mitigated. The specific form that the water crisis assumes differs somewhat from place to place and organization to organization but, overall, a heightened sense of urgency has been coupled with escalating pressure to take action, resolving or at least mitigating problems with water. Old approaches have been resurrected and new solutions generated, but they often fail to translate social demands and cope with public interests. The public, as agents who may cause or prevent problems and as recipients of messages about the looming water crisis, is increasingly expected to assume new roles. Indeed, solutions to water scarcity, bankruptcy of municipal operators, inequality, health, and new distributions among sectors explicitly need to engage citizens and water users. Social participation in water management is characterized by initiation or direct consultation that results in active participation in the decision-making on public or private water policy and management actions. The notion associated with this approach is that administrative reform of both the state and relevant private sectors needs to be coupled with the engagement of the public and water users.

The objective of this panel session is to share opinions, experiences and analyses of social participation in water management from around the world. While increased social participation is currently being broadly advocated, few research projects on the specifics of participation have yet emerge and little has been offered in the way of a comprehensive approach to understanding social participation in water management. The panel session will be one of the first exchange of ideas and analyses on the past, present and future of social participation in water management and will address the distinctive political history social participation has had in many countries. Panelists will consider such questions as how to balance administrative control and social participation; where social participation has increased or decreased; who is involved and who is excluded; what sorts of historical cycles and geographic patterns are associated with social participation; how rhetorical appeal meshes with actual experiences; and where have there been successes and challenges in effective implementation. Perhaps most challenging are the issues concerning how to couple real participation with administrative reforms and how to encourage effective, open decision-making. The panel is part of a larger book project whose aim it is to integrate an understanding of social participation in water management with other key dimensions of water management. Accordingly, panelists will consider how different tensions inherent in water management influence, and in turn are influenced by, social participation, including: competition between urban demands and rural needs; evolving roles of the state, nongovernmental organizations and communities; indigenous approaches in contrast to dominant cultural approaches; gendered dynamics; conflicts resulting from relative position within a basin or type of water use; and competition between economic integrity and environmental sustainability.

Historical experiences of drought and changing conceptions of water scarcity, consumption and provision

1 Frank Trentmann and Vanessa Taylor

2 Will Medd and Heather Chappells

3 Leandro del Moral Ituarte

ABSTRACT

Within the context of climate change there are increasing calls for mitigation strategies to avoid social and environmental catastrophes caused by drought and water scarcity. The lessons that can be learnt from the historical analysis of the social and cultural dimensions of drought, and the spatial distribution of water scarcity have, however, rarely been developed. In this session we explore ways in which the analysis of water resource stresses across time and in different socio-cultural settings reveals important distinctions both in conceptions of scarcity and in perceptions of consumer and provider roles in water management. Times of perceived water scarcity also expose changing consumer and provider values in relation to what are regarded as essential or wasteful water uses.

The papers in this session will examine historical cases of drought under socially and culturally distinctive water management regimes. Bringing together historians, geographers and sociologists, the session will promote interdisciplinary debate on changing conceptions of water scarcity, consumption and provision. Further discussions will consider the role of crises in mediating new water management regimes.

Specific questions addressed are: how do historically constructed narratives of drought and scarcity reflect and construct diverse socio-cultural, economic and political needs and priorities; how are the roles of consumers and providers in drought management conceptualised; what do differential experiences of drought and coping strategies reveal about the role of consumers in water management and changing water values; and how do definitions of drought and scarcity reflect the strategic priorities of different players, including water managers, and national and international agencies?

Contexts to be addressed in the session include the changing experience of drought in Britain since the late nineteenth century (see abstracts: Trentmann and Taylor; Medd and Chappells) and in modern Spain. Leandro del Moral's paper will focus on Spain where the severe economic and social impacts of droughts in urban areas have provoked a growing vulnerability consciousness and, alongside the general ongoing process of change of the traditional hydraulic paradigm, introduced a new understanding of drought management priorities and mechanisms. Karen Bakker's contribution will explore the historical and spatial production of water scarcity in the global South, focusing on the case of Jakarta, to reveal how the classification of urban citizens has been actively translated into water supply connections and disconnections. Lyla Mehta's paper on drought in western India will consider the transformation of historically specific understandings of drought into a universalist concept of Scarcity and the strategic uses of this concept in legitimising certain kinds of technical, water management and relief interventions.

Hydrosolidarity: concept with a history and a future?

Session coordinators:

Pieter van der Zaag
(UNESCO-IHE, Delft)

Maurits Ertsen
(Delft University of Technology;
IWhA; moderator)

Session debaters

The debaters will introduce several aspects of the idea of hydrosolidarity. They will not monopolize the debate, as most of the debate time is reserved for open floor discussions.

Erik Mostert

Delft University of Technology, the Netherlands

Topic: International solidarity in river basin management

Robert Varady

University of Arizona, Tucson, USA

Topic: Global Water Initiatives

Pieter van der Zaag

UNESCO-IHE, Delft, the Netherlands

Topic: The concept of hydrosolidarity

ABSTRACT

This debate focuses on the question whether hydrosolidarity really exists. Falkenmark and Folke (2002; see also Falkenmark & Lundqvist 1999) define hydrosolidarity as “reconciliation of conflicts of interest with a solidarity-based balancing of human livelihood interests is to be achieved against unavoidable environmental consequences”. Assuming it does, as is elaborated upon in the background document attached to this proposal, the debate will try to address issues like what the roots are of this concept and the mechanisms that allow it to emerge. Furthermore, it will be discussed to what extent different answers to these questions are relevant and important within the modern context, in which peaceful sharing of water resources is becoming more and more precarious (see Wolf et al 2003). Water resource availability is becoming more variable and less reliable due to climate change while the demand for water continues to increase. Will demand for water indeed continue to bind people together and foster cooperation, or will it trigger conflict? Can hydrosolidarity be a useful concept on larger spatial scales, such as large river basins? Does it have a future?

Take the classic case of a small group of irrigators that jointly own and share a small irrigation canal that diverts water from a river. The distinguishing feature is not only that such a set up occurs in many societies across the globe, but also that the lasting success of these small systems is based on the recognition of all irrigators that they all have a claim

to canal water, despite of the upstream-downstream asymmetry that is inherent in most if not all water systems. Typically, the diversion weir in the river is a simple structure made of local materials. This has two important implications: the weir leaks (and hence does not divert all river water) and it tends to collapse nearly every year during the storm flow season (and hence has to be reconstructed regularly). Instead of considering this technology as being belowstandard, it could be considered cutting-edge. The leaking weir ensures that the river does not dry up completely which is good for the environment and for the canals that take out water further down the river. Moreover, the fact that the weir has to be rebuilt regularly fosters cooperation. The irrigators at the head end of the canal partly depend on the labour input by the tail-enders during the reconstruction of the weir. The latter's labour investment translates into a claim to the canal water that cannot be ignored by the others, ensuring that water reaches the tail. This is a situation where irrigation technology and Walter management are internally consistent. It would appear that principles of equity and ecological integrity are reinforced. These are principles that are globally recognised in integrated water resources management (IWRM), and that are pursued in many if not all water sector reforms and new water policies and laws.

The classic situation is extensively documented (Kenya (Fleuret 1985); Nepal (Martin & Yoder 1988); Tanzania (Grove 1993; Adams et al. 1994; Potkanski & Adams 1998); Bolivia (Gerbrandy & Hoogendam 1996); Zimbabwe (Van der Zaag 1999); Eritrea (Mehari et al 2005)). One typical feature of these systems is that upstream irrigators along the canal tend to be more powerful than the tail-enders. The existence of large power differences between actors is often considered an impediment to collective action. However, Baland and Platteau (1999) have shown that this may not necessarily be the case and that cooperation may prevail even in cases with large power differences. Historical evidence shows that strong upstream irrigators may indeed respect a water sharing agreement with a weaker downstream irrigator. This phenomenon requires careful analysis, but it may be that the risk of the stronger party to lose a lot is sufficient incentive for them to cooperate and broker cooperative and equitable deals with their less powerful counterparts, even if the latter would free-ride and not comply with the agreement.

Two contrasting hypotheses could therefore be formulated:

1. The larger one's stake in the water pie, the larger one's interest in the common good and thus the more responsibly one may act.
2. The recognition by those in a more advantageous position of their dependence on the cooperation of those in a less advantageous position ensures the former's willingness to forego immediate and short-term benefits.

The question to be debated is whether the kernel of "hydrosolidarity" as described above is a universal phenomenon, robust enough to "upscale" from the furrow to the village to the watershed and basin levels. Can the roots of hydrosolidarity as found in age-old and indigenous water systems in three different continents, the mechanisms "oiling" it, and the principles underlying it, inform the modern institutional requirements of water management? What is known of these age-old water systems? What is fact and fiction? Does hydrosolidarity have a future by having a history?

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Understanding the evolution of the urban water and sanitation paradigm: European cities in the 20th century

ABSTRACT

The 19th century re-invention of piped networks for drinking water and sewerage was a decisive step in the eradication of the cholera, typhoid and other epidemics that plagued European cities. In the interest of public health, European governments subsequently concessioned the right to provide domestic water and sanitation services. In doing so, they created urban water and sanitation monopolies.

The rise of urban public and private concessions transformed the urban water and sanitation market and technologies used for service provision. Before the advent of water and sanitation concessions, city dwellers relied on a multitude of sources (canals, shallow wells, water vendors) for their domestic water needs. Likewise, a wide range of local solutions existed for the management of human wastes. Gradually, this spectrum of local technical solutions was replaced by a single technological paradigm. A single provider treated raw water up to a high quality quality. It conveyed this 'potable water' via a closed, pressurised network to all urban dwellings. Householders relied on this water for all domestic needs including the removal of faeces and urine. The latter were mixed with potable water in 'water closets' and the resulting wastewater was eventually transported to a treatment works, where another cycle of purification made the water safe for discharge.

So far, much of the research on the evolution of urban water and sanitation concessions has centred on a binary opposition of public and private concessionaires. In the course of a heated debate over the pro's and contra's of ownership types, we have lost sight of several intriguing questions:

- 1) Why and how did local national/local governments arrive at the decision to monopolise the urban water and wastewater business through concessioning?
- 2) Over the course of the 20th century the size of water providers increased virtually continuously. At present, most providers are considerably larger than would be justified in terms of scale economies. What factors acted as drivers and facilitators of this size 'overshoot'?
- 3) The World Health Organisation recommends potable water for all domestic uses. This category includes not only water used for drinking and cooking, but also water for maintaining food and personal hygiene through hand and food washing, bathing and laundry. What evidence or reasoning underpins this WHO recommendation?
- 4) The current technology for handling faeces and urine flies in the face of both environmental (pollution prevention) and cost effectiveness considerations. In fact, the current waterborne sanitation system was selected from a range of technological alternatives. Several 19th century alternatives were less costly, had lower optimum scale thresholds, and more desirable environmental features than the waterborne system. Yet the waterborne system ultimately prevailed. Why?

It is these issues that this session will address. We will do so by juxtaposing case studies of the evolution of urban water/sanitation concessions in different parts of Europe.

Washed by all waters: histories of water management in the Dutch Delta

Session coordinator

Maurits Ertsen

(Delft University of Technology; IWHA)

Session papers

Toon Bosch

A forgotten river? The struggle for the improvement of The Meuse in the Dutch province of Limburg (1830 – 1918)

Nil Disco

Hanged for a sheep or a lamb. A comparative history of sea and river floods in the Dutch delta in the 19th and 20th century

Erik Mostert

The many sources of the management of the Rhine

Bert Toussaint

Development of flood management knowledge systems in the Dutch delta: 1800-1940

Session theme

The Netherlands is structured by water. To the West and the North the country is bordered by the North Sea. Large European rivers like the Meuse, Rhine and Scheldt meander their way through the country that is in fact their common delta. A large inner sea and large former estuaries in the Southwest part of the country are other prominent geographical features of the Dutch delta. Zooming in, water-related infrastructure is present all over the landscape. In the absence of adequate water management, two thirds of the country would be regularly flooded. The Dutch delta, as other delta's worldwide, is a transition between the rivers and the sea. Being such a transition brings along fundamentally different aspects of water management, which are different from areas dominated by lakes or mountain rivers. Apart from the fact that the low lying deltaic country is potentially flooded from both rivers and sea, the interaction between rivers and sea may lead to flood risks much more severe than of floods exclusively originating from either source. At the same time the link between river and sea in the delta area is a key feature of the Netherlands as a commercial power and creates rich ecological conditions. This session will discuss several aspects of the Dutch delta, including floods, management of Rhine and Meuse rivers and the position of the Dutch Public Works department.

A forgotten river? The struggle for the improvement of The Meuse in the Dutch province of Limburg (1830 – 1918)

Toon Bosch

(Department of Cultural Sciences Dutch Open University)

The history of the river Meuse in the Netherlands is only partially written, or, to put it in another way, partly neglected. Historians have concentrated on the northern part of the river within the context of large-scale river improvements undertaken in the Dutch delta in the period 1850 –1916, or on the canalisation of the Meuse in the 1920's and 1930's.

However, the southern Meuse, which runs through the province of Limburg, has escaped historical attention and remains to be written. This paper is one attempt within a larger framework to fill this gap in Dutch river history. It focuses on the period 1830-1918 and shows that the history of the Meuse in the period under study does not allow mono-causal explanations. Besides trends in 19th century water management policies and economical and hydrological issues, navigability and river improvement were important. Other matters include the strained relations with the kingdom of Belgium since the separation from the Netherlands in 1830 and the peculiar political and cultural position of the province of Limburg in the Dutch nation state. This contribution poses the question why the improvement of the Meuse was delayed over and over. After the main outlines of the hydrological problems encountered in relation to the large-scale river improvements in the Dutch Delta, the involvement of national and regional politicians, diplomats, Dutch state engineers (Public Works (“Rijkswaterstaat”)) and civilians in their quest for solving this major hydrological problem will be sketched. The specific political, hydraulic and cultural position of the Meuse will be discussed. Finally a (preliminary) answer to the question why the Meuse in Limburg was treated so different when compared to the Rhine and its branches will be given.

Hanged for a sheep or a lamb. A comparative history of sea and river floods in the Dutch delta in the 19th and 20th century

Nil Disco

This paper will discuss the way flooding from sea and rivers were discussed and dealt with by Dutch water management institutions in the 19th and 20th century. Flooding is well known in Dutch water management history. Internationally there remains the idea that the Dutch have learned to work with nature and that that knowledge has helped produce a more sustainable system of flood defences both from rivers and sea. There is a germ of truth in this, but also considerable mystification. Staying one up on the floods is not a genetic proclivity. Hard political and rhetorical work has gone into maintaining the vaunted defences that keep the Netherlands more or less dry and allow it to prosper. It is certainly the case that since the 1970s Dutch hydraulic engineers have discovered the value of accommodating nature. This might be elevating were it not for the fact that in the previous thousand years the inhabitants of the Lowlands bent themselves to exactly the opposite task: transforming their realm into a huge garden in which nature is thoroughly domesticated. This provided them with a country, but at a price. A third of this garden presently lies below mean sea level, and nearly 60 percent is vulnerable to flooding. Producing and maintaining such precarious real estate was only possible by incorporating nature into human order. This hybrid order was based on constraining the Rhine, Meuse, and Scheldt rivers, along with a host of minor watercourses, between levees and more or less hermetically closing off the Delta from the sea, a project that started in about the year 1000 with damming up smaller rivers and culminated in the Delta Works. Against this violent background, working with nature appears a marginal and recent accomplishment.

The many sources of the management of the Rhine

Erik Mostert
(Delft University of Technology)

The Netherlands as a downstream country located in the delta of the Rhine has a huge interest in international cooperation on this river. A lot of international cooperation has developed since the Second World War, much in the framework of the International Commission for the Protection of the Rhine (ICPR). Moreover, water quality has improved drastically. This is usually attributed to the activities in the framework of the ICPR. This paper challenges this view by having a closer look at the development of water quality and water quality management of the Rhine. It then appears that more general processes have played a role, often with a different and larger scale than the Rhine basin. These include the end of the Second World War, economic and technical development, growing environmental awareness and national regulations. Moreover, the development of European Union environmental policy (itself influenced by the Rhine pollution) has played a crucial role. Finally, the international cooperation on the North Sea has had some impact. The paper concludes that, whereas the Rhine has only one source, the management of the Rhine has many. These can only be found – and transboundary river basin management in general can only be understood – by placing the river in its broader, evolving socio-political and economic environment.

Development of flood management knowledge systems in the Dutch delta: 1800-1940

Bert Toussaint
(Rijkswaterstaat, the Netherlands)

Being a flood-prone area, flood management strategies in the central part of Holland required the continuous development of knowledge of levee and sluice construction, drainage and reclamation techniques. In the 18th c, flood management issues were raised in enlightened scientific circles aiming at better safety strategies as a response to repeated river flooding. Two opposing views were held: a systematic regularization of the river channel, and less radical and more flexible responses like the construction of spillways. Finally, in 1850 normalization of all Rhine arteries was adopted by the government - which was much later than in Germany and France. This was partly due to a lack of faith within the risk avoiding engineering community in a comprehensive normalization approach. Nevertheless, since the 1830s Rijkswaterstaat, the national water management agency, built up a solid body of knowledge with river mapping and a systematic production of hydraulic data, which underpinned the realization of the normalization projects. From the 1890's onwards, a parallel knowledge system was developed regarding the coastal zone: sea maps were improved and tidal data were collected. Around 1920, the growing impact of mathematics, physics and hydraulic modeling on engineering first materialized in the Zuiderzee project: the combination of an enclosure dam and huge reclamation projects required an unprecedented long term planning horizon and the application of innovative physical and hydraulic modeling. In the 1930s scientific coastal engineering led to a novel storm surge risk approach and to closure plans of the SW estuaries, which were major elements in the postwar Deltaplan and a new flood management strategy. In contrast, river engineering developed much more along evolutionary lines before 1940.

Water and city: history of water related natural disasters and mitigation: issues on ecological and social risk in town planning

Session Organizer: A.G.Bhole / Lalit P.Chaudhari
ISDR, India.

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Session co - convener: Ms.Annette Kimmich
Open University Geology Society, Switzerland.

Session Outline:

Asia pacific region is more vulnerable to Geo disasters and impacts of climate changes in recent years. On 26 December 2004 massive waves triggered by an earthquake surged into coastal communities in Asia and East Africa with devastating force. Hitting Indonesia, Sri Lanka, Thailand and India hardest, the deadly waves swept more than 200 000 people to their deaths. Also in an another extreme climate change phenomenon during last week of July 2005 , causing heavy rains and flooding situation in the Mumbai ,and state of Maharashtra .More than 20 million population in the Mumbai metro region alone and 150 million all over the Indian states are witnessing the social- economical and ecological risks and impacts due to climate changes. Also number of hurricanes, cyclones forest fire and flash floods occurs around the continents of the globe in Asia –Pacific region such as hurricane Katarina, Rita etc. The economic losses to coastal ecosystem, agriculture, irrigation, aquaculture, drinking water resources, coastal industries and infrastructure are very high due to extreme geo-disasters that are linked with environmental and climate changes .The ecosystem, economic system, agriculture and aquaculture system in this region are severely affected and need systematic rehabilitation. Also mitigating the geo-disasters, marine hazards and rehabilitation during post tsunami period , scientific knowledge is needed, requiring experienced research communities who can train the local population during tsunami rehabilitation.

The session aims to start the history of water related disasters in Asia-Pacific and Europe region and Global initiatives on the problem identifications in management of risks in water-disasters, tsunami ,river floods, cloud bursts , hurricane and cyclones etc., to investigate problems related to social-economic and ecological risks and management issues resulting from the water related disasters, tsunami and Geo- disaster, recent Hurricanes and cyclones , to aid mitigation planning in affected areas and to educate scientists and local populations to form a basis for sustainable solutions. The session aims to assess the potential risks and hazards, social, economic and technical issues, problems and damage arising from water related disasters in the towns and cities of Asia-pacific-Europe region including agriculture, aquaculture, irrigation, drinking water, coastal infrastructure, coastal ecosystems and coastal economic systems using water resources planning through disaster mapping ,GIS and GPS applications . This session reviews the status and issues of water-risks, marine risks along coastal towns and cities in Asia, Europe and America focusing on technical issues, problems and damage arising from the extreme floods, hurricanes, cyclones, flash floods, earthquake and tsunami in agriculture, aquaculture, irrigation, drinking water, housing, social and economic losses , coastal infrastructure, coastal ecosystems and coastal economic systems etc.

Round-table panel I: Water and development cooperation

The history of water can be studied within the general framework of the history of the environment. Environmental history observes and studies the interaction between humankind and nature, and how their relationship changes in the course of time. Recently the pace of this change has intensified and accelerated considerably.

In this panel discussion we will concentrate on water history as a part of the development cooperation efforts related to human settlements. Hence, the emphasis will be on water supply and sanitation, but we shall not forget the adjacent sectors of irrigation and water borne and water related illnesses.

Today the generally accepted aim is sustainable development. In this respect we will address all measures of human involvement in nature. Hence, water history includes also history of water technology, while not forgetting the social dimensions either.

Competition inside the water sector is basically a competition for access to water. This concept includes three main issues. The first is the utilization of water sources, the second is the balance between the public and the commercial concept of providing services, and the third one concerns the technical hardware and planning of facilities.

In addition, if we are responsible and aim for sustainability, we must not forget the indispensable elements of wastewater treatment and sanitation. These are closely connected to another issue, competition for water quality. This involves also the concept of nature conservation, which in turn refers back to the early note in this paper, history of the environment.

Potential issues/questions for the Panel

- Difference between the development cooperation efforts of Public Authorities and NGOs
- Responsibility to develop: Whose responsibility is it?
- Values and cultures in the water sector
- Change/progress of values, the green revolution
- Sustainability, an illusion?
- Sector support: Is it a modern version of washing one's hands of the responsibility to aid?
- Population explosion and its impact on service provision
- Are present trends suitable for predicting the future?
- Access to water, a human right or a commercial commodity?
- Potable water standards and ways to meet them
- How to get sanitation on the real agenda in developing countries with scarce economic resources
- Fragmentation of expertise and education in WSS&HE
- Recycling water for multiple use (biological stabilization)
- Wastewater quality standards from the point of interest of different recipients
- Have we learned anything?
- Significance of the UN Millennium targets in the history of WSS

Tentative programme

Chaired by Mr. Heikki Wihuri

Rapporteur: Willem Ankersmith: w.ankersmit@planet.nl

Presentations (15 min each)

1) NGOs improving access to safe water - a public health perspective to community based/initiated activities (Ms. Marja-Leena Salin, Senior Advisor, The Family Federation of Finland): marja-leena.salin@vaestoliitto.fi

2) Experiences of water supply and sanitation programme (Piers Cross, The World Bank): pcross@worldbank.org tkskytta@lycos.com

3) Lessons from the evaluation of water supply and sanitation programs (Mr. Tauno K. Skyttä): tkskytta@lycos.com

4) Development of community financing and its implementation experience in rural water supply and sanitation in Ethiopia (Ato Mulatu Ferede, Program Director): rwsep@ethionet.et

Followed by panel discussions:

Speakers and the following invited experts:

Dr. Ezekiel Nyangeri Nyanchaga: samez@wananchi.com

Dr. Jarmo J. Hukka: jarmo.hukka@tut.fi

Mr. Arto Suominen: rwsep@ethionet.et

Ms. Sanna-Leena Rautanen: srautanen@worldbank.org

Contact persons: Heikki Wihuri: heiami@kolumbus.fi and Tapio S. Katko: tapio.katko@tut.fi

**Round-table panel II:
Water services management:
pasts and futures**

Friday 15th of June at 13.30 to 15.30 (Draft programme)

In many connections – such as the World Water Forum 2006 in Mexico and the World Water Development Report 2 in 2006 - it has been recognised that the biggest challenges in water and sewerage services and their management are largely related to effective water governance.

The objective of this panel is promote professional discussion on some of the key principles, practices and strategies related to the management and governance of water services (including sewerage and sanitation) in long-term perspectives. At the same time, through the two key papers and the shorter commentaries, the panel brings out some of the current development issues regarding these services. Furthermore, through these examples we wish to highlight the various ways in which pasts and alternative futures are highly interconnected.

Chair: Dr. Riku Vahala, Finnish Water and Waste Water Works Association,
Rapporteur: Dr. Pekka E. Pietilä

Tentative programme:

Key papers (20 min each)

Mr. David Hall & Mr. Emanuele Lobina, University of Greenwich, PSIRU

“Undercurrents of empire - the colonial sources of water privatization” (full paper, 20 min)

Mr. Jukka Piekkari, Managing director, Helsinki Water

“Making a Difference: Strategic Planning in a Water Utility” (full paper, 20 min)

Shorter commentaries (tentative topics) based on case cities (10 min. each)

Mr. Pertti Reinikainen, Managing director, Vaasa Water

“Views on the current Finnish doctrines on water services management in long-term perspectives”

Mr. Olli Keski-Saari, Managing director, Lappavesi Ltd.

“Diversity in water and wastewater services management in Lapua and Seinäjoki regions”

Dr. Osmo Seppälä, Managing director, Espoo Water

“Futures thinking in water services management”

After the formal presentations a panel will be held. This will be joined by the paper presentors and the following experts: Mr. Paavo Taipale, Finnish Association of Local Authorities; Mr. Vesa Ranta-Pere, Kemwater Services.

We also wish to invite distinguished experts of the water services field to join the conference and the panel at least for this one day.

Contact persons: jarmo.hukka@tut.fi and tapio.katko@tut.fi

Round-table panel III: Water history in Israel-Palestine in the 20th Century

Participants

Eran Feitelson, Department of Geography and Head, Federmann School of Public Policy and Government, The Hebrew University of Jerusalem

“The Three Eras of Israeli Water Policies”

Hassan Dweik, Palestinian co-director, IPSO

“Israeli-Palestinian Water and Environmental Cooperation: A Force for Peace or Conflict?”

Dan Bitan, Israeli co-director, Israeli Palestinian Science Organization (IPSO)

“The Issue of Water in the Debate on the Partition of Palestine in 1947”

Amer Marei and Mohammad al Shalaldeh, Al Quds University – East Jerusalem West Bank

“Legislation and Laws Relevant to Water Quality in Palestine in the Past Century”

Itay Fischhendler and Galit Cohen-Blankshtain

“Addressing Uncertainties in the Design of Mega Projects: The Case of the Dead Sea Canal”

Background

The area that currently comprises Israel, Palestine and the Kingdom of Jordan is small. Yet, its history is disproportionately rich. The shifts over time in water utilization and management thus can be clearly discerned in this region. Surprisingly, however, the water history of this region, and particularly in the past century, has received almost no scholarly attention. The purpose of this workshop is to initiate studies and discussion of the water history of this region, by local and international experts.

Abstract of Substance of Presentations

Three main actors operated in the water field in Israel-Palestine in the first half of the 20th century:

- 1 Villagers, operating traditional local systems
- 2 The government, first Ottoman and then British, which determined the institutional and legal setting
- 3 Modernist entrepreneurs—largely, though not solely, associated with the Zionist movement.

The interplay between these three actors can be compared with the interplay between similar actors in different parts of the world at the time.

After the establishment of Israel in 1948, two different systems evolved on the two sides of the armistice line. In Israel a modernist system was developed with a very strong hydrological imperative as its driving force. In the West Bank, then controlled by Jordan, a more traditional system remained, though modernist plans were drawn up, and regional projects initiated. Concurrently water-related conflicts erupted between Israel and her neighbors, most prominently over the headwater of the Jordan River. These led to the first informal agreement between the parties, the Johnston Accords.

By the mid-Sixties most of the water sources had been tapped. Thus, a new stage began in Israeli water history, a stage where the emphasis lay on optimizing the management of existing resources. Yet, this was overshadowed by the political conflict among sectors within Israel. Following the 1967 Six-Day War, Israel assumed control over the West Bank, thereby controlling all of the Mountain Aquifers and subsuming it within the Israeli water system.

Internal crises due to overutilization—precipitated by droughts—and the beginning of peace discussions in the early 1990s brought water issues back to the fore of the public discourse, both in the region, and within Israel. Yet, this discourse is very different from earlier discourses, as new issues and concerns have arisen in the meanwhile, most notably water-for-nature and water-quality issues.

In addition to major issues concerning supply, water quality, too, has been a source of disagreement. Various pieces of legislation have been enforced in Palestine over the past century—from the Ottoman era, through the British mandate and Jordanian control, to Israeli occupation and Palestinian Autonomy. Over time, concern over the quality of accessible water was gaining momentum with increased pressure on already limited water resources, leading to low-quality water and requiring its treatment to improve potability.

The Proposed Session

The proposed session, which follows a special planning workshop among Israelis and Palestinians held in Italy in December 2006, will include presentations by Dan Bitan, Hassan Dweik, Eran Feitelson, and Amer Marei. These speakers will offer an overview of history, as well as three more focused presentations of epochs and issues in this water history. These 15-20 minute talks are intended to serve as the starting point for an open discussion of the issues among the participant and the audience.

The organizers wish to illustrate the sorts of emphases that a water history of this troubled region should take, so as to form a common background for discussions of the current water issues in this area. The session will be chaired by Robert Varady. Drs. Bitan and Dweik are the co-directors for Israel and Palestine, respectively, of the Israeli Palestinian Science Organization.

**All talk and no action:
Will our future be filled with the inaction of the past?**

Rationale:

Each year the water community generates more information on how to better manage the world's water resources, and each year that information is received and then ignored. Languishing on bookshelves in universities, research funding bodies and donor agencies, very little of what is known is actually implemented. Why? What obstructs the transfer of knowledge from the page to the ground? Does the knowledge reach the decision-makers? Does it focus on the correct issues? Are the recommendations workable? Is more money needed? Unless the water community examines why so little knowledge is implemented, there is a danger that we can become irrelevant, reduced to producing material that is never used. The EU funded project, Aquastress, is examining how better to implement water policies to manage water stress in Europe and the Mediterranean region. Lessons from the project's experience will be used to examine the questions posed above. The IWhA 5th conference provides a rare opportunity for the water community to start this internal debate, thus, this proposal focuses on holding a debate rather than presentations.

Output:

A commentary in a water journal, including the speakers' positions.

Format:

Opening remarks outline the session's aims, followed by 3 speakers who will take a position to provoke debate. Each speaker will prepare a handout outlining their position (500 words). A lightly moderated discussion with the audience will follow. The discussion's minutes will be circulated afterwards by email, unless there is a consensus otherwise.

Session breakdown:

Introduction & welcome: (10 mins)

Dr Undala Alam, Cranfield University.

Open discussion: (1h 20)

Moderator: Dr Undala Alam.

Rapporteur: To be confirmed.

Session chair:

Dr Undala Alam, Cranfield University.

T: +44-1234-750111 x 3302; E: u.z.alam@cranfield.ac.uk

Undala Alam graduated in chemistry from Imperial College, but then did a masters in international politics from Leeds University. A PhD in political geography from Durham University followed, focusing on the negotiations leading to the 1960 Indus Waters Treaty between India and Pakistan. To better understand the negotiations, Undala also trained as a mediator. After completing her PhD in 1998, Undala worked in international development, focusing on water resource management. Between 2001-05, she worked simultaneously for UNDP and the World Bank and was responsible for coordinating multi-partner projects on international rivers. Since August 2005, Undala has been based at Cranfield University.

Speakers:

Prof. Eran Feitelson, The Hebrew University of Jerusalem

E: msfeitel@mscc.huji.ac.il

Eran Feitelson has long been active in water resources management, and published extensively on differing aspects of the topic, not least on groundwater management. He has worked in Israel and the USA, and is a well respected member of the international water community.

Dr Maria Manez, Osnabruck University

E: mmanez@usf.uos.de

Maria Manez brings a multi-disciplinary approach to water resources management which includes economics and geography. She has combined academic research with practical experience in international development having worked on World Bank funded projects in Latin America.

Ir. Henk Wolters, RIZA

E: h.a.wolters@riza.rws.minvenw.nl

Henk Wolters has a background in water engineering from Wageningen University, and combines it with an understanding of the social implications of water management. He is currently working for RIZA, the research and advisory body for the Directorate-General for Public Works and Water Management of the Dutch government.

The water and sanitation challenge in Africa: what's history got to do with it?

Thematic focus:

The challenge of managing water and sanitation in Africa is greater than ever. The population growth is still high, and the rate of urbanisation in Africa is greater than anywhere else in the world. While some African countries enjoy real economic growth and improving governance framework, Africa still has the highest proportion of poor people. It is widely accepted that adequate water and sanitation services and sustainable management of water resources are prerequisites for successful poverty reduction. To this end, UN's Millenium Development Goals (MDGs) and the goals from the Johannesburg World Summit in 2002 aims to reduce by half the proportion of people without access to adequate water and sanitation by 2015. However, Africa consistently shows the lowest levels of access to adequate water and sanitation. Furthermore, according to recent projections, most of Africa will be under a condition of water stress within 20 years. International aid organisations have focussed attention on Africa in recent years, and many African countries have also recently undergone public sector reforms for water and sanitation, often with a view to increase private sector involvement. African governments now hope to make headway towards the MDGs using new sector structures, notseldom based on models from the industrialised world. Historic experience from Europe and USA has sometimes been promoted as examples for learning for the low- and middle income countries. However, the history of water and sanitation in African countries themselves, is largely unmapped territory. So what evidence is there to support the prevailing tacit assumption that an adoption of imported institutions, organisation, technologies and knowledge is the best way of reaching the water-related MDGs? Is not the unique historic experience in African countries themselves more relevant for assessing the options for sustainable management and development of water and sanitation? How can African history be reconstructed in order to unveil structural deficiencies and opportunities, and hence provide a better understanding of problems and possible strategies to manage the challenges of today and tomorrow? In short: what is the role of history in Africa's current water challenges and policies? This is the topic for this proposed session.

This session will focus on the history of African water and sanitation policy and practice and put it into the context of contemporary challenges. We wish to discuss the impact of history on today's situation and its implications for sustainable management and development of water resources, water services and sanitation.

Papers proposed to this session:

Contributor

Title

Theme/geographic focus

J Appelblad*

Emerging Strategies in the deliverance of Water Services to the urban poor- the case of Kampala, Uganda

Urban water and sanitation / Uganda

* paper co-authored with D Nilsson

A Bohman

Framing the Water Challenge:

Institutional change within the water and sewerage sector in Ghana 1957 – 2005

Water and sanitation policy / Ghana

H Hoag

The Politics of Damming in Postcolonial Africa: The Case of Ghana's Volta River Project

Water resources and dams / Ghana

E Nyangeri Nyanchaga

The use of historical trends in the governance of water and sanitation services to predict the future service level: Kenyan perspective

Water and sanitation policy / Kenya

M Kjellen

Accepting Realities of Multiple Systems? Water Resale and Vending throughout Dar es Salaam's Water History

Tanzania

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From research to consultancy

Water in the modernization of everyday life in the 1950s Turku

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Keywords: everyday life, modern conveniences, swimming pool, the 1950s, water shortage, water supply

ABSTRACT

Modern conveniences such as water pipes, water closets, bathrooms, central heating, as well as indoor and outdoor swimming pools are nowadays self-evident in city life. It is almost impossible to think of modern dwelling and living without facilities that relate to water. We realise this especially if the water pipes of our apartment house are under repair.

If we look back to the 1950s in Turku or other cities in Finland, we find the situation quite different. Back then it was usual that homes had running cold water but the privy was in the backyard. The first water system in Turku had been established as early as in 1903 but it was a luxury of the few. Along with new housing construction projects, the system covered larger areas in the 1920s and 1930s. Water pipes and water closets were also installed in many old houses. During the reconstruction period after the WWII, the circumstances of everyday life began to change fundamentally. Firstly, it was a question of technical development, secondly, of its effects on everyday life. In my paper, I concentrate on the latter. What did running water and facilities related to water mean to the townspeople? How did they feel when they moved to the modern dwellings or when the swimming pools were opened?

Because of the enormous housing shortage after the WWII it was necessary to build new homes. Many old wooden buildings were demolished and the homes without modern facilities were replaced with homes in high-rise apartment buildings. Then the families got a chance to move into modern homes. Especially hot water, bathrooms, and laundry rooms facilitated women's lives. The outdoor swimming pool was welcomed but also heavily criticised because of its costs. However, the pool was very popular among the townspeople, especially among the children who had to spend their summer in town.

In spite of all good things, it now and then happened that summers were rainless and water pressure was not high enough in the upper storeys of the new buildings. This caused inconvenience to the inhabitants, and sometimes rationing of water was necessary. However, modern conveniences were not fairly distributed. Those who lived in the new housing areas in the suburbs were without water supply and sewage system; they had to fight for the urban infrastructure.

The new luxuries in the 1950s should be considered against the previous wartime, rationing, and shortcomings. The 1950s was a time of hope and progress. Housing comforts were part of the bigger whole; both materially and mentally, people were at the beginning of a new era. Water was an important part of the modernization process of everyday life.

Experiences of the development and implementation of rural sanitation strategy in Amhara region, Ethiopia

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ABSTRACT

The Amhara National Regional State has an area of about 170,752 square kilometers and a current population of approximately 19.5 million of which more than 16,150,000 (85 percent) live in rural areas. The Region is divided into 11 administrative zones where the zones are further divided into 140 woredas (Districts) and about 3418 kebeles.

An estimated 70 to 80 percent of health problems are due to infectious communicable diseases (fecal and water borne) and nutritional problems. Much of the urban and rural population has no accesses to safe water supply and sanitation facilities.

Some progress on latrine construction in the rural areas has been seen since 1995 where the latrine coverage was only less than 5.3 %. Many international agencies and non-governmental organizations have been working to improve sanitation by constructing latrines and toilets with subsidies like provisions of SanPlat at different rates. Among these organizations are RWSEP, UNICEF, CARE, CONCERN, EOC (Water Aid Ethiopia) are some among others working on WASH in the region.

The contribution of these stakeholders has shown incremental trend and the number of people accessed to latrine usage in the region (e.g. 12.9%, 2004, 23.5%, 2005, 40.2%, 2006). But even after a decade of such efforts it is difficult to find 100 % latrine coverage in all kebeles (Gotte) in the region. Success has generally been measured on the basis of the number of latrines constructed within a given period of time instead of the extent of its cleanliness, usage and sustainability.

The government of Ethiopia is not only striving to fulfill the Millennium Development Goal (MDG) but also have plans for a Universal Access Plan (UAP) for a 100% latrine coverage by year 2012 and has designed a national sanitation strategy and protocol for on-site sanitation. The Amhara Regional Health Bureau is also striving for 100% sanitation coverage through the Whole system approach of involving every person, organization, donors, NGOs etc. One of such organization that jointly pioneered the regional plan is the World Bank Water and Sanitation Program and the USAID Hygiene Improvement Project which aimed to at scale Hygiene and Sanitation with the principle of learning by doing. The main objective of the project is to organize and mobilize the community for a sustainable change in constructing a functional latrine with hand washing facilities by themselves and without any external subsidies.

Through this project a regional multi-stakeholder meeting has been organized which has come out with six action agendas. These action agendas are now being decentralized to the zones and woredas which will be followed with capacity building, situational analysis, and implementation through local government, community based organizations etc. involvement.

With such involvement of the National, regional and local governments; NGOs and Donors; and the community based organizations (CBOs) and individuals we hope to reach the Universal Access plan in Amhara on the target date.

Devastation of city Ocotepeque in 1934

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ABSTRACT

In 4: th of June 1934 a flash flood of River Marchala destroyed whole city of Ocotepeque in North Western Honduras. About 10.000 people died in this catastrophe.

The length of River Marchala is only 8.5 km and the basin area is about 12 km². How it is possible that the small river can destroy the whole city? During a tropical storm in 1934 a huge land slide occurred in the deep valley of River Marchala. Slopes are 40% or more. The land slide made a dam and a flood lake started to grow behind the dam. In 4:th of June 1934 the dam broke.

For the prevention of a new catastrophe and the installation of early warning system studies of River Marchala were started in 2006. Land slides continue and this increases erosion remarkably. Some first results of the studies will be presented.

Combination of land slides and heavy rains seems to be main reason for many natural catastrophes. Some examples can be found from Hurricane Mitch disasters in 1998 in Central America.

Aromatic herbal baths used in Medieval Azerbaijan

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Keywords: Azerbaijan, ethnopharmacology, ethnomedicine, herbal bath, aromatherapy, hydrotherapy.

ABSTRACT

To study the ancient recipes of herbal decoctions used in bathing in medieval Azerbaijan, 18 medieval manuscripts in Azeri, Ottoman Turkish, Arabic and Persian, were investigated for the first time.

These medieval sources contain information about more than 50 aromatic herbs that were used in the preparation of medicinal baths, including grape leavers (*Vitis vinifera* L.), chamomile (*Matricaria recutita* L.), pomegranate (*Punica granatum* L.), basil (*Ocimum basilicum*), anise (*Pimpinella anisum*), violet (*Viola sororia*), almond oil, garlic (*Allium sativum* L.) and barley (*Hordeum vulgare* L.).

Bathhouses in medieval and post-medieval Near East and Azerbaijan used fragrant substances in several ways, including: (1) Aromatic decoctions or infusions were added to the water in a bath, (2) Ointments containing aromatic herbal oils were applied to patient's bodies after or before bathing, (3) Fragrant fruits or perfumes were placed near a bathing person.

As a result of the present study, a number of forgotten medieval recipes have been revealed and deciphered. It has been established that aromatic baths were used to treat reproductive, urinary and intestinal disorders, skin diseases and allergies, stings of poisonous animals, damage of soft tissues, rheumatic and neuralgic pains, nervous and cardiovascular diseases, and more. Some of these recipes will be listed and discussed in the present paper.

A critical review of the EU Water Framework Directive

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Keywords: integrated control, river basin, management plans, recovery of costs

ABSTRACT

The Water Framework Directive (WFD) has been heralded as the most significant piece of water legislation to come out of the European Union in the last 20 year (Fairley et al., 2002). The WFD aims to introduce a strategic legislative framework designed to tie together the various strands of water policy and provide a more holistic and integrated approach to water management and conservation.

The most important aim of the directive is to protect aquatic environments. This will be done by setting and working towards environmental objectives defined to ensure that all waters achieve “good status”, and by taking steps to prevent the deterioration of waters. The directive also introduces a new “combined approach” to pollution control. In this respect the WFD differs from previous directives by taking into account the quantitative use of water through water management plans.

Another novelty in the WFD is the legal status of water as a natural resource that flows from place to place. Water and its different uses are defined as components of legal norms and objects of responsibilities. This is likely to cause various legal problems according to the different legal traditions in question. All the EU member countries should at least take into account the EU Commission’s concerns that water must be used in a systematically controlled way. The implication is that all European citizens should have equal access to safely managed water resources.

Where it exists in abundance as a freely available luxury product, water should be seen as an exception to the general need for planning and regulation. According to the rationale behind the WFD, the costs of water management should be covered by reasonable water prices. This in turn will promote the more sustainable use of water resources.

The WFD may in practice accentuate differences between citizens and companies in member countries with regard to their competitive positions or their property rights, even though it does not aim to regulate water as a commercial product, but instead as part of everyone’s common heritage that has to be duly protected and cherished.

It is interesting to analyse the implications of these factors. The EU legislators have not been able to eliminate significant features of national legal systems such as private ownership rights over waters, or the fact that water is sold in large quantities from one country to another.

If the WFD intends to prohibit trade in water, this would run against the “four freedoms” that underlie EU law. If the concept of “heritage” enables water molecules to be owned privately or by states, this would represent a step backwards in the development of environmental law, which has so far applied the principle that flowing water cannot be owned.

Dry feet, clean water 800 years of regional watermanagement by water boards in the Netherlands

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ABSTRACT

Water is critical to the Netherlands. One quarter of the country is below sea level and much of it has been reclaimed over centuries. The Dutch nationhood is over the centuries being formed by the response of its citizens to their often hostile aquatic environment. Regional water boards played a major part in this development. The water boards belong to the oldest representative governing bodies in Europe.

Management of land reclaimed from open water and of waterlogged areas started in the Middle Ages by local communities. The perennial threat of flood forced the feudal lords as early as the 11th century to offer semi free tenurial status to farmers prepared to colonize and settle these waterlogged lands. These farmers organized themselves in local communities to prevent further encroachment from the sea. Early dikes and drainage canals were constructed and maintained by local communities, with the village councils as key political organisations.

However vast areas of land were lost to a great number of floods between 900 and 1450. Protecting the settlements against these floods became ultimately too complicated to manage locally. To overcome these problems special regional water management authorities called water boards were created. They were separated from the general local government. The influence of the smallholder farmers of the local communities in the waterboards gradually declined because of changes in landownership due to commercialisation of the rural economy. The water boards were mainly governed by members of the aristocratic elite, who were often absentee landlords.

The water boards developed into prestigious, well managed, highly respected governing bodies because of their increasing ability to cope with floods and to improve drainage by better hydraulic structures and the introduction of windmills. Numerous polders (lowland areas with artificially maintained water levels and surrounded by drainage canals with embankments) were created.

The long period of 900 to 1500 in which vast areas of land were permanently lost, was over. The process was now put in reverse and although occasional setbacks occurred land reclamation has continued up to the 20th century.

In the second half of the 19th century the water boards were incorporated in the structure of the modern state and they became more democratic again. More categories of beneficiaries of good water management were represented in assemblies of the water boards.

The influence of central government increased over the years. Projects on a national scale (like the closing off and the partial reclamation of the Zuiderzee and construction of huge storm surge barriers in major rivers and estuaries) became the responsibility of the National Department for Public Works and Water Management.

Still the water boards had a role to play in the 20th century. With the emerging water pollution problems they were entrusted with the challenging task of water pollution control in addition to their traditional task of water quantity management.

For efficiency reasons the number of water boards has over the centuries decreased; many of them have merged into larger entities. In 1850 there were 3500 water boards, in 1950 still 2500. In 2004 there were only 37.

Their survival by adapting to changing circumstances during almost a thousand years and their contribution to the creation of the Netherlands makes the Dutch water boards interesting examples of decentralized water management. However, it might be difficult to transplant this model which was developed to suit one particular small country and its culture.

Water resources and rural development in arid lands, the history of qanats in Central Iran

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Key words: Water crisis, arid land, rural development, Qanats, Central Iran

ABSTRACT

The issue of water crisis associated with the rapid rural development as well as the global climatic change is a well known fact facing as a major challenge in populated arid lands. What is important in parts of central Iran, as a paradigm for developing areas in arid lands, is the revolutionary change in the method of groundwater harvesting. The traditional Qanats, which its history comes back to >2000 years and the shallow tube wells are replacing by the deep (up to 400 m) water wells, pumping large quantities of water from limited resources. The fall in water tables resulted in a drastic drop in the debit of Qanats and a remarkable change in the geomorphology of the desert borders, where these areas degraded by desertification at a significant expanding rate. The associated serious environmental problems forced rural populations to leave their home and immigrate toward larger cities. Several local projects were operated to improve water resources, but none was so effective because while the efficient management of the water demands is as important as the improvement of the water supply, it is essential to educate farmers how to use water in an economical and limited resource. This is essential for achieving a sustainable development in rural areas if the local cultures and traditional interest of farmers are considered. The big problem exists in the studied areas and probably other rural areas in arid lands. This study discuss the history of water in rural areas in arid lands in central Iran and highlights the past and future of Qanats, the greatest effort and achievement in ground-water utilization by ancient people in arid lands and desert borders.

Past and present can help build better future for the states sharing water resources (Israeli-Arab water conflict area)

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ABSTRACT

Worldwide water resources are unevenly distributed and they are generally scarce in arid and semi-arid zones such as the Middle East. Lack of growth, distrust as a consequence of poor relations, use of force to solve conflicts and inefficiencies management and use of water resources are the problems besetting water resources.

Israeli-Arabic in general and Israeli- Palestinian areas in particular are currently suffering from water scarcity which will explode within twenty years. If nothing is done, this scarcity will increase with time due to rapid population growth, drought, as well as global climate changes. With the expected population growth the gap will be around 37 percent in the Palestinian and 53 percent in Israeli areas by 2020. There is an urgent need to maintain a balance in water use between different parties in the area, to reduce water scarcity, as well as to bridge water gaps.

Like in many other areas also in the area of water conflict resolutions history is repeating itself. There are numerous cases from past but also present, which can give a useful lesson in solving the complex relationship between riparian parties in Israeli-Palestinian water conflict. These cases point to the benefits of strong cooperation between riparian parties, rejecting sovereignty over water resources, integrated water resources management, building of institutions and development of human resources. Only when these are accounted for then also technical means for generating additional water resources can be successfully implemented. These practices must not only alleviate current problems but also pre-empt future water shortages.

Past has shown that the United Nations often has a power to catalyst this process by forming international joint commissions and calling for international mediators to help resolve such conflicts. Harmonization of national regulations facilitates joint management of shared water resources. Harmonized national regulations cannot, however, replace an international agreement in the management of a shared aquifer or other trans-boundary water resources.

Studying positive results and failures of the past and present attempts to resolve similar water conflicts, finding the effective practices for given cultural, social and political environment and will and commitment to implement these are a key elements of water conflict resolution.

Water management paradigms in Iran: technical, social and ethical aspects

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Keywords: water scarcity, pre-modernity (tradition), industrial modernity, reflexive modernity

ABSTRACT

In Iran, water scarcity is one of the main problems threatening food security. The country is confronted with the challenge to continue the expansion of food production to meet future demand without negative effects on the environment. To illuminate the problems and perspectives of water management in Iran and comparable (semi-)arid countries, three paradigms should be distinguished: the pre-modern paradigm, the industrial modern paradigm, and the reflexive modern paradigm. The pre-modern water management paradigm can be characterised by its key technical system (the 'qanat' underground irrigation system), its main social institution (the 'buneh' cooperative organisation of agricultural production), and its ethical framework (Zoroastrianism and Islam). To some extent, the pre-modern paradigm has been more compatible with the ecological and social requirements of the country than the current paradigm of industrial modernity. This paradigm can be identified by the partial replacement of 'qanats' by deep well and large dams, the substitution of the 'buneh' by a system of smallholding, and the emergence of a mechanistic worldview with important ethical ramifications. Since the 1960s and 70s, industrial modernity has gradually given way to what has come to be known as 'reflexive modernity'. Recently, this turn can also be recognized in Iran. Here, the new paradigm is still in its first stage, and must be developed and conceptualized in terms of new technical systems of water management, of corresponding social institutions and of a new ethical framework that is sensitive to the specific features of the region. The traditional structures need to be revitalized and integrated with the structures of industrial modernity, in such a way that the benefits and advantages of both will be preserved as much as possible. We will present a sketch of what we consider to be the main contours of the new paradigm: a complementary system of traditional and modern methods of water provision, a participatory water resources management, and a 'post-mechanistic' ethical framework that encourages sustainable development through collective action and decision-making.

Ancient sustainable water management systems of Sri Lanka: lessons from past to the future

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Keywords: Cascades, Dry Zone, Sluice, Tank, Village headman

ABSTRACT

Sri Lanka has a long history of irrigation water management, based on reservoir storage system that is well known as one of wonders of the ancient world. It's irrigation history goes back to the time of earliest civilization of the country, to the 6th century BC and continually developed over a period of about 17 centuries, flourishing a hydraulic civilization.

The water storing, regulating, controlling and management systems, had been entirely based on an interconnected reservoir system designated as cascades which had been built in order to use water in a sustainable manner within a river basin context. The basic structures of these ancient water management systems are still being functioned in spite of many despites happened throughout the history, such as climate changes, social evolution, and collapse of hydraulic civilization. The concept of the sustainable water use was based on **not even a little water that comes from the rain must flow into the ocean without being useful to man**. To achieve this concept a sophisticated water management system had been developed tightly linking the small cascade tank systems with the large reservoir storages. This interconnection had two entities, (1) technically, physical set up of the systems and (2) socially, cultural adjustments of the people who used water for irrigation, drinking, sanitation and for all other domestic needs.

The present paper first attempts to highlight, the technical significance of the small reservoir (tanks) cascade system dealing with its overall physical setup. The paper then discusses the social aspect with regard to the utilization of water, dealing with the traditions, attitudes, knowledge and people's awareness on water. The paper attempts to highlight how the combination of technical setup of tank systems and social entities affected the ancient irrigation water management systems to be functioned for so long time to achieve the sustainability.

The paper finally put forwards what kind of concepts and technology could be drawn from the ancient systems to be adopted for the future water management strategies in the modern systems. The content of the paper is totally the outcome of researches carried out by the author himself, based on number of case studies undertaken in the Dry Zone of Sri Lanka.

The “common heritage”: a legal concept to combine past-present-future Example of water management

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Keys words: social values, global environment, water, heritage, environmental law

ABSTRACT

The main question of environmental concerns, from a legal point of view, is constituted by the concern of giving to each generation the right to make use and to profit of the planetary resources. This concern set an equal possibility of access to the resources and to their use. It means that the conditions of existence of the future generations should not be more unfavourable than those inherited from their predecessors. This gives another scope to the question. The right of the future generations is registered in all that deals with the environmental protection and the safeguarding of the natural resources. Conservation makes sense only from a temporal point of view; otherwise everything can be consumed and wasted in the present. However if water as common good is used not by a person but by a community, it is also a fundamental element of the environment in which humans live: water is at the same time the resource and support for the existence of other resources. It is likely to have international, national and local importance simultaneously and its management raises regional problems. In this way, it is included in the “common heritage”. Within this framework, the legal concept of “heritage” is applied by extension to the environment in order to mean that, appropriated or not, environment must be transmitted from generation to generation, indefinitely, as it was traditionally done from father to sons for private goods (grounds, constructions ...).

The legal analysis, that this communication proposes, gets the heritage and explores it as one of the legal means adapted to organize the awakening of the man who it belongs to a community and receives elements which must be preserved for the future generations. This conception highlights the potentialities of the concept in order to protect and promote water as a fundamental element of the life supporting systems on our planet.

The right to water - a human right?

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Keywords: human rights, water law, use of waters, water supply, order of priority

ABSTRACT

During the present decade, many international institutions and publicists have argued for the human right to water. The most authoritative source in this regard is General Comment No. 15 titled “The Right to Water” by the UN Committee on Economic, Social and Cultural Rights. The right to water is considered to include access to safe household water to meet basic human needs, not just water used to prevent death from dehydration and disease. It is based either on positive law or universal morality. Policy goals relating to water are also recalled. However, the human right to water remains controversial and many states have not yet taken up an official position on water.

In this presentation, I address two key questions relating to the discussion over the human right to water. Firstly, does the individual’s right to water, according to existing international law, meet the requirements to be considered as a human right? International law is considered to consist of international conventions, international custom and general principles of law. Secondly, how could we better satisfy basic human needs for water by developing legal tools?

International human rights conventions do not explicitly recognise the human right to water. Thus, the possible human right to water can only be inferred. On the other hand, deriving the human right to water from the human rights sources, which do not mention it, is susceptible to critique. Firstly, the right to water is a multidimensional right, which requires further definition and rethinking. Secondly, the presented inferences are not compatible with the principle of legal security. Although the human right to water is significantly supported, it does not appear to be a part international law in the strict sense.

The human rights-based approach to water rights focuses almost solely on the household use of water. In general, there is enough water to meet basic human needs, but not necessarily enough for varied uses. Today, agriculture uses an estimated 70 %, municipal 10 % and industry 20 % of the world’s used freshwater. Therefore, the implementation of the right to water in substantial legislation would require the prioritisation of household use over other uses of water. Thus, it could be valuable to focus more closely on the equal share of waters between natural and legal persons in addition to human rights law.

Water allocation is regulated by international and national water laws. International water law already indicates that if the use of the international or national water resources is essential to human life, it commands priority over other uses. Both international water law and human rights law support this conclusion. *De lege ferenda*, working on the basis of undisputable water rights could illustrate how we could alleviate the dreadful water shortage situation since human rights law may sometimes prove to be too ambiguous and far reaching for this purpose.

“For more and better water, choose pipes!” Considering the politics of water development on Kilimanjaro, 1945-1980

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Keywords: Water, Irrigation, Tanzania, Furrow, Pipeline, Kilimanjaro

ABSTRACT

This paper analyzes a significant transformation in the distribution of water resources on Mount Kilimanjaro, Tanzania. In 1967, the Government embarked on an extensive water development project known as the Rural Water Supply Program for Kilimanjaro, an ambitious venture aimed at providing “more and better water” to the mountain’s population of nearly 500,000. Though ostensibly conceived to provide a needed public service, and to improve public health and standards of living, the project also embodied a number of political objectives held not only by the newly independent government of the country, but also by its colonial predecessor. This paper contends that this initiative and others of the period of the same period were proposed to a large extent as a means of consolidating national control over water resources, of undermining local forms of political authority, and of building loyalty to the nation. It illuminates our understanding of colonial and post-colonial development by highlighting the striking continuities in projects from both periods, in terms of not only technology but also desired social and political outcomes. It indicates complexities in the politics of the post-colonial period, in terms of often-conflicting local, regional, and national development objectives. Lastly, it provides a vivid account of a struggle over the meaning of a vital natural resource, a struggle that continues to the present and promises to intensify in the future.

Cleansing of urban sewer systems by hydraulic flushing from mid-19th century to 2006: growth, decline and revival of a technique

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Keywords: automatic siphons, cleansing, urban drainage, flushing, sewer systems

ABSTRACT

Sewers systems were and are still affected by deposition of solids and sediments generating nuisances and operational difficulties. Various techniques and methods were invented to solve this problem. Among them, the hydraulic flushing technique was widely applied. The paper gives a short overview of the development and the evolution of hydraulic flushing since the second half of the 19th century, illustrated by examples of technologies invented and applied in different countries and contexts. Flushing tanks equipped with automatic siphons were probably the most used technique until the 2nd World War, with numerous types of devices and constructive arrangements. In the second half of the 20th century, this technique almost disappeared due to both technical and economic factors. But new constraints and considerations contributed to the re-emergence of modified flushing techniques since the 1990s with new perspectives and approaches.

The twists and turns of water management in Berlin and London

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Keywords: public management, private sector, contests

ABSTRACT

The governance of water in the EU has been transformed through processes of commercialization, privatization, liberalization, internationalization and increased environmental regulation. This paper examines the realities of water privatization in two European capitals, Berlin and London, tracing the experiences of each under very different models of private sector involvement with full privatization in London and partial privatization in Berlin. In doing so it reveals the inherent contradictions and continuing controversies surrounding these different forms of private sector involvement in water management.

Within this context of shifting organizations and logics of water management, we consider the realities of water privatization in two European capitals, Berlin and London. Placing our study in historical context, we show that water management in both cities, as across Europe, has taken many forms, fluctuating between different forms of public and private ownership and that private sector involvement should not be seen as a new development. For example, in both cities we see some public dissatisfaction with private sector ownership and performance, whilst also seeing private sector frustration with the regulatory and political contexts within which they must operate. As a result there is a sense that actors in the water sector, from consumers, through regulators and politicians to private companies, are left dissatisfied with the practices and logics of contemporary water governance structures. This raises questions over the long-term stability of present forms of private sector involvement in European water management.

Management of water channels: some reflections on colonial projects and their objectives

Ujjayan Bhattacharya

ABSTRACT

The paper aims at charting the career of a state as a centralized power in its role as key decision maker, and perhaps the only one, in the management of water channels. In attempting to describe this role, I also wish to point out that in the early period of colonial British rule in India water resources became a part of public property in an institutionalized manner, under the management of the state, directly, as distinct from common resource management that had been practiced earlier. Common resource management, in the pre-colonial period, was a shared responsibility, in which the state had indirect control, and agencies like the zamindaris were involved.

The colonial state had to confront the difficult question of managing ungovernable water channels quite early in its history. In fact it was in the same year, 1765, when they received their formal mandate to administer Bengal's revenues that they had to make a beginning in this business of water channel management.

This was not, probably, a unique event in history. Thucydides wrote that water was a constant cause for fights between Tegeans and Mantineans because of the "harm it does to the country into which it flows", and how Agis II the King of Sparta planned to make the enemy come down from the hill to stop him diverting water and so fight a battle on the level ground.¹ In our country we have the instance of the historic conflict between the Deccan Sultanates and Vijaynagar kingdoms over the control of water resources in Raichur Doab in the sixteenth century.

It can be argued that, states, in every period of history, had to encounter the question of managing water resources, as an expediency, and often encountering its baneful effects rather than utilizing its felicitous ones, even when it was not consciously engaged in any project of creating a tight structure to establish "a successful hydraulic culture", or, in other words of creating a "centralized administration in control of the distribution of water" and "in complete control of agricultural activity".²

¹ *The Complete Writings of Thucydides: The Peloponnesian War* ed. and trans. John H. Finley, pp.320-323.

² C.T. Smith (1969) 'The drainage, basin as an historical basis for human activity', in R.J. Chorley (ed.) *Water, Earth and Man*. Methuen, London, p.108. Smith summarizes Karl Wittfogel in these terms, Malcolm Newsoms.

Medieval water supply systems used at Daulatabad fort, India

Charu Bhavsar, Pradeep Bhalge

ABSTRACT

Indian civilization is one of the oldest civilizations in the world. It has contributed a large number of aspects such as religion, culture, philosophy, technology, water harvesting, and water management. Several periods of prosperity are quite discernible in the history of India. Numerous documentary and field evidences which attest to the existing water systems which in turn were based on well conceived planning and regulation, are extant in different part of India. The method of water development of respective periods have long been closely linked to the Indian climate, social fabric, and living style. The recently carried out exercise by Maharashtra Water & Irrigation Commission has brought to the fore the possibility of unearthing countless guiding principals through that data that may prove useful in the contest of structures being conceived in the new environment of India even today. History shows that, though under the dynastic ruler of those days, people lived happily. However owing to the neglect, innumerable structures and an invaluable stock of literary and documentary information pertain thereto are gradually being pushed on the verge of extinction. It is necessary to get all this preserved as a valuable historical heritage. The Medieval water supply system used at Daulatabad fort [India] is an inspiring example for the water harvesting experts. It gives the guidelines for How to manage the available water resources effectively? The water supply system used at Daulatabad can be said as one of the best examples in the world. The details of the scheme are discussed in this paper. Daulatabad fort is situated at 15 km away from the world famous Ellora caves. The town is known for its medieval hill-cum land fort. It is most significant of all forts in India. This paper illustrates the various schemes of water supply, which were implemented during the different phases at Daulatbad fort. An attempt has been made to gauge the feasibility of water supply schemes of medieval Daulatabad with modern principals of engineering.

Sustainable water management in Norway for a hundred years: the industrial area Odda - Tyssedal as a case study

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Keywords: Hydropower development, power intensive industry, Protection Plan for River Systems, national park

ABSTRACT

With 4000 watercourses and 250 000 lakes Norway is a water nation. Norway is also a hydropower nation. Hydropower development began towards the end of the 19th century. During the first decades of the 20th century power intensive industry turned Norway into an industrial nation. Industrial towns like Odda - Tyssedal, Ålvik, and Rjukan were established. Electricity transmission technology lagged behind production technology, which explains why industry had to be located close to a power source. In the years 1906-1917 foreign investments in hydropower led to concession laws which ensured reversion of ownership to the state after a period of time. These laws ensured that the government could control, and in the long run direct hydropower development in the country. Consequently by 2004 public power plants constituted 88 percent of the production capacity. In the years 1945 to 1980 hydropower production increased from 11, 0 TWh to 89,7 TWh. In the 1960s the pace of development was so fast that if any watercourse nature was to be preserved it had to be preserved quickly. The result was the first Protection Plan for River Systems in 1973. The plan included 95 watercourses. The Protection plan was expanded in 1980, 1986, 1994, and in 2005. Today 387 watercourses are protected against hydropower development.

Norwegian water resource management is seen as unique in an international context. In this paper we are going to study hydropower development and the conservation of watercourses, focusing on the industrial area Odda - Tyssedal in West Norway. We will briefly look at the significance of hydropower in light of industrial production until 1930. The cyanamide plant in Odda was part of the breakthrough of the international nitrogen fertiliser industry. In connection with work on the Protection Plan in the 1960s and 1970s the municipal council in Odda ended up being in favour of protecting a large watercourse. During deliberations in parliament a watercourse nearby was also proposed protected, contrary to NVE's (Norwegian Water Resources and Energy Directorate) recommendations. We are going to look at the various points of view presented at the time. When ownership of the power plants reverted to the state, the power company that produces electricity for the industry in Odda – Tyssedal, applied for permission to develop local watercourses to ensure the industry continued control over its own power supply. In 2005 the industry's need for electricity came into conflict with plans to establish Folgefonna National Park. We are going to have a look at the debate that then ensued.

In this paper we are going to show that hydropower development in the early 1900s provided the foundation for industry of great international significance. The necessity of curtailing hydropower development in order to preserve some of the characteristic watercourse nature in West Norway was expressed in the 1973 Protection Plan for River Systems. In 2005 the needs of the industry were set aside in favour of conservation. We regard Odda – Tyssedal as documenting in miniature Norwegian water resource management over a hundred years, providing a unique opportunity for up-close study. It is this micro-level approach that is new and noteworthy about our study. The sources are newspaper articles, international literature about the nitrogen industry, reports and documents from company archives, as well as studies made in connection with the Protection Plan, and impact analyses.

The constitution of “techno-nature”: a few remarks about the South African experience

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ABSTRACT

South Africa has one of the most complex system of water transfers in the world, which forms a close-knit network of rivers, canals, tunnels and dams where “natural” and “artificial” dynamics cannot easily be perceived. This system has been described as “techno nature” or “hybrid” by scholars in different spatial and historical contexts (Swyngedouw, 1999, 2005, Castree 1995).

This presentation will focus on the constitution of the “techno-nature”, or, in other words, the process of hybridation, as it is described in B. Latour’s *L’espoir de Pandore*. Based on Latour’s theoretical framework, I will discuss three assumptions:

Firstly, I will demonstrate that the constitution of techno-nature began long before Apartheid. The first IBT projects were drawn in the middle of the 19th century, and major dams were “scientifically” planned between the 1920s and the 1940s. The influence of the “Segregation era” (1910-1948) water policies, at least during the first years of Apartheid, is thus undeniable. A closer attention to the process of hybridation can put a new light on South African water history.

My second point will show that the process of hybridation is not fully understandable without taking into account the reverse process of “purification”, i.e., exclusion of the social and political networks that produced the “techno-nature”. The political implications of dams and transfers were obliterated, as well as the epistemological foundations of hydrological knowledge. In a sense, dams and canals were “naturalized” in the discourses when “nature” was totally harnessed by technology in the facts.

Finally this presentation will study the implications of this twin process of “hybridation and purification” on water management in the new South Africa.

Inventing a paradigm of piped water: the evolution of urban water concessions on the European continent, 1800-1970

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ABSTRACT

European foundries master the art of mass-producing cast iron pipes in the early 1800s (Cast Iron Soil Pipe Institute 2006:1). Slow sand filters, buried pipes with bell and spigot joints, steam powered pumps, and water towers make for a universally applicable technology for urban water supply. Piped water systems enjoy a long service life and modest operational costs but require high initial outlays of capital. Also, pipe laying raises complex right-of-way issues (Meidinger 1980). Around 1850 it is by no means certain that buried water infrastructure can hold its own against contending modes of urban water supply. Cost-wise it certainly cannot compete against local water sources such as shallow wells and canals. By 1900 however, piped supply is establishing itself as the dominant source of domestic water in European and North American cities. Seventy years on, piped networks are the sole source of urban domestic water.ⁱ A parallel network of buried sewers carries the large volumes of piped water away from urban homes. How do piped water and waste technologies come to dominate domestic water regimes in European and North American cities? An early literature attributed the rise of urban piped water and sewerage to an unfolding understanding of the nature of waterborne disease (Baker 1949). Subsequent investigations by urban environment historians show that public health concerns play a minor role only in early 19th century decisions to embrace piped water infrastructure (Juuti and Katko, 2005; Millward 2004; Tarr et al. 1984; Troesken and Geddes 2003). The introduction of piped water supply, in enabling householders to install waterborne waste removal systems, may arguably even have aggravated waterborne disease (Tarr et al. 1984).ⁱⁱ Urban environment historians place the rise of piped water against a background of rapid industrial and population growth in European and North American towns. The environmental stress accompanying 19th century industrialisation triggers a crisis of urban water and waste that literally overwhelms city administrations (Tarr 1996). National and state governments respond by, late in the 19th century, enacting laws and regulations that place responsibility for solving the crisis in urban public health on the shoulders of municipal administrations. City administrations respond by committing to large-scale and centralised technologies for handling urban water and waste. Much of the research published in English focuses, rather unsurprisingly, on the United States and Britain. This article attempts to complement our understanding of the emergence of the piped water paradigm with evidence from the European continent. Here, as elsewhere, waterworks are pioneered by private entrepreneurs under municipal concession contracts. Early concessions confer a limited degree of market power to concessionaires. In most cases the concession amounts to no more than a permit to bury piped systems in municipal soil. Gradually waterworks concessions grow in scope. The public health legislation underlying these arrangements provides concessionaires with a virtual monopoly on domestic water supply in the city. The next two sections sketch the development of piped water and sewerage technologies and the increasing involvement of municipalities with piped supply. Section four turns to the central argument. I show how the deepening commitment of municipal administrations to piped water occasions a shift in the legal brief under which concessionaires operate and the consequences this has for domestic water provision in the city. The final section summarises key points.

The history of urban water services in Rio de Janeiro, Brazil: an analysis of the evolution of the concepts on sanitation

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Keywords: sanitation, water services, urban environment, urban history

ABSTRACT

The history of the systems of water supply and sewerage in Rio de Janeiro began in the mid 1800's, when private -- mostly British -- companies started operating public services. In 1876, water supply, which aimed at individual distribution, was run by the state, whereas sewerage was run by a private company, which had been created in 1857 by the association of British and Brazilian capital, with the concession of the monarchical national government. Rio was thus one of the few cases in Brazil where the water supply was run by a public utility since its very beginning, in contrast to the majority of the other cities, where services were firstly installed by private capital. One of the main reasons for direct state intervention was the rapid growth of the urban population and the sanitary problems associated to it, such as cholera and smallpox, which threatened the whole of the population, irrespective of social class. In the last decades of the XIX and beginning of the XX century, two co-existing notions of sanitation are identifiable. The first notion, still guided by the medical fields, is associated to the control of diseases originated from environmental conditions, within a concept of public health. The second meaning was generalized by polytechnic engineers and corresponded to the idea of preparing the space for city expansion, filling up flood areas, channeling rivers, controlling landfills and eliminating risk areas like wetlands and ponds, which due to environmental conditions were potential sources of epidemics. By the mid 1950's, a new concept of sanitation, designated "basic sanitation," arises, and has as its specialists, the sanitary engineers. Recently, in the 1990's, a new meaning linked to the idea of environmental quality has arisen: the concept of environmental sanitation. In this paper, focusing on the example of Rio de Janeiro, the historical evolution of these concepts is thus traced. The difficulties the actors of the water sector face to adopt the new concept of environmental sanitation, when conceiving and managing related infrastructures, are also analyzed.

Perception patterns of water-power use in medieval Arabic treatises

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Keywords: water-power, water-mills, hydraulic imagery, Arab technology, marvellous devices

ABSTRACT

The use of water-power to drive water-mills can be traced in several medieval Arabic treatises. The historical sources considered here belong to several *genres* of the Arabic grammarology: geography, cosmography, historiography, as well as works concerning world marvels. The patterns of perceiving water-power and of describing its use in hydraulic devices range from reports about milling output in terms of day-production of meal or flour up to impressive accounts about marvellous machines with the features of a perpetuum mobile. The presentation proposes an interpretation of the perception patterns on the basis of the specific socioeconomic context of the periods considered and of the role of the literary traditions involved through our sources.

Eyesore or ornament: a brief history of Jackson Creek

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Keywords: jackson creek, history, peterborough, water

ABSTRACT

Jackson Creek is a small watercourse located in Peterborough, Ontario, Canada that has played a vital role in the development of the City and continues to influence urban form as it flows through the downtown core. For nearly two centuries, Jackson Creek has been considered both an “eyesore and an ornament” to the City of Peterborough . This paper takes the reader on a tour of the Jackson Creek Watershed that spans over 100 kilometers and 200 years and explores the different perspectives and values that have been placed on the creek.

Local finance and technology: why water supply was not municipalised in nineteenth-century Lisbon?

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Keywords: utilities, water supply, municipalisation, municipal finance, Portugal

ABSTRACT

From the beginning of the modern water supply system in Lisbon, in 1858, and until 1974, waterworks in the Portuguese capital city were run by a private company. This long term prevalence of private management did not imply the absence of disputes over the conditions and quality regarding water supply.

This paper tries to identify the motives behind this recurrent conflict, as well as the moments when it breaks out. The reasons for the absence of municipalisation - although strongly supported by the city council - will be identified and discussed. A complex web of motives emerges as an explanation for the lack of municipalisation. However, financial and technological reasons associated with the introduction of water-carriage system of waste removal are presented as the main reasons preventing municipalisation in late nineteenth-century Lisbon.

Rivers as territorial boundaries and links between nations

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ABSTRACT

Rivers are one of the most usual natural boundaries between nations, and there are examples going back to centuries and millenia that select rivers as the natural division of the territories belonging to one or the other sovereign.

This feature of rivers have had different consequences. One of them is that they become international, and then not subject to the use of a nation, but of two or more. The other consequence, directly derived from the latter, is that riparian communities became connected by the common use of the river, and the interest of organizing there common interests launched the initial international organizations. International rivers were at the origin of those institutional entities, starting a practice of cooperation encouraged by the coincident interest in the administration of the watercourse.

Another consequence of the internationalized status of many rivers was the trend to resolve the differences that arouse from that situation in a negotiated manner or, if that mechanism was not successful, by means of a jurisdictional solution. There are a reach variety of cases both of international water institutions and of international awards on watercourses.

The importance of rivers for the development of international institutions is worth to be stressed and the different institutions and cases developed will be dealt with.

Lilian del Castillo-Laborde

Historical paradigms of quality of waters in Georgia (XX-XXIC.)

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Keywords: Quality of water-legislation- health promotion-history of medicine.

ABSTRACT

The most important resource for human exists and health promotion is water. The responsibility of Government of each country towards own population Health partially is reflection in legislative documentation about request of quality and safety of water. We had studied existing documentation about epidemiological and hygienic request of water, also the rules have acted in Georgia since beginning XX century up to present.

On the basis of the results of study we divided history quality request of water into 3 periods: soviet period (before 1990), period of transition (1990-2000), period of development (2001-up to present).

In Soviet period in Georgia a lot of normative documentation acted, but no one corresponded to international standards.

The changes of political arrangement and the existing foundation of the state governance at the end of XX century had the catastrophic consequences on all of the spheres in Georgia. In Georgia was acute institutional vacuum. Existing normative documentation was ineligible, but the new was not elaborated.

The new law on Water was adopted by the Georgian government in 1997. „Every citizen of Georgia is obliged to protect water from pollution and ensure water ration use” - says the law.

From 2001A lot of documentation was elaborated about epidemiological and hygienic norms of Water, for ex. „Water-Hygienic request for quality of central system” (2.1.4.001-02); „Water-Hygienic request for quality of noncentral system”(2.1.5.002-02); „ Superficial water’s sanitary norms and rules”(2.1.5.002-02); „The norms and rules for quality assurance” (2.3.2.004-02) and others.

Law about „Safety and quality of food” was adopted in 2005 and responsibility sent from Ministry of Health and Social Care to Ministry of Agriculture of Georgia, Department of Food Safety. Elaborated documentations are not in perfect accordance to guideline of EU and WHO.

**The nation-state and the rivers.
spaces and times on Dutch rivers, 1795-1825.**

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Keywords: rivers, netherlands, floods, dikes, governance

ABSTRACT

In 1795 French troops invaded the Netherlands, catapulting the Patriot party to power and initiating the formation of a unitary nation-state to replace the fragmented Dutch Republic. The new centralist state provided an historically unique opportunity to establish effective national water management. The main objects of national concern were the rivers and especially the frequent dike breaches and flooding along the Meuse and the branches of the Rhine. These not only caused loss of lives and property in the agrarian regions surrounding the rivers but even threatened the rich and urbanized provinces of Holland and Utrecht. During the 18th century several provinces had joined forces to redistribute flows of Rhine water among its various branches in the delta, chiefly for navigational reasons. This had shown the value of “national” water management and had created a new cohort of water “engineers” who saw the value of inter-provincial water management both as a means to domesticate rivers and as a medium of social mobility. The project, however, resulted in more water flowing through the northern Rhine branches which was good for navigation, but bad for flood control, especially along the vulnerable dikes protecting Holland and Utrecht. So there was even more impetus for establishing comprehensive river management. Traditionally, however, dike-building and management was a prerogative of local dike boards, supervised by the provinces. Dikes were the common property of riparian farmers organized into dike boards. These dike boards organized maintenance and repair by the local populations. As a system of organizing and financing inspections and upkeep it worked tolerably well. The problem for the nation-state and its new engineering elite was how to insert the “national interest” in this robust system of local flood control without compromising its viability.

This paper argues that the key to understanding how this was accomplished is to distinguish different “times” and “spaces” on the river. Thus, at times of emergency associated with high river stages and the breakup of river ice, the state engineers found dike boards and provinces more tolerant of their interference than at normal times. This enabled state engineers at such times to encapsulate the local boards in a system of river “correspondence” whereby messages were sent between watchposts along the rivers so that the state could achieve a panoptical view of the condition of the whole river from hour to hour. This created practical and real-time knowledge about a new longitudinal space on the river: i.e. the river as a coherent flow and problematic conduit for floodwaters. Other spaces existing in the rivers’ cross-sections were associated with different property regimes which were more or less impervious to the state’s interventions. Private property regimes existed behind the dikes and in the floodplains; the dikes were a kind of commons managed by dike boards in the name of the local landowners; finally the river channel was owned by the state. But floodplains were ambiguous because at times (in the winters) they were river beds. So the river channel and the floodplains were also entering wedges for state regulation of the rivers during normal times as it took shape after 1850.

‘The Mazwikadei Dam as an axis of life’: the hydropolitics of dam construction, human survival and economic development in post independent Zimbabwe

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ABSTRACT

This paper analyzes the exploitation as well as the significance of water catchment areas, especially dams, in Zimbabwe in relation to food security and sustainable economic development. Drawing its case study from the country’s third largest inland reservoir, the Mazwikadei dam, which lies on the Mukwadzi River near Banket, 144km northwest of the capital Harare, the paper asserts that since its inception in 1988 the dam became the axis of life for the surrounding communities. With a storage capacity of 343.779m³ and a surface area of over 2 300 hectares, the dam was constructed mainly to store water for irrigation and in the process it brought to the drought-prone Banket region the needed assurance and security for the desperate commercial farmers involved in grain, tobacco and livestock farming. Other than reducing competition as well as conflicts over the water resource among farmers and ensuring maximum food production, the dam also triggered the emergence of other economically viable activities such as commercial fisheries and crocodile farming. Likewise, the availability of water in the area also saw the development of a lucrative hoteling industry on the Mazwikadei peninsula where tourists and hoteliers visit the dam’s recreational park to the benefit of the country’s tourism industry as well as the economy. Downstream, the dam has also ensured a steady supply of water to other smaller farm water reservoirs and also the nearby Ayrshire Gold Mine which uses the water in the processing of its gold mineral before export. Furthermore, the paper explores the dam’s relevance in the context of the country’s current prevailing harsh economic conditions, where the poor majority in the area is acknowledging the dam’s importance by exploiting its downstream waters to fish and pan for the precious alluvial gold which they trade to illegal buyers for cash. With these developments, the paper therefore, contends that the construction of the Mazwikadei dam has proved to be a success story on the politics of harnessing the scarce water resource in Zimbabwe which has gone a long way in ensuring food security and economic development as well as survival for the communities that once competed for the resource in the Banket area and beyond.

Airs, waters and places: death and disease in eighteenth- and nineteenth-century Flanders

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ABSTRACT

Rural areas have invariably been associated with good health and urban areas with ill health. The data in this paper show that during the eighteenth century the population of the Flemish countryside was far from healthy. Especially the marshland parishes (the so-called Polders) witnessed very high death rates, moving beyond those of the large city of Ghent. Surprisingly, these were also the most affluent economic areas. Ecological circumstances, stagnant waters in particular, caused disease pathogens to multiply. Medical reports suggest that the high mortality was largely the result of an endemic disease called malaria vivax. Environmental efforts by local authorities inspired by the testimonies of medical practitioners made this disease gradually disappear. This conclusion brings a different perspective to the nineteenth-century mortality decline. While scholars in the debate on the mortality decline have mainly emphasized the role of urban powers in the nineteenth-century sanitation movement, this paper shows the importance of rural authorities even before the middle of the century.

Past and future collaborative management of New Zealand's North Island waters

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ABSTRACT

Water, waterways and their histories as sources of food is relevant in many parts of the globe. These relationships with communities play a major role in determining and influencing the history of the communities around its parameters. Histories of Maori tribes who provide what are termed "traditional foods" such as the kina (New Zealand sea-egg) from surrounding waters are cultural markers and symbols of tribal pride and sovereignty when providing hospitality to guests, Māori or otherwise.

This paper will focus on Māori/water relationships with the waterways of New Zealand's middle North Island, and the relevance of those links to the traditional food resources of local Māori communities, as noted in claims to the Waitangi Tribunal, a government agency dealing with issues linked to water regarding topical issues of guardianship, use and management.

It will be contrasted with requests by companies and institutions to central govt. as noted in Waitangi Tribunal reports and recommendations regarding use and management of such waters, and the effects of proposed use and outcomes on the economy and food resources of indigenous groups, and local communities as a whole.

The benefits of collaborative engagement by official organisations with Maori and local communities with regard to issues such as food resources within waterways will also be highlighted, as will the tensions created when joint discussions are not considered relevant in such issues.

Assessment of drinking water promotion in polluted environment

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Keywords: Water, sanitation, health, people involvement, local realities

ABSTRACT

The Republic of Benin is a small developing country situated in the West Africa. The people access to drinking water in order to improve their state of health is the main problem it is confronted with. Therefore, the Government set up water supply equipments through the National water company (SONEB) to provide people with services. That is the case of Pobe-Sakate-Ifangni cities in the South-East of the country. However, few years later the sanitary statistics show that people in this region are confronted with diseases such as diarrhoea, cholera, hepatitis, malaria. This situation does not come from the water quality but depends one:

- 1 The household use of water without any sanitation facility
- 2 The polluted environment in which people live and which is favourable to various contaminations and diseases

As solution to this situation, a project has been initiated by the SONEB to promote water business and develop awareness water use in a better way and protecting their environment. The project aims at people awareness on water-hygiene-environment-health interactions and constructing public and private sanitation facilities such as latrines and canals. Five years after the project implemented its actions, it is noticed that the region is still unhealthy. People continue to live in unhealthy conditions. The rate of diseases has even increased seriously and the number of new subscribers to the water network did not increase. It is clear that the expected results of the project are not reached.

The evaluation investigation indicated that the main reason of the project failure is related to the applied methodology and the technology used in terms of sanitation: people who benefited from the project were not associated to its activities as much as it should be and the socio-cultural and economical realities of the region were not correctly taken into account

As results, the project is considered as a foreign initiative and its activities were neglected by the beneficiaries. To be successful, it would be important that the project focused on the following areas of action driven:

- The awareness programme must be developed simultaneously with the equipments setting;
- People should be associated in the all project phases: identification, conception, technology to be used, implementation and evaluation;
- Local realities such as socio-cultural, historical and economical of the region must be taking into account as basic data.

Historic studies as a method to develop relevant strategies

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ABSTRACT

To connect the past to the future is instructive and challenging for the present. It may be tempting, though, to paint the past in dull colours, while the future is in bright. Such descriptions run the risk of preventing us from learning from actual past experiences. Are we then better off without visions? Not necessarily, but we need to ask – vision for whom? – in order to address the issue of strategies for a sustainable future.

This paper catapults from the water and sanitation situation in East Africa in the 1970s and takes a look at the visions entertained by authorities at the time. How did they define the roots of prevailing problems in the sanitation and water sectors? The paper then moves on to scrutinize some achievements in the period 1900 to 1960, and how they relate to the above-mentioned problem descriptions. The following 30 years of development of sanitation and water is outlined to be compared with the visions held at around 1970. Two important aspects come to the fore in these comparisons: the impact of a rapid population growth and the swift urbanisation, none of which was incorporated in the strategies to achieve the visions.

The knowledge gained from a comparison between visions and achievements lay the foundation for an improved understanding of the new vision of Millennium Development Goals for the sector from 2002. For those who will write the history in the year 2025 other factors than population patterns may come to the fore. However, the world's urban population is expected to grow from 3 billion in the year 2000 to 4 or 5 billion by 2025. Such a rapid urbanisation is anticipated to strain physical and economic resources, and thereby allows for unconventional and resource-saving and re-circulating solutions.

Two scenarios will be described which affect the capacities of various stakeholders in the sanitation and water sectors: (i) continued growth and urbanisation vs (ii) 'normal' growth level, but rapid urbanisation. Vision for the future may help to get our priorities right, but only if we simultaneously learn from history. Part of the scenarios will deal with the human capacity to tackle unprecedented challenges in the 21st century.

**The Office Régional de Mise en Valeur du Haouz Archives:
Testimonies of modern irrigation introduction in the twentieth century Morocco**

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Keywords: Archives, Morocco, irrigation, engineer, management, agriculture

ABSTRACT

The aim of this paper is to recount the different steps of my historical approach in building up my research related with accessing the ORMVAH data. First I will list the current bibliography available on the irrigation history in Morocco, and then I will place my specific subject in the scientific and technical context required for the “modernization” of twentieth century Morocco. Next, I will review the ORMVAH data mentioned showing why they are valuable resources for researchers both in history as in social subjects interested in the development of twentieth century Morocco. Finally I will end this paper by indicating new research ideas following the preliminary work on the ORMVAH and some recommendations about how to value them.

Integration of water supply, sanitation and hygiene education in Tanzania

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Keywords: Integration; Water Supply; Sanitation; Hygiene Education.

ABSTRACT

Safe drinking water and adequate sanitation have more impact on human welfare. Most residents of developing countries had limited supplies of high-quality water available at the turn of the tap and human and household wastes are not removed quickly from their homes and neighbourhood.

Inadequate drinking water supplies and sanitation facilities can have devastating impacts on mortality, morbidity and the economy. Water related diseases and illnesses are responsible for the deaths of most of the 5 million children under five who die annually in Africa, which includes Tanzania. Guinea worm, and schistosomiasis, parasitic diseases propagated by poor sanitation and unsafe water supplies are often painful and debilitating.

Developing countries face the additional task of providing all of their people with the minimum supplies of high quality water that are essential to good health and important to economic development. This task is formidable as 81 percent of the people in the developing world lack access to safe drinking water, and 44 percent lack sanitation facilities.

Therefore, inadequacy of basic water and sanitation facilities in Tanzania and their importance to human welfare and sustained development make the integration of water supply, sanitation and hygiene education of paramount importance/priority. Lack of access to safe water, sanitation and hygiene education is one of the root causes of poverty as it is the poor (especially women and children) who suffer most due to poor living conditions, diseases and foregone opportunities. Hygiene education greatly improves the health impact of water and sanitation interventions, whereas providing water alone has minimum impact, which has been the case for developing countries.

In order to improve the health and conditions of people in the rural areas emphasis should be placed on integrating water supply and sanitation services and hygiene education.

From fractions to holistic views and collaboration – three decades of environmental engineering education at TAMK, Finland

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ABSTRACT

All engineering schools and programmes have one thing in common: They have been founded and created to provide skilled and well-schooled technical experts to meet the demands of the raising economies of the society. The programmes have always been modified by the local, national and in recent times in ever increasing manner by global developments. In many cases engineering education has been the forerunner of these trends. Global issues, especially water management issues have in study curricula for decades. Therefore the development of environmental education in engineering provides a fascinating target for more detailed studies since it also reveals the history of the industrial and societal development.

Which have been those factors that during the last 30 years made the few obligatory courses offered for students grow into full size study programmes are discussed in this paper in more detail. How the concepts of sustainability and environmental awareness were introduced to all engineering education will also be looked at with an emphasis in the local development from the point of view of the City of Tampere, Finland. This is interesting since, the strategy of the City of Tampere is based on sustainable development. Its four dimensions - social, economical, ecological and cultural - are all considered when making decisions for developing the city. One key issue constantly in mind is the future of enterprises in the region and their activities elsewhere. The City of Tampere, in collaboration with regional and national authorities, has been developing the main technological clusters in the region for several years already. It is time to start development in fields of expertise and know-how that show obvious potential but nevertheless have not as yet formed a cluster. One such field is environmental technology. Thus this paper also describes briefly the challenges of the future in the form of on-going collaboration between the Tampere Polytechnic University of Applied Sciences, the Tampere University of Technology and the EcoFellows Ltd. a company owned by the City of Tampere. The aim of the project is to develop a collaboration between enterprises in the field of environmental technology and educational institutions in the region, in order to provide the companies with young experts equipped with the best qualifications, as well as to update the knowledge of the people already working in the companies.

Household water supply, water rights and institutional change in Northern Ghana

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ABSTRACT

Household water is not only domestic water understood in the narrow sense as water for health and hygiene but also includes water for productive uses, be it for self-subsistence, or for the generation of non-farm income. Local water rights regulate ownership, access and power over water sources. They are robust institutions and may also adapt to changes in their natural, socio-cultural and political environment. In rural Northern Ghana, it is changing hydrological conditions, missionary activities, the work of several NGOs and donors, as well as colonial and several post-colonial drinking water policies, which showed impact on household water supply and local water rights. Current international drinking water policy dictates communal management of improved rural water supply facilities, such as hand pump fitted boreholes, to guarantee their technical sustainability and better access to water. Ghana has adopted and implemented this approach countrywide in its National Community Water and Sanitation Program (NCWSP) since the mid 1990s. But some concepts, which the NCWSP policy suggests, contradict both former local water right regime and local perceptions of water. Water user communities are challenged to balance and deal with project legislation and hand pump management manuals deriving from water policy, as well as with socio-cultural norms, ecological circumstances and practical needs, which all embody divergent management priorities and call for different norms applied in such a management practice.

How have household water supply and water rights changed over the past 100 years? How are both subjects interwoven with changes in natural, socio-cultural and political environment? And what are the consequences for the access to water and local water allocation practices?

The paper suggests that rural household water provision was rather untouched by colonial and early post-colonial water policies and that only the establishment of the Catholic mission in 1965 was the beginning of crucial changes in household water supply and management. Even though improved water supply was only its side effect, it enhanced the mission's attempts to gain foothold in the local community; it had an impact on the natural environment and ensured a key position of the mission in subsequent village development projects and water management. The NCWSP led to changes in the local household management regime. The formal membership in bounded user communities was introduced; members hold a monopoly on ownership, access and power over the water facility. The regular payment of money for rural water supply was extended to all regions of the country. Water user communities got encouraged to sanction non-payment by the exclusion from access. But 'crafted' institutions were negotiated on local level to balance contradictions between management manuals and the former water right regime; non-members of formal user communities may obtain only limited use rights. Payments were conceptualised as maintenance fees and not as water tariffs; additional rules and the close linkage of ownership and use rights prevent the exclusion of users due to non-payment. Despite the new conceptual design and diversification of water rights, water allocation practice does not show major changes but rather depends on non-normative factors.

Water and oil wars: evidence so far

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ABSTRACT

Much has been said in the last twenty years or so about the coming water wars in the Middle East. Yet none have been forthcoming and, as this paper argues, while they cannot be excluded, do not seem likely in the foreseeable future. What we witnessed instead were two major “oil wars” in 1991 and 2003, both embroiling among others, Iraq and the United States. True, factors other than oil might have abetted the breakout of hostilities, a few would deny, however, that a key motivation was securing access to this strategic energy commodity of the gulf region which, together with Iran, sits atop about two-thirds of world reserves. Why then water, which is just as scarce and as vital as oil, did not precipitate violent confrontations, and conflicts over its allocation among riparian states remained confined to the diplomatic arena, verbal sanctions, and indirect pressure? This is the question that the paper seeks to answer. It contends that environmental determinism, the dominant explanation for violent conflicts over resources, is terribly inadequate. Other mediating factors must be taken into account. These factors include the geopolitical significance of the resource-- that is whether it is of regional or of global interest-- especially whether it is salient for major world powers; the political and military balance among the disputants and their absolute capabilities; the perception of whether going to war would secure the desired access; the ability of countries to find substitutes for the resource’s product (in our case energy and food); and other contingent factors unique to the context at hand. One of the conclusions of the paper is that the access of states to natural resources may be better safeguarded by building alliances with the source-states than by waging war. The paper anchors its claims in the discourse pertaining to the Gulf wars and the hydrogeopolitics of the Euphrates-Tigris, Jordan, and Nile basins. I consult selectively the conceptual and empirical literature on environmental conflicts and security, including the work of Thomas Homer-Dixon and researchers affiliated with World Watch Institute, as well as their critics. Works on the politics of international watercourses, such as John Waterbury’s *Hydrogeopolitics of the Nile Valley*, provide major reference on water conflict. The analysis is also based on recent books and articles on American foreign policy, including Rashid Khalidi’s *Resurrecting Empire: Western Footprints and America’s Perilous Path in the Middle East*. Finally, factual information and arguments are augmented by reports in the international media.

Water culture in Iranian civilization, by looking at ancient hydro-structures

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Keywords: ancient Iran, hydro-structures, Dariyoon canal, diversion weir, regulating dam,
Chogazanbil water treatment system

ABSTRACT

The Iranian from the old times, have found out the water value and respected it. Iran geographic situation, lack of precipitation and its non-conformity of time and location over the country have caused plenty of improvements in technology of access to water through digging Qanats (infiltration gallery) and wells, storage of water behind the dams and construction of diversion weirs. These hydro-structures of which some still exist and date back to 2500 years ago are indicative of the knowledge and skill of the Iranian in construction of structures for storage, transmission and treatment of water. Hand-made water transmission channels, specially in south of Iran, such as “Daryoun” channel with 2500 years ancientness; and bridge-weirs such as “Mizan”, “Khak” and “Shadervan” from the time of Sassanian dynasty (226-652), and “Dara” weir from the time of the Achaemenian dynasty (550-330 B.C) are all some examples of tens of Iranian hydro-structures which are located only in present province of “Khouzestan”. Water treatment plant of “Chogha Zambil”, beside ancient “Chogha Zambil ziggurat”, is also considered as the oldest one in the world and dates back to 3250 years ago. Iranian scientists have focused on different aspects of hydrology such as hydrology cycle, groundwater movement, wind, storm, tornados, vaporization, sun shine effect, and some phenomena such as tide flow and waves in seas and oceans.

In this paper, water culture in the ancient civilization of Iran and some of the historical hydro-structures has been described.

Governance of transboundary water resources: the power and limits of environmental NGOs.

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ABSTRACT

The goal of this paper is to contribute to a better understanding of the long-term development efforts to manage interactions between society and the water in semi-arid regions. The nature of many water related environmental issues and the poorly understood relationship between the natural world and social world make the global environmental problems difficult to decipher. Although environmental problems at the local or regional level have been known and addressed for centuries, the idea that human activities are systematically transforming the environment on global scales is relatively new. For instance, the “Earth day” in 1970 was the first sign of its global recognition as a distinct phenomenon.

As many studies have shown, although there is an undeniable potential significance of transnational networks within the context of global environmental governance, there is also a need to investigate further their impact. This study attempts to contribute to these debates by looking in depth at the regional partnership in the Aral Sea Basin among intergovernmental Organizations (IGOs), environmental nongovernmental organizations (ENGOs) and local governments to determine how their interplay has laid the foundations on which contemporary efforts in dealing with the water crisis are now building. Currently, the extensive research on non-state actors and epistemic communities has been motivated by the observation that these NGOs appeared to have more influence on international environmental outcomes than predicted by orthodox, state-centric, models of international relations. However, we still know relatively little about the connection between environmental NGOs/donor communities funding strategies, local contexts and projected outcomes.

It is time for careful assessment of their *raison d'être* and activities. How well have environmental NGOs performed the tasks they have established for themselves? What are the chief goals of environmental NGOs? Who sets these goals, and how? Who rules? Does the NGO set its own objectives internally, or are these in effect dictated externally? What strategies are utilized to achieve these goals? What resources are necessary to implement these strategies successfully? How is “success defined and determined by the NGOs? Those are some essential questions that this paper would attempt to address. Most importantly, the continuity of the water related environmental crisis despite the regional know-how is troublesome.

Drinking water from the Seine in the 18th century, or the emergence of the filtration fountain

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Key Words: Anthropo-historic Approach – Engineering evolution – Health and sanitation –Seine in Paris – Urban Water – Water consumption – Water perception

ABSTRACT

Among the waters of large rivers, the Seine water is considered, from a long time ago, one of the best. The Seine water is used and consumed commonly in Paris during the XVIII century. However, because of the urban expansion and economic development, the Seine water quality is degrading. Thus, population usage of this water has changed. The XVIII century is a turning point concerning the relation that Parisians have with the Seine which they are accustomed to and whose banks are becoming dirtier. It is also a period during which having access to large amounts of water is given overwhelming support by the King and the city fathers, which motivated big projects entrepreneurs. Until 1840, the qualification of “good water” is mainly assessed by the sensorial approach of its users before relying on scientific standards produced by chemists and pharmacists; that is what we demonstrated at the 4th IWHACONFERENCE.

The object of this communication devoted to the XVIII century transitional period, is to analyse the appropriation modes of the Seine water before the creation of networks. We will also see how its quality evolved under urban and environmental pressure and the consequences on the Parisians perception of their river and their use of it.

This analysis shows how a new statute for water is constructed through quality criteria evolution and the apparition of new techniques such as filtration. Thus, in the XVIII century, water intended for feeding was the object of new stakes, that transformed it gradually into a commercial product.

This study stands on the analysis of files dating back to the XVIII century. They have been written principally by physicians, engineers, industrials and also chroniclers. The analysis of this corpus is carried out by an anthropologist and a geographer, and is aimed to show that the XVIII century is a transitional period that contributed to the construction of contemporary representations that Parisians have of the Seine and of drinking water.

Using and consuming water from the Seine was a common practice in 18th century Paris. As the river traversed the French capital, water was drawn from it by hydraulic pumps at La Samaritaine (1608), Notre-Dame (1672), and, later, by pumping stations at Chaillot

(1781) and Le Gros Cailloux (1786) in order to supply public fountains and water carriers who delivered water to homes throughout the city. The Seine was also used as a receptacle for waste water produced by homes, hospitals and tradespeople (tanners, butchers and washerwomen). The river was also navigable, and much used for rafting timber.

Flowing through the heart of the capital, the Seine was a multi-purpose resource. However, with urban expansion and economic development, the quality of the river's water declined. Yet water from the Seine had long been thought of as among the best of Europe's major rivers.

This ambivalence caused people to change their views about the river's water and, consequently, to think differently about the uses to which it was put.

The 18th century was a key period in the relationship between Parisians and the river which was such a key part of their lives and whose banks were becoming increasingly polluted. It was also a period in which access to large volumes of water was of concern to the King and the Paris notables, a fact which encouraged entrepreneurs to undertake major projects.

However, with the decline in the quality of water from the Seine, decent water became increasingly difficult to access. Filtration became the technique of choice in households concerned with avoiding health risks. Domestic filtration fountains became essential items for clarifying water and rendering it fit for consumption. Indeed, users habitually evaluated and defined "good water" by means of their sensory experiences, and it was only in the 1840s that they were able to base their judgment on the kind of scientific norms elaborated, notably, by pharmacists and chemists¹.

In this article, we will offer an analysis of the evolution, during the 18th century, of the perception of the quality of drinking water taken from the Seine, and examine how the aristocracy and the bourgeoisie gradually came to change their views about untreated water from the river. We will observe the vital role played in this transformation by new actors such as filtration fountain merchants. Lastly, the article will demonstrate that the diffusion of this new technological object, the filtration fountain, was accompanied by the elaboration of new criteria concerning the quality of water used in homes.

This study is essentially based on an analysis of archival texts dating from the 17th to the 20th centuries. Most of these texts were written by doctors, engineers and industrialists, as well as chroniclers and travellers. The objective of the analysis of this corpus, undertaken by an anthropologist and a geographer, is to demonstrate that the 18th century can be viewed as a period of transition in the evolution of the status of water.

¹ *Is it good water? Historical analysis on the perception of drinking water from the XVIIth to the XXIth century. The example of Paris.* 4th IWHA conference - Water and Civilization - Paris, France, 1-4 december 2005

Water problems for a world center in an arid region: California, a case study

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ABSTRACT

The popular history of California is short and filled with drama and myth. The Gold Rush, the Transcontinental Railroad's Golden Spike, the cowboy and his Remington Rifle, the Great Quake of 1906, and Hollywood's sinister glamour make up some of American history's most popular headlines. Behind the action, however, lies a landscape: either a harsh, unsettled territory, or a lush urban bustle. Both California landscapes—the arid land and the overgrown city—are founded on an unstated subtext: the problem of water. California and the arid American West face a pair of contradictory realities: the pressures of ceaseless and increasing demand for water on the one hand, and the illusion of perpetual and sufficient supply on the other. How has this dichotomy worked in the past, how does that history play itself out in the present, and to what can we expect it to lead in the future?

Central to my study are the three aqueduct systems that supply California's two largest metropolitan areas, the Los Angeles basin and the San Francisco Bay Area. Water for Los Angeles draws primarily from two aqueducts, the Los Angeles Aqueduct (1913; lengthened in the 1940s; amplified in the 1970s) and the California Aqueduct (1960s). The Los Angeles Aqueduct diverts the east-facing Sierra Nevada Mountains' vast snowmelt away from the landlocked inland deserts of eastern California and Nevada, sending its volume 325 miles south to metropolitan Los Angeles completely by gravity. Along the opposite slopes of the Sierra Nevada, the California Aqueduct diverts the west-facing watershed, normally destined for the San Francisco Bay and the Pacific Ocean. The California Aqueduct funnels that water in reverse. It travels 400 miles south to Los Angeles on a system of pumping stations that coax the water along its uphill journey.

Another major California water project, the Hetch Hetchy Aqueduct, diverts the mountain snowmelt of the Tuolumne River watershed from the highest elevations within Yosemite National Park to San Francisco. After collecting behind the still-controversial 1924 dam for the Hetch Hetchy Reservoir, water is released by gravity 200 miles westward to the city.

The Los Angeles and the San Francisco projects have been controversial since they were conceived. Each of these monumental water works has helped create cultural ideals about the landscapes and environments through which they course. The Los Angeles Department of Water and Power (LADWP) no longer has single-handed control over environmental problems that its history of water diversion has caused; seven state and non-profit agencies now work with the LADWP on issues of supply, diversion, and environmental impact. San Francisco's powerful early water lobby enabled the city to effect an Act of Congress to build its dam and aqueduct within Yosemite National Park in 1924. But in 2006, lawmakers, politicians and the public battle over the question of whether to tear the dam down, returning the watershed to its protected state.

The state of California poses a concentration of critical problems for a major economic world center located in an arid region. Those problems remain complex and unresolved.

Water resources of republic of Karelia and their use for improvement of drinking water supply: results of Russian–Finnish cooperation

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Keywords: Water supply, water and health, ground water, strategic stock, selling of waters to the other country, security problems

ABSTRACT

The work is based on results of cooperation between partners from Finland and Republic of Karelia from 1993 till 2003. A Finnish-Karelian team of authors composed of experts in the field create a water supply development plan for Republic of Karelia, which will be used to find crucial solutions to the most momentous clear-water problems in larger municipalities and towns. The goal of the Karelia water supply project, initiated in the spring of 1993, is to set the basic premises and guidelines for the improvement of the drinking water system in Karelia. The ways to improve water quality for drinking purposes in Karelia have been discussed in the report.

Learning lessons from history for public health reform: reflections on the MDGs

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Keywords: history, public health, water, sanitation, MDGs

ABSTRACT

Learning from history has been identified by the British Department for International Development (DFID) as a primary task of international development work. Certainly it would be advantageous to pay attention to the broader political and institutional environment for reform and the incentives and capacity for change that will benefit the poor. For this reason, this paper offers an historical review of the drivers behind the slow development of safe water and sanitation services that took place in Britain during the nineteenth century and aims to identify the key lessons that can be learned and applied to a contemporary developing country context from this. An understanding of why improvements occurred in the past will help to ensure that today's efforts towards change are based on experience, rather than experiment.

Controlling water, creating home: colonial Adelaide and the river Torrens

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ABSTRACT

Early in 1837, surveyor general William Light, described the location he had selected for Adelaide, the capital of the new British province of South Australia. Among the site's many virtues, he wrote, 'the proximity of a plentiful supply of excellent fresh water all the year round [makes] no doubt of its capabilities for a capital.' Within a year, this 'plentiful supply', the River Torrens, had proved itself a fickle partner in the colonizing venture. Floods washed out gardens, homes and infrastructure, while summer flows dwindled to sludgy pools, and the raw sewerage, dead animals, and refuse from brickyards, breweries and other river-side industries made the 'excellent fresh water' a lethal cocktail of dysentery and cholera.

This paper examines government records and asks why Adelaide's European settlers waited until 1860 for a systematic approach to water supply (through the construction of Thorndon Park Reservoir off-stream from the Torrens Gorge above Adelaide). The research shows that competitive commercial enterprise controlled pioneer-Adelaide's water supply but that, after settler South Australia achieved self-rule in 1857, many local parliamentarians were elected from among the socially and politically influential settlers who were building permanent homes around Adelaide. The paper argues that whereas get-rich-quick land speculation had occupied many wealthy pioneers in the UK-controlled period, by the 1850s they had begun to settle in the suburbs, developing public and family lives and creating a capital city—a shift in outlook that is demonstrable in their changed attitude to water.

Water in the Israeli / Palestinian conflict: a history that leaves few options

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Keywords: middle east, international water, expropriation of resources

ABSTRACT

The foundation of today's conflict over Palestine's land and water was created by the 1917 United Kingdom (UK) Balfour Declaration promising a Jewish land in Palestine and the 1919 letter from C. Weizmann to UK PM Lloyd-George requesting that the boundaries include the region's principle water sources. The history of strategic decisions by the International Community and its members that have led to today's situation can be traced from that time: their culpabilities evident from the beginning. Weisemann's request of a boundary change was reflected in the UK 1922 World War I Mandate and later most of it was included in the 1947 United Nations (UN) Resolution 181 that partitioned Palestine. Israel's expropriation of water within its area and the areas captured in the wars of 1948 and 1967 gave Israel full control of all water and land resources of Palestine, the Golan Heights and portions of the Kingdom of Jordan. Israel's 1982 incursion into Lebanon added additional access to Jordan headwaters. The sequence of Community decisions during this period created an all-powerful State of Israel that imposed apartheid rule on all Arab residents within Israel and in the Occupied Territories, a life that remains its only peace offer to the Arabs. That offer leaves the Community with only one responsible option: creating a viable sovereign State of Palestine fully independent of Israel and returning the land and water rights expropriated by Israeli military actions in the region. In the process, the Community will have to replace the U.S and its failed pro-Israel 'mediation.'

**Regulation of lake Näsijärvi and lake Pyhäjärvi, Tampere,
during the last few decades**

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ABSTRACT

Lake Näsijärvi has been regulated since the 19th century but the permits for regulation have been issued later. The first permit is from the year 1923. The permits have been changed in the years 1937, 1945, 1965 and 1980. The original purposes of the regulation have been production of hydropower as well as flood protection. Water flows from Lake Näsijärvi to Lake Pyhäjärvi through Tammerkoski Rapids and the average difference of the water levels of these lakes is 18 metres. The regulation is carried out by means of the hydropower stations in the upper part of the rapids. A company called Näsijärven säännöstely-yhtiö is the permit holder for the regulation which is practically implemented by the Electric Works of Tampere. The regulation has increased the lowering of water level in spring whereas the summertime variation of water level has decreased from 75 cm to 20 cm, which has improved the recreational use of the lake.

The regulation of Lake Pyhäjärvi was started in 1962. Also here the original purposes are hydropower production and flood protection. The regulation is carried out by means of the hydropower station of Melo, owned by the company PVO-Vesivoima Oy, in the river Nokianvirta. The regulation is diel and the discharges are changed in short terms which causes rapid changes of water levels in the vicinity of the hydropower station. Pirkanmaa Regional Environment Centre is the permit holder of the regulation which is implemented by the company PVO-Pool Oy. The most important impacts of the regulation have been lowering of water levels in winter, lowering of high water levels during floods and the stability of summertime water levels. The lowest water levels have remained practically unchanged whereas the highest water levels are now almost 90 cm lower than they used to be.

Challenges facing West Bank water resources sustainability in the light of the stalled peace process

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Keywords: Sustainable Development, Peace Process, Groundwater, Water Resources Management, Joint Management

ABSTRACT

The political boundaries between the Palestinian and Israelis make the water issues critical and sensitive. Groundwater is the primary source for the Palestinian in the West Bank. Although, there are many studies on the shared surface resources (Jordan River Basin), there are few studies on the groundwater shared resources between the Palestinians and Israelis.

There are three primary groundwater basins underlying the West Bank (Eastern, Northeastern and Western Basins) as shown in Figure 1. Both the Northeastern and Western basins are shared between Israelis and Palestinians. The Palestinians have a limited access to the Northeastern Basin and strictly limited access to the Western Basin.

In addition to the quantity of available water resources, the quality of water is emerging as a critical issue. Threats to ground water quality include disposal of untreated wastewater, increasing salinity due to agricultural activities and intrusion of native groundwater of poor quality. Widespread use of herbicides and pesticides also represent a threat to drinking water supplies.

The Declaration of Principles signed in Washington D.C in 1993 was a major step toward resolution of the political conflict between the Israelis and Palestinians. However, the water issue is part of the final status negotiations, which still unresolved. As resolution to political conflict is pursued, it is clear that water resources management issues remain at the forefront because of the transboundary nature of the hydrologic regime. Cooperative management on the technical level appears to be the only alternative to further conflict and degradation of the region's scarce water resources. This paper will study the impact of the transboundary resources on both sides and explore some of the most significant groundwater management issues facing both the Palestinians and Israelis.

Chemical munitions dumped in the Baltic Sea

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Keywords: Chemical munitions, Baltic Sea, Bornholm Deep

ABSTRACT

An expeditions were performed in the Baltic Sea in 2001-2006 for investigation of an area, where ships with German chemical munitions were scuttled after the Second World War. The position of the wrecks was registered. Samples of sediments and water taken near Bornholm Island have been analyzed.

To the benefit of the few and the chagrin of the many: South African water management practices under colonial and apartheid rule

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Keywords: South Africa, water management, colonialism, apartheid, inequality, Pongolapoort Dam

ABSTRACT

This paper focuses on some of the Dutch and British colonial and apartheid water management policies and practices in South Africa and evaluates the negative effects they had on a large percentage of the country's population, which was strongly discriminated against under previous regimes. A particularly poignant case study is the construction of the Pongolapoort dam in 1950, which resulted in the displacement of thousands of people during that decade. In addition, the government's regulated flood releases did not coincide with any natural flooding patterns and thus resulted in poverty and hardship for the downstream communities, who subsequently had to adapt to an altered floodplain regime. This impacted severely on their socio-economic activities such as farming (mostly subsistence) and fishing. Problems related to resettlement in the area are ongoing and have not yet been adequately resolved.

The focus of the paper is not limited to an historical account of the policies and practices under which water was managed; rather the aim is to interpret how such practices blatantly disregarded the rights and needs of the majority of South Africans. An attempt is also made to link historical water management to other apartheid government strategies, such as the Group Areas Act, which sought to "relocate" black residents to resettlement camps in the *Bantustans* (Homelands). Ultimately, this account aims to serve as a basis for a better understanding of some of the multi-faceted challenges that are faced by the democratic South African government today as it tries to implement the country's progressive new national water legislation.

Transboundary cooperation and conflict on water management in the Han River basin: a case study on political ecology in China from 17th to 19th centuries

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Keywords: water management, political ecology, China, 17th -19th century

ABSTRACT

It is believed by previous scholarship on human ecology that the commons have always been managed through local institutions, and alternatives at the state and regional level have rarely been capable of accomplishing the task. However, water management in the river basin which crosses human boundaries is usually encountered additional complexities due to strains in riparian relations and institutional limitations. This research intends to see beyond territoriality and locality and analyze the transboundary cooperative schemes in the Han River basin, as a reflection of the political ecology in 17-19th century China.

Based on current studies, there are a large number of rivers that cross administrative boundaries (counties, prefectures, and provinces) where the cooperative scheme is significant for an efficient and effective water management system. However, while most of studies discuss the environmental security in the contemporary world, there are rarely works which focus on the historical evidence of cooperation and conflicts across boundaries. When one reviews the historical records, it will be discovered that human conflicts are always associated with the history of the river running through its territory. Issues of water allocation, flood control, water drainage, and dike/dam construction lie behind many of these conflicts.

This project is part of my research on the political ecology in 17th -19th century China. The whole research includes three parts: the first part is an examination of the structure of local institutions and local customs in managing the waters; the second part is to analyze the transboundary official administration on the water management and assess its function as a super-regional institution; the third part attempts to explore the technological factors in the transboundary cooperative scheme and their relations with institutional regulation. The goal of the research is to reveal the triangular relationship among the state, society and environment.

Past and future of water turbines in Romania

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Keywords: water wheel, water turbine, hydropower, hydro-power plant

ABSTRACT

Water wheels have been known since Antiquity, being primarily used to raise water from rivers, and to generate mechanical power for mills. Water wheels spread during Middle Ages, being widely used till the 19th century. Some water wheels, entirely built in wood, dated from the 18th and 19th centuries and in use till the mid 20th century, are well preserved in Romanian museums where they have been transferred. With the widespread introduction of Hydro-Power Plants for generating electricity, in the late 19th century, water turbines have largely replaced the water wheels. A brief overview of the concepts and evolution of water turbines is realised within this paper, being illustrated with pictures from Romania. As the need of renewable energy sources increases, new concepts of turbines adapted for marine currents or hydropower farms are emerging. Water-current turbines or collections of such turbines (farms) use directly the kinetic energy of the water current to produce electricity. Water-current turbines only need minor civil works and are easy to transport and relocate.

The power of urban flooding to reshape society

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Keywords: flooding, urban, culture, history, relevance

ABSTRACT

Following a record-setting flood in 1913 in the United States, cities underestimated the power of the flood to reshape the social and cultural tenets of their communities. Few historians have studied the social significance of urban flooding; however, responses to flooding hold the power to reshape the cultural future of cities worldwide. Without acknowledging this power, communities echo and repeat responses to flooding that result in disjointed urban sprawl, unhealthy sections of cities, shifts in social power, and other undesired and unintended changes.

This paper employs a case study of the 1913 flood in the city of Indianapolis, Indiana, situated along the White River, a non-navigable tributary of the Wabash River. Analysis of primary source materials showing the political, institutional, and cultural responses to flooding reveals the relationship the city had with its river and how its responses to the flood impacted the social fabric of the city. This paper discusses an area important to the city's founding and infrastructure that was stigmatized and labeled by flooding. The city passed flood control legislation and implemented flood control measures, but these seemingly positive actions reinforced the flood's power to bring unintended changes to the city. The results of these historical responses continue to be seen and felt throughout the city today.

Whether a city is in a geographic region predisposed to flooding or has fallen victim to a water-related disaster, a city's relationship with its water source and the ways in which it responds to flooding is crucial. As revealed by this historical study, flooding has the power to create the identity of a city.

Research of water plants in Latvia, Baltic: since folk songs till WFD

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ABSTRACT

Water has been a subject of special attitude of Latvians Over centuries. There are 217 996 folk songs in Latvia, and water and its typical features is such as water colour, morphometry of waterbody, stream velocity as well as flora and fauna are mentioned in a lot of them. The aquatic plants had practical (reeds for roof, wickerwork), aesthetical (water lilies, pipes of reed etc.) and symbolic (reeds – women, young girls, brides; instability; inaccessibility etc.) meaning. Different species (reed, rush, spatterdock et al.) growing in streams and lakes of Latvia are revealed and also their overgrowing stages are talked about. The folk songs have been the main source of historical information and form of communication in Latvia till 18th century. Then the first scientific studies of waters containing information on higher vegetation started. They were carried out by German researchers till the first part of 20th century (Fischer, 1791; Wilkomm, 1872; Kupffer 1905-1925; Ludwig, 1908 etc.) and the overgrowing and the role of plants for fish life were stressed out. Republic of Latvia was established in 1918, and investigations of waterbodies, mainly lakes, including their vegetation were carried out. The main directions of studies were devoted to research of individual lakes and species (for example, the relict floating water-nut *Trapa natans*) (Valters, 1926; Kelss, 1929; Berzins, Ozolina: 1930ies – 1940ies, Apinis, 1940 etc.). After World War II when Latvia was occupied by Soviet Union many scientists emigrated and were deported, thus scientific work was disrupted and proceeded after the war in USSR. Practical (impact on fishery) and ecological point of view became dominant. Investigations of flora of Latvian lakes in total, plant identification of flora in Latvia; methodology of lake typology according higher water vegetation (structural features like as species composition, abundance and occurrence) were provided using systemic approach (Kumsare, Spuris: 1950ies-1960ies; Cukurs: 1960ies – 1980ies). In 1980ies studies of running waters in connection with pollution problems began, and list of indicator species was compiled (Urtans). In 1991 Latvia regained its independency. Since then long-term investigations of several waterbodies started, and use of different methodologies for studies of higher vegetation began. During the pre-accession phase to the EU implementation of new environmental legislation became actual for Latvia. According to the Water Framework directive (WFD, 2000/60/EC) that defines the environmental goals and policy including requirements for water quality and sustainable management, higher vegetation is one of obligatory elements for the ecological quality assessment in Europe. For this purpose, establishing of joint and comparable methodology is important issue. At the moment in Latvian Environmental, Meteorological and Geological agency use standard method EN 14184: 2003 for running waters, Latvian scientists have participated in river standardisation and classification project STAR in 5th Framework programme, but is still necessity for unified lakes investigation methodology.

Intellectual property disputes during the early development of sea-water distillation

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Keywords: sea-water, distillation, ships, intellectual property, disputes

ABSTRACT

The protracted sea voyages between Europe and colonies in the East and the Americas, which became common in the 16th and 17th centuries, were critically dependent on an adequate supply of drinking water. At the same time, precious cargo space had huge commercial value and provisions for the crew had to be kept to a minimum. Reliable sea-water distillation systems, together with their fuel supply, would take up only a fraction of the space usually allotted to bulky water barrels. Despite this obvious advantage, which was first seriously investigated from about 1630, it took many decades of arduous experimentation and development before sea-water distillation was accepted by about 1800 as a common and robust technology suitable for ship-board use. Against this background, two bitter disputes about intellectual ownership are explored:

- 1 The first was a protracted dispute between William Walcot and Robert Fitzgerald, which took about 20 years to resolve, eventually by a special bill of the British Parliament. William Walcot won the first patent for such a system in 1675, but the patent was annulled after seven years and another awarded to Robert Fitzgerald in 1683, after influence on the King by the eminent scientist Robert Boyle. They continued their rivalry a year later in the Netherlands with Walcot then winning a patent from the Dutch (who had a thriving trade through its Dutch East India Company) in 1684, after demonstrating the superiority of his system over that of Fitzgerald. In 1694, Walcot brought a bill to the British Parliament to reinstate his patent over that of Fitzgerald, which was eventually successful.
- 2 The second dispute was that between the British naval physician James Lind, the British ship captain James Irving and, to a lesser extent, the French physician and scientist Pierre-Isaac Poissonnier. Some of the claims made were simply repeating some discoveries made sixty years earlier – conveniently or genuinely forgotten. James Lind started some systematic experiments in 1761 and had a running prototype soon thereafter. Pierre-Isaac Poissonnier, in France, designed a system in 1763 with some very innovative features, but containing no new scientific principles to that known at the time. In 1770, James Irving entered the fray with tremendous energy and laid claim to a number of features which were either known before or simply not true. Ironically, Poissonnier and Irving were generously rewarded by their respective parliaments while Lind got nothing.

These two disputes bring to light a larger historical question. Did the early measures to protect intellectual property accelerate the development of this technology, or did they inhibit progress by forcing inventors to keep their expertise close to the chest, away from

scientific challenge and debate, by only releasing the bare minimum of details?

Undercurrents of empire – the colonial sources of water privatisation.

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ABSTRACT

Water privatisation since the 1980s has been mainly an international phenomenon, with multinational companies, mainly from Europe, gaining business abroad. Much of this growth has happened in developing countries, many of which were formerly colonies of the same European countries. Modern trade theories propose that international corporate expansion may be explicable by various forms of path dependency, especially in imperfect markets. This paper will explore the evidence for path dependency links between colonial history and the modern pattern of water privatisation.

These links are visible in two ways: firstly, by studying the extent to which multinational companies active in a country originate from the old colonial power; and secondly, by studying the history of the companies themselves to identify long-term connections with imperial and colonial relations.

The paper will map corporate activity in water privatisation region by region, relating the home country of the companies involved in water privatisations to the former imperial power(s) which colonised the country. Despite the fact that water is a sector highly concentrated in the hands of companies from one country (France) clear patterns emerge showing strong corporate-empire links. This can be seen most clearly in Africa, even in the case of Germany, which lost its African colonies as long ago as the 1920s. From the other direction, Portuguese companies are dominant in former Portuguese colonies, but hardly active at all elsewhere. Similar patterns emerge in Latin America and Asia. These patterns will be discussed in relation to historic colonial relations, linguistic ties, and the similar pattern of donor activities focussing on former colonies.

The paper will also analyse corporate history. The major company involved in water privatisations, Suez, owes its origins to the 19th century Suez Canal company, whose history and development was intimately dependent on the political, financial and military relations between Britain, France and Egypt. Its subsequent survival as a financial investment group was also a key consequence of the Anglo-French-Israeli invasion of Egypt in 1956 and later World Bank interventions. The current Suez group also includes the former Societe Generale de Belgique, which was a central financial agency in Belgium's African empire. The history of the other major French group, Veolia, will also be discussed, including its early expansion into Mediterranean countries in the 1880s, at the same time as France and Britain were using military force to protect the interests of financial investors in Egypt, including the Suez canal. More recently, other companies entering the private water business in the global south include Jardine Matheson, which originated as the dominant 19th century financial investor in China, playing a leading role in developing the opium trade and the British colony of Hong Kong.

In conclusion, the paper will discuss the implication of these connections for theories of multinational expansion, path dependency factors in the development of water services, and the perception of water privatisation in developing countries as a form of neo-colonialism.

Duchesne river development and management: past, present, and future, or: Can technology save the Duchesne river from 150 years of history?

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Keywords: real-time monitoring, automation, water management

ABSTRACT

The Duchesne County Water Conservancy District and the Bureau of Reclamation (Reclamation) are using real-time technologies and the Internet to help overcome 150 years of mistrust between the various water user and environmental groups that rely on the Duchesne River for their livelihood and enjoyment. The river basin is a rural area located in northeastern Utah, USA. Over the last 100 years, three separate Federal projects were constructed by Reclamation to export water (trans-basin diversions) from the Duchesne River to the populous Wasatch Front (Salt Lake City area), thereby reducing potential water supplies for local consumption and environmental needs. In recent years, the latter requirement has taken a front seat. Technology – a real-time monitoring and control system – is being used to improve management on a river system that is over-allocated. Some of the funding for this effort is coming from a “Water 2025” challenge grant from Reclamation.

The history and the future of the parks on the banks of the rapids

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ABSTRACT

The Tammerkoski rapids, factories, and parks together constitute a national landscape that has played a significant role in the history of Tampere. The rapids provided the basis for early industrial activity, the mill, and later the textile industry, which came to determine the direction of the city's development. The good waterway connections and the road from Turku to Viaborg across the rapids formed the basis for the establishment of a marketplace, the village of Tammerkoski, and later, in the early 17th century, for the merging of the village farms into a manor house. The manor house was located near the old marketplace by the bridge over the rapids.

This scenic and logistical junction became the heart of Tampere, founded in 1779, serving as the location for the market-place, church, and the first public gardens of the city. The core of the national landscape, the Tammerkoski rapids, was created with the construction of factories on its banks in the 19th century and the rapid urbanisation and revision of the image of the Tampere that started in the late 19th century, and which transformed it from a small town into a typical modern industrial city.

The recreational value of the Tammerkoski rapids has long been recognized. The foaming rapids were a natural attraction, the beauty of which was admired and which people came from far and wide to see. The rapids also provided water for gardens. The first known plantings on the banks of the rapids included the pharmacist's garden, a block garden that, typical of the period, followed the grid layout of the town. The city's first public park, a promenade surrounding the 1820s church, was opened next to the pharmacist's garden. Together, the promenade and the pharmacist's garden formed the basis for the present day Kirjastonpuisto Park.

Even though the promenade and the pharmacist's garden are located on the banks of the rapids, this has not been directly reflected in their geometrically strict composition. The first actual rapids' garden was a private park founded by Wilhelm von Nottbeck, a factory owner, towards the upper course of the rapids in the mid-19th century. By idealizing nature; the bridges, isles, and painting-like surroundings of the landscape-style park integrated the rapids' views with garden art in a new manner. The charms of the free-flowing rapids could also be enjoyed on Konsulinsaari Island, restored by the manager of the linen factory, which hosted a summer café that could, in the late 19th century, be accessed via a wooden foot bridge.

The growth of the city and the simultaneous construction of a park network in the city centre peaked at the turn of the 19th and 20th centuries. The stone city extended according to the city plan on the eastern bank of the rapids, giving rise to the park zone con-

sisting of what is currently known as Verkatehtaanpuisto, Koskipuisto, and Työnpuisto parks. The establishment of the post of city gardener in the 1870s had a central role in promoting the importance of park design in Tampere. The creation of city parks was an essential part of a revival of the image of the city, the result of which is also the Art Nouveau-style centre and its main street Hämeenkatu boulevard. The parks by the rapids are promenade sites typical of the era, intended to be used for walking and being seen in, and for the enjoyment of the gardens and scenery of the park. Gently sloping towards the rapids, the terrain formed a natural auditorium, from which people admired the flowing water.

The conscious development work of the rapids' area as part of the cityscape continued in the early 20th century. A theatre and library were built on the western bank of the rapids to complete the silhouette of the city. The most significant change was the construction of a hydroelectric power station and a dam in the 1930s, which involved narrowing the riverbed and broadening Koskipuisto park. The new strip of the park was turned into a continental-style riverbank promenade with imposing plantations and arching lamp-posts. The western bank of the rapids was also modernised in a similar style. This gave the rapids, bordered by Koskipuisto and Kirjastonpuisto parks, their present appearance of continuity, which has become the symbol of Tampere.

The old parks by the rapids still represent the heart of the park network in the city centre. Their restoration-oriented repair is one of the major issues in the city's current green construction. The increasing recreational use of parks in the city centre poses challenges to the design of their gardens and furnishing. In addition to preserving the old parks, a new kind of green rapids' scenery has also been constructed. The park belt has, in recent years, been completed with two new parks - Otto Gustafsson's park and Aleksandra Siltanen's park, which were built in the 2000s on the river zone that was formerly part of Tampella's industrial area. Tampella's parks have provided a unique opportunity to extend the series of parks built by the rapids to the north. The rapids' bank promenade, which is being planned as part of the Ratinanranta residential area, will extend the park belt southwards to Lake Pyhäjärvi.

The improvement of the pedestrian and bicycle routes in the area have also been promoted recreational opportunities. The Patosilta bridge, built on the remains of an old maintenance bridge, connects Kirjastonpuisto park to Työnpuisto park, offering a scenic highlight by taking the visitors very close to the rapids. Two other bridge projects involving pedestrian and bicycle ways are being planned: the Palatsinsilta bridge from Wilhelm von Nottbeck's park to Aleksandra Siltanen's park in the upper course and the new Ratina bridge from Ratinanniemi to Laukontori market-place at the bottom of the rapids.

As the most important symbol of Tampere, the rapids constitute a resource that contributes to the image of the city. The landscape of parks and factories is still rich with vitality, despite the decreased industrial significance of the rapids. With the decline in industrial activity, the recreational role of the rapids has grown significantly. The position of the Tammerkoski rapids among the Finnish national landscapes has brought appreciation and interest both to its industrial cultural heritage and park culture.

Ecological solutions to feeding and watering a city: a historical study of Sana'a and Ghayl Ba Wazir, Yemen

Ingrid Hehemeyer

ABSTRACT

In the arid environments of Yemen, skillful management of water resources formed the basis for urban development, and different natural conditions elicited a variety of technological responses. Tapping an aquifer through rock-cut channels gave rise to the city of Ghayl Ba Wazir in the 15th century. The water tunnels directed the water first to the settlement, and then to the fields as grey water for irrigation. Wells provided the medieval city of Sana'a with its primary water source. The expedient use of grey water helped sustain its vital market gardens. These two examples illustrate successful adaptation to environmental constraints in an urban context.

Hydrologic and hydraulic research in the soil conservation service

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Keywords: hydrology, hydraulic, research, sedimentation, Soil Conservation Service

ABSTRACT

The U. S. Congress created the Soil Conservation Service (SCS) in 1935 in legislation that declared “the wastage of soil and moisture resources on farm, grazing, and forest lands of the Nation, resulting from soil erosion, is a menace to the national welfare and that it is hereby declared to be the policy of Congress to provide permanently for the control and prevention of soil erosion and thereby to preserve natural resources, control floods, prevent impairment of reservoirs, and maintain the navigability of rivers and harbors ...” When the law was enacted, little hydraulic or hydrologic research had been done on the relationship of soil erosion to flood control, the impairment of streams and harbors, and the sedimentation of reservoirs. SCS undertook hydrologic and hydraulic research in order to design and implement effective conservation practices. The research developed basic principles that both aided the soil and water conservation Program and made pioneering contributions to science and technology related to land and water.

Evolution of environmental engineering education in the USA

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Keywords: education, environmental, engineering, sanitary, USA

ABSTRACT

Sanitary engineering in America was started at MIT in 1887 in the Department of Chemistry. In 1889, the program moved to civil engineering. The first graduates were in 1891, with a total of 40 by 1900. Also, in 1887, the Lawrence Experiment Station was founded, which had an early relationship with MIT faculty, and utilized pilot plants to explore methods of water treatment.

By the early 1950's, the MIT program started to incorporate chemical engineering, physical chemistry and microbiology to underpin design, as opposed to the empirical criteria that were prevalent. Due to funding limitations sanitary engineering was terminated in 1962. Presently, in 2007, there are about 150 environmental engineering programs. As at MIT, the courses are built on largely on fundamentals and, as at MIT, the faculty are mostly multi-disciplinary and have relations with other departments.

New/old ways for storm water: learning from the history

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Keywords: stormwater, management, retention, infiltration, urban area

ABSTRACT

People in ancient civilization knew how to manipulate with storm water, they drained the water away from their dwellings or they used to retain and used the water. Even though some was slowly forgotten, it has been revealed how our ancestors were inventive. In the paper ancient techniques used for storm water management thousand years before Christ are described and their reinvention for modern cities is discussed.

Water as a legal subject: traditions and futures

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ABSTRACT

Water law is one of the oldest fields of legal rulings. For this it is enough to refer to the vital importance of waters for societal activities and functions. Legal interests in waters are multifaceted, depending on needs and supply in individual areas and societies. Also the system of property law addresses waters in different ways depending on the political structure in a state. Two main viewpoints may here be observed. One is the emphasis of public interests especially when rivers are concerned. The interests of navigation, fishery, later on energy production and water supply in many states overrule private interests. As a result large watercourses may have the position of public domain. In other states private ownership of all watercourses and groundwater may be the starting-point but, of course, public interests must also here have priority.

Water law, including water law history, has developed and maintained very particular but also clear and largely valid principles and concepts. In addition to the predominance of public interests in regulating water uses also scarcity of water is a common area where law has to interfere. Priority of uses and users, rights to access to water and other water-related uses, are issues which arise not only between individuals and associations but also between states and groups of population. Water law tend to be "democratic" in the way principles of use are developed and adopted. International water law, especially the law of transboundary waters has its difficulties due to the egoism of sovereign states, but lately equitable use of neighbouring states has been approved as a valid principle.

In the European Union water law is a rather new phenomenon but many members states have a long and solid tradition on water law. The Union may have difficulties in coordinating the historically different traditions of its members. More important than that is the reality that member states whenever necessary have been working for the development of comparative and thus commonly acceptable rules for water law.

Comparative water law addresses water utilization as a reality of challenges. Today Europe phases any kinds of practical common problems. Water pollution has been – at least theoretically – tackled by the adoption of numerous emission laws. Water scarcity and floods are different problems which often have a transboundary nature as well. Also the role of nature conservation and the protection of diversity in the water environment are more recent objectives which have been addressed in water both nationally and supranationally.

Future of integrated water resources management in Beninese municipalities

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Keywords: IWRM, decentralisation, municipalities, Benin

ABSTRACT

This paper illustrates the use of Integrated Water Resources Management (IWRM) in a decentralised context. In addition to findings from the current literature, it gives, based on the author's experiences, a description of the introduction of IWRM in municipalities in Benin (West Africa).

The programme in Benin encompassed technical assistance to the municipalities for the drawing up of 5-year development plans. Water and sanitation were important components of these plans, but an integrated approach was often lacking. After consultation with some municipalities, a few organisations joined forces and drew up a pilot project (mid 2005) to introduce IWRM into the municipal development plans. By then, some of the municipalities had already finished their plans and were only intending to have revisions after one-year implementation (rolling plans). Others were still in the planning phase and thus had more opportunities to introduce some of the IWRM principles with immediate effect.

Comparing this practical situation with a theoretical background, some observations and recommendations are given. Further the paper provides some points for future research, evaluation and action.

Water in mythology

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Keywords. mythology, rivers, springs, Egypt, Sumeria, China, Greece, Bali

ABSTRACT

The study of the mythology of ancient civilizations gives us cultural information about the beliefs in and interaction with the waters that sustained these civilizations. In addition, geology, climate, the availability and behavior of water, and available technology influence how a given society chooses to value and manage its water resources. This paper discusses the myths surrounding major water sources and descriptions of the landscape. Three river civilizations (Egypt, Mesopotamia, and China) are analyzed along with a “dry” civilization (Greece) and a modern example (Bali).

Privatisation of Berlin Water Works (Berliner Wasserbetriebe BWB): political process and consequences

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Keywords: privatisation, statehood, public services, democracy, legitimacy, sustainability

ABSTRACT

Berlin Water Works were partially privatised in 1999. This paper aims to show why partial privatisation in the water sector, as realised in Berlin, is neither in the interest of democratic citizenship nor good for the management capacities of huge municipalities. The 'Holding Model' developed in Berlin tries to balance public and private interests and leads to a situation in which no side can act without the other. This compromises the state's and the management's capacity to resolve conflicts in a socially responsible, sustainable manner. This is obvious if we look at the example of the necessary but as yet untackled deconstruction of infrastructure following a massive reduction in water consumption in Berlin. Additionally privatisation arrangements in Berlin such as the guaranteed revenue for private partners, secrets contracts, enhancement of tariffs and personnel cutbacks reveal massive changes in the nature of statehood because traditional categories of statehood regarding democratic legitimacy and welfare production are no longer guaranteed. On a more positive note it might be argued that international business activities of Berlin Water Works are now under the control of professional managers instead of inexperienced political functionaries who ran up huge losses when in charge.

Tampere hydropolis: past, present and future; water-infrastructure in urban and regional development

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Keywords: regional planning, landscape urbanism, water, infrastructure, regional development

ABSTRACT

Many functional regions have originally developed around natural water-networks, which offered easy transportation infrastructure for trade and industry. Cities were founded on locations, where logistical advantages were accompanied with the possibility to utilize water-energy by harnessing rivers and falls. This was just the case in the Tampere Region. Later on, after the turn of the 19th century, this kind of regional structure was totally inverted, as railroads, roads and automobiles began to dominate in transportation and logistics. In few decades the central regional flows moved away from the water-network of the Lake Näsijärvi, thus leaving it for secondary uses like, for example, tourism and leisure. Further urban growth was centralized into the vicinity of main transportation networks which offered good accessibility. As a consequence of this development, extensive rural areas of the Tampere Region are classified as remote and outlying, indicating decreasing density of settlement structures and service-networks. It is worth of studying, if there is any hidden potential in the water-infrastructure to be utilized in the battle against uneven regional development.

In this study, the theory of landscape urbanism is used to analyze the region as one hybrid network with its architectural, technological and natural elements. According to it, the region could be divided in three distinctive, partly overlapping, main elements: first, the thick and fast structure of the Tampere Urban Region, which bursts from the South, hits the Näsijärvi coastline and creates a mushroom-shaped formation; second, the outer ring of the region, which is occupied by medium-fast structures of small towns; and third, slow and thin structure which rims and covers the Lake Näsijärvi. These could be named, for example, the metropolitan network, the small town network and the landscape network. This kind of structural model could be useful in developing strategies for improving regional cohesion. For example, the landscape network provides relaxed and inspiring nature-, water- and ice-based experiences to counterbalance the stress of the busy metropolitan network. The advantage of the model is its ability to create a common mental geography that unites the region as one structure with its seemingly passive water areas.

A history of Lake Teganuma: how did it shed the ignominious distinction of being “Japan’s most polluted lake?”

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ABSTRACT

The purpose of this paper is to review the history of the recovery of Lake Teganuma and to present its lessons for history and some issues to be tackled in the future.

Lake Teganuma is located in Chiba Prefecture, Japan, and it has a unique history. The natural environment along the lake was once so beautiful and romantic that several famous writers and artists used to live near the lake in the early 20th century. The quality of the lake water was also quite high, the lake was a good fishery, and people in that neighborhood used to enjoy swimming there until mid-20th century. However, because of rapid urbanization around the lake, the lake was soon polluted especially by an inflow of household sewage effluents. In 1974, the annual average of the lake water’s COD (Chemical Oxygen Demand) finally attained the worst water quality ranking in Japan, and the lake held the worst place for 27 years until 2000.

Thanks to various efforts, the COD of the water of Lake Teganuma became the second-worst and the lake was finally able to clear its dishonorable name as “Japan’s most polluted lake” in 2001. Since then, the lake water seems to be getting cleaner year by year. In the summer of 2006, a triathlon was held near the lake, and those athletes actually swam in the lake. Also, it was reported by news media in November 2006 that some salmon coming back from the sea were found in the river that flows into the Lake Teganuma.

How did Lake Teganuma succeed in getting out of the worst position? Local governments and environmentally-conscious local citizens made great efforts to recover the water quality of the lake. Also, a national project by the Ministry of Land, Infrastructure and Transport was completed in 2001 and it gave a major positive impact to clean up the water of Lake Teganuma. The project pumps up fresh water from the Tone River, conveys it by underground pipes and pours it into Lake Teganuma. Thanks to the project, the lake water is certainly getting cleaner. However, we cannot say that it is a fundamental solution since it has some negative impact on a sound ecosystem for the lake.

In this paper, some historical and environmental lessons are presented by reviewing the history of efforts to recover the quality of water of Lake Teganuma that was once called “the most polluted” lake in Japan.

Water services from the point of sustainable development – the Finnish case

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Keywords: water, development, management, protection, sanitation, service, supply, sustainability

ABSTRACT

Human life is absolutely dependent on perceived water. This reality led us to survey how water services are considered and valued from the point of sustainable development (SD) and documented in related strategies. Today Finland represents a society where almost all inhabitants can take it granted to have access to safe water while the responsibility of wastewaters is left for the municipalities and authorities. This is why Finland offers an interesting case to study a history that resulted in the present situation and the relation of water services to its national SD efforts.

This survey indicates that the quality and availability of perceived water are represented as high status issues of SD particularly in the global context but not in the EU and Finnish SD strategies. The aspect of water services is included only indirectly in these SD strategies, i.e. in terms of pollution control and natural resource management. Instead, water service management is considered as a separate sector which should target sustainable implementation solutions. Thus, water services are not seen as a strategic goal of sustainability. However, the studied documents did not much define characteristics of sustainable water services. The studied Finnish case highlights the importance of regional planning as a basic framework for implementing water services. The planning instrument can help to find optimal regionally coordinated and technically advanced options for water services. Further, it can also offer a platform for e.g. on the job training and increase of information about local and regional geographic and socioeconomic conditions. Particularly, it seems that a concrete involvement of authorities in planning process may benefit the following implementation process of water service plans.

Inorganic species in groundwater and human health – a global overview

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Keywords: groundwater, health, arsenic, fluoride, nitrate, management

ABSTRACT

Quite a number of inorganic species in groundwater could be of health concern. However, it is mostly anions that cause most problems due to the fact that their retention in soils and aquifer material is lesser than that of cations, like most heavy metals. Arsenic has emerged as a major groundwater pollutant in recent years due to mainly two facts, that it has not frequently been analysed in the past and that its toxicity is greater than previously believed. Fluoride protects against caries but it has a narrow therapeutic spectrum and may cause dental and skeletal fluorosis at moderate levels. Nitrate has increased in groundwater parallel to the increased use of inorganic NPK fertilisers.

William Mulholland, the city of Los Angeles, and ‘Chinatown’: an historical analysis of the most famous film in water history

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keywords: los angeles, water supply, mulholland, chinatown, film noir, st. francis dam

ABSTRACT

Released by Paramount Pictures in 1974, the film *Chinatown* tells a story of Los Angeles promoters manipulating a supposed water shortage to appropriate rural agricultural land and feed urban growth for the benefit of a mendacious business elite. Acknowledged as one of the finest *film noir* films ever made, *Chinatown* is also recognized as a *tour de force* in public understanding of Water History, as it makes vivid the exploitative – and potentially corrupt and violent – character of large-scale water control bureaucracies and their destructive effect on less privileged or powerful small-scale water users. .

Starring Jack Nicholson, Faye Dunaway, and John Huston, and directed by the acclaimed and controversial Roman Polanski, *Chinatown* has become a central reference point for broad-based public understanding of the modern history of municipal water supply. As such, it is important that the relationship of the film’s fictionalized narrative to actual events in the development of Los Angeles’ water supply system be clearly understood. Specifically, this paper examines: 1) how the fictionalized characters of Hollis Mulray and Noah Cross comport with the real-life engineer William Mulholland and former mayor Fred Eaton; 2) how the fictionalized “stealing” of land from farmers in the film’s “Northwest Valley” compares with the city’s annexation of the San Fernando Valley following completion the 230 mile-long Los Angeles Aqueduct in 1913; 3) how the fictionalized failure of the “VanDerLipp Dam” compares with the real-life St. Francis Dam (designed and built under Mulholland’s direct authority) that collapsed in March 1928 and killed more than 400 people; and 4) how the personal interrelationships of Noah Cross, Evelyn Mulwray (wife of Hollis), and Hollis’ “girlfriend” relate – if at all – to Mulholland’s own family life.

Offering many compelling insights into the water history of Los Angeles (and to the larger theme of “water and the city”), the film nonetheless presents a narrative that does not always accord with actual events. Never intended as an “historical documentary,” criticism that the film takes dramatic license in formulating a story of Los Angeles water history appears unwarranted. However, because of the film’s powerful hold on public perception, the intermingling of fact-and-fiction demands analysis.

Public attitude towards water in Uttarakhand Himalaya: past, present, and future

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ABSTRACT

The present study purports to show the attitude of traditional hills society of Uttarakhand Himalaya (28° 44' and 31° 25' north latitude, and 77° 45' and 81° 1' east longitude), India, towards water in three different phases, namely, past, present, and future. The study is based on information culled from firsthand source material.

There will be three sections in this essay. The first section will deal with a variety of records suggesting as to how socio-religious obligations conditioned public attitude towards water in the past. The second section will show as to how this attitude is gradually changing due to modern socio-economic circumstances. These two sections will serve as the background to build on the last section addressing the future of water vis-à-vis the changing attitude of the public.

The Past:

Combined testimony of the archaeological record, folklores, and ethnography, dating back from at least 6th century AD, clearly shows that traditionally watering places were held very sacred. Water supply works were executed, maintained, and secured through community efforts. People generously participated in their construction in order to earn spiritual and religious merit. So much so that Madho Simha Bhandari, the legendary General of King Prithvipati Saha of Garhwal (AD 1631-1667), sacrificed his son Gaje Singh to seek divine favour to cause water flow through a nearly 100 meter long tunnel constructed by him in public interest at Maletha, near Srinagar (Garhwal), the capital seat. This story immortalized in folk songs of Garhwal is sung even today with great devotion on the occasion of an annual fair when the crop is harvested.

The present:

Despite compelling economic circumstances, this spirit still lingered on among the village folks in the modern times. This is clear from the history of Chhana Gul (District Almora), a nearly 10 kilometer long canal which was constructed in AD 1954-56. Despite poverty, the villagers involved in its construction voluntarily charged only 50% of their wages; they offered the remaining 50% amount to the Government Treasury as their contribution to the cause of water. In 1990s the same canal was lying abandoned as it was partly damaged. However, by this time the public attitude had completely changed. People could have undertaken the repairs themselves as it was not extensive. Instead they waited for the government action.

The future:

Himalaya is the source of the greatest perennial rivers of North India, namely, the Indus, the Ganges, and the Brahmaputra. However, the people of Himalaya are struggling for adequate supply of water. In recent years The World Bank has financed a large number of water supply schemes in Central Himalaya. Already, private operators have started setting up bottling plants to sell the Himalayan Water. Tankers are being used to sell waters in places where there is acute shortage of water. During summers when there is heavy rush of tourists and pilgrims water is sold at exorbitant price. It is the same region which once provided charitable watering places and rest-houses to all alike. The signals are alarming. As they say "coming events cast their shadows before", we are proceeding towards a chaotic future. It can be avoided provided we learn from history.

The History and future of Tammerkoski and its banks – a UNESCO World Heritage?

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ABSTRACT

City of Tampere is located in scenic surroundings on a neck of land between two large lakes: Lake Näsijärvi to the north and Lake Pyhäjärvi to the south. The two lakes are connected by the one-and-a-half kilometre long Tammerkoski rapids, which descend 18 metres from north to south.

In the 19th century, several paper and textile mills and machine shops were founded along the banks of the rapids. The change of Tampere's industrial structure began already in 1928 when the Frenckell paper mill was closed. The municipality bought the plot and its buildings to demolish them in order to build a new town hall and apartment buildings. The war in 1939 and shortage of money afterwards saved the old beautiful buildings. They house nowadays municipal offices and a theatre.

There were over 37 000 working places in the City was in 1970, twenty five years later less than half of that number. The job loss has been offset by a proliferation of jobs in the service sectors and public administration. In the 1960's two universities were founded in Tampere, one of them a university of technology. The Nokia group has extensive research and development facilities in Tampere.

Verkatehdas, a massive 19th century industrial complex on the eastern bank of the lower rapids was demolished in the late seventies. A shopping mall, a high-rise hotel and several blocks of flats replaced it. The demolition decision sparked strong public dissent. Ever since, the general consensus of opinion has been to preserve the remaining old mills, so important to the cityscape and the reminder of the history of the city.

Finlayson textile mill on the western bank of the upper rapids was the greatest factory in Scandinavia in the late 19th century. The factory was closed in the beginning 1990's. Most of the buildings are preserved housing ITC-offices, office of the regional newspaper, restaurants and a cinema-complex. A few smaller warehouses were demolished and replaced by new apartment buildings.

Tampella metal and textile works were on the opposite banks of Finlayson. The company and the city arranged an architect competition of the reuse of the area in the year 1990. The new town plan was accepted by the City council in the year 1995. All the old red brick factory buildings alongside the river are preserved housing now offices, the Law Courts of Tampere and the city museum "Vapriikki". Some factories from the 1950's and 60's behind them are replaced by modern apartment houses for almost 2000 inhabitants.

TAKO cardboard mill stays on the western bank of the rapids even today. There is often plenty of smoke coming out of the high smoke stack and several smaller pipes. However, it is only steam. The factory will be closed in the future, but I am sure, the building shall stay on the place quite in the hearth of Tampere. I suppose the building can be used as a shopping centre, offices and perhaps housing, too.

The city grew along the Tammerkoski rapids. The waterfalls, the red-brick factory buildings edging the rapids with the smokestacks and the green parks now surrounding the once-industrial sites are an important feature of Tampere's cityscape. The ones with historical value are to be preserved as landmarks. In 1995, the Department of Environment designated the industrial cityscape of the Tammerkoski Rapids part of the Finnish national heritage. This was the first time in Finland that this status has been granted to an urban environment.

The centre of Tampere and main shopping areas of Tampere are located on both sides of the river. On the banks there are parks, restaurants, theatres, hotels, stadium and offices in old factory buildings. The banks of the rapids are and shall be developed in the future as the recreation and entertainment centre of the city.

There are plenty of old factories in new uses in many cities in the world, but I do not know any other town, where the preserved factories are located so well and nicely in the centre with beautiful parks alongside the rapids.

The UNESCO World Heritage List includes plenty of old churches, castles, palaces and cities, but only few factories or industrial sites. Our City Board has suggested that Tammerkoski rapids with its banks should be added to the Heritage List. Dear Ladies and Gentlemen, what do you think of the idea?

Sanitation: situation versus policy

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Keywords: Health, sanitation, Walter

ABSTRACT

Before the industrial revolution, people of the northern hemisphere enjoyed health like others in the rest of the world. Then, trachoma, cholera, malaria and leprosy were globally common as they are today in the developing world. Lack of clean water and sanitation, inadequate personal hygiene, poor housing and malnutrition were identified as the fundamental reasons for their prevalence. Today, access to good water and sanitation is no longer a problem in the industrialized world thanks to a dramatic change in their circumstances. The result is that water- and excreta-related diseases have reduced to virtually zero. This dramatic improvement happened for one reason: their recognition of the relationship between contaminated water, poor sanitation and disease, and measures taken to break this relationship. However, the situation in developing countries is still as alarming as it was, if not worse. This paper attempts to highlight the water and sanitation situation in general as a prerequisite to health: what sanitation stands for, reasons for its low attention, and why it is important and should therefore be given special emphasis. Second, a critique of the global sanitation picture is addressed as against the adverse impact of poor water and sanitation service levels in the developing countries. Third, Ghana's sanitation coverage and policies are considered with their associated health implications. Finally, certain sanitation policy recommendations are made for consideration by the Ghanaian government.

Reconstructing the history of a Roman aqueduct

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Keywords: Roman, Aqueduct, Campania, Calcium Carbonate, Geochemistry

ABSTRACT

This paper presents work in progress on the Aqua Augusta, a 100km long Roman aqueduct that served the settlements of Campania, including Naples and possibly Pompeii.

The major part of the paper will be the presentation of the preliminary results of the analysis of samples of sinter (or calcium carbonate deposits) from the ancient aqueducts and water systems of Campania, Italy. Water issuing from a spring has a characteristic composition of trace elements and stable isotopes related to the geochemistry and hydrology of the aquifer that supplies the spring. This characteristic composition is also generally reflected in the sinter derived from the water. Thus it is often possible to distinguish between different sources that fed ancient aqueducts by comparing the composition of their sinter deposits. It is thought that there were multiple aqueducts supplying the settlements in Campania in the Roman and Late Antique periods and the uncertainty over which aqueduct supplied various water-containing archaeological features may be able to be resolved in this way. The aqueduct attribution of extant sections may be able to be similarly resolved.

Information about the history of these aqueducts, including periods of disuse and final breakdown, may also be reconstructed from microscopic examination of the stratigraphic layering present in many of these sinter deposits. In certain favourable samples, the chronology may be made more precise through uranium series dating.

Boise, Idaho's municipal water supply controversy: one hundred fifteen years of private ownership

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Keywords: water supply, privatization, municipal utility ownership

ABSTRACT

Prior to 1880, private investors owned over 50 percent of the municipal water systems in the United States. By 1920, municipal governments had acquired approximately 68 percent of the water systems and by 2005 municipal governments or water districts owned 85 percent of the water utilities in the United States. Urban historians attributed the decline in private ownership of water utilities to a number of causes including: disagreement over water rates, refusal of private corporations to provide water to unprofitable sections of town, inadequate volume or pressure for fire protection, and high rates of disease caused by unsanitary water. Although all of these issues were debated in Boise, the water supply has remained privately owned for over 115 years. Boise's citizens have long spurned municipal ownership of utilities including the public water system. The spirit of private enterprise, western individualism, and the anti-tax libertarian leanings of the citizens of Boise coupled with the conservative Idaho constitutional requirements related to municipal bonding are contributing factors responsible for the continued private ownership of Boise's water system.

Historical perspective to pollution control and recycling in food production and consumption in Finland

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Keywords: agriculture, reclaim, reuse, recycle, fertilizer, water eutrophication

ABSTRACT

From the early dawn of civilisation man has had to struggle for survival with the nature. Development of agriculture gradually provided the knowledge to master the growing of domesticated plants. One hundred and fifty years ago in Finland more than 85% of labour force was needed to produce the food for the people. Today only some three percent of population get their living directly from agriculture. Today we are living in a post industrial society where connection to the nature is not as self evident as it was at the times of agricultural society. Special attention was then paid to Reclaim, Recycle and Reuse all organic waste and fertilizing material. Today industrial fertilizers are extensively to used and human excreta and even cattle manure is often considered to be waste material. Environmental concern is focused separately to different phases of food production and consumption. The total sustainability of the food production and consumption system can be evaluated with the RRR criteria (Reclaim, Recycle and Reuse). This kind of multidisciplinary understanding should be developed to assure sound environmental practice of the whole food production and consumption chain.

Diversity in water supply services management: case Lapua-Seinäjoki region, Western Finland

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ABSTRACT

Despite of the fair challenges in water supply, the service coverage of public water supply today is very high – close to 100 % - and quite significant food industries have concentrated in the region, like the meat-giant Atria (water demand 1,5 million m³/a), the Altia distillery (1,3 Mm³/a) and the Valio dairy (0,7 Mm³/a). The municipalities and customers are very satisfied with their water supply services, and the present management structure is considered well-functioning and effective (despite of the almost full public owner). Against a rather general perception, abundant supply of good quality raw water for potable water production is not self-evident in all parts of Finland. Lapua-Seinäjoki region in the western part of central-Finland is one area, where availability of good quality water is scarce. Lapua-Seinäjoki region here stands for eight towns, served by two intercommunal water providers: Kyrönjokilaakson vesi ltd and Lappavesi ltd.

A typical feature of these towns is that they consist of a commercial centre and several rural villages with 50-300 people. The villages are often located as far as 15-25 km away from the centre. As many towns have virtually no good quality potable water resources, genuine problems in getting water has during the past decades called for both private initiative and innovative solutions in water services management. It has lead to quite significant regional water co-operation as early as 35 years ago (Lappavesi was established in 1973).

Lapua-Seinäjoki region is geographically a flat area with few lakes of any meaningful size, characterized by intensive agricultural activity, especially potato farming, poultry and piggery. There are numerous groundwater sites, but most of them just with capacities of some hundreds of cubic metres per day, and yet many aquifers suffer from considerably high iron, manganese and natural organic matter (NOM) concentrations. Most surface waters are quite challenging from potable water production point of view, and thus are only used in a few cases - either as a supplementary or a back-up raw water source.

The villages - earlier supplied by private water co-operatives from their own point sources - have now joined the clientele of Lappavesi, but the co-operatives still remain in-charge of the water distribution and customer management in their respective “historical” service areas. Those eight municipalities that own Lappavesi and Kyrönjokilaakson vesi have also kept their own waterworks operating. The municipal works take care of the networks and customers in and around the commercial centres in Lapua and Kauhava towns, and practically the whole communal area in the other six towns.

Since 2004 the two intercommunal potable water providers have a co-operation arrangement. Lappavesi buys up to 2 000 m³/d of water from Kyrönjokilaakson vesi, and the companies also provide one another a stand-by water supply. On top of that the two companies co-own one water treatment plant, have developed a close co-operation in the field of R&D, and also have joint plans for future expansions of water exploitation.

Lappavesi operates 12 water intakes with in all 27 groundwater wells, two chemical water treatment plant, one small alkalization plant, 2 booster stations and 156 km of water mains. For our 365/24 operation the production staff is 3, distribution staff 1 and office staff ½+½. Annual water sales are 3,9 million m³ and annual invoicing is 1,4 million EUR (0,36 EUR/m³).

The municipal utilities have to cover their whole O&M cost plus some 8-10 % interest on the capital invested by the municipality. This brings the water tariff to some 1,00-1,30 EUR/m³.

The small co-operatives mostly work on voluntary “actual costs covered” principles and only charge their customers the Lappavesi tariff plus some overhead to pay for their electricity, accounting and maintenance and spareparts as necessary. The tariffs are generally in the range of 0,40-0,60 EUR/m³.

Debating the urban water cycle: the destination of rainwater

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Keywords: Urban water management, Rainwater, Infiltration, Germany.

ABSTRACT

One of the most striking features of the growth of historical studies of technology has been the separation of those who are interested in history of technology, especially historians and engineers. Despite all contradictions and using the example of urban water infrastructures this paper from an engineering perspective seeks to contribute to the issue: how historical insights do matter.

In urban water management the question about the destination of rainwater became increasingly controversial in the 1970s. Since the formation of the conventional approach of water and waste water infrastructures and its wider diffusion this question had been answered. At the same time water supply and sewage disposal have been increasingly developed as separate fields of engineering.

Today in Germany especially rainwater infiltration is often seen as a more sustainable solution in comparison to general drainage. It seems to be valuable to look at this transition in more detail, in order to gain a broader understanding of the process rainwater infiltration reached the status “state of the art”.

Infiltrating rainwater offers desirable prospects for both fields: recharging the ground water body as the main source for water supply in Germany as well as solving problems of sewerage. Building on that the following case study is focused on the questions, why and how rainwater infiltration could have been primarily established as an approach of sewage disposal rather than one of water supply.

The conclusions point to the context in which a debate takes places and decisions are made as that defines the frame for therewith related processes. Beside information about certain techniques history provides insights into the construction of the context which means a co-construction of technological solution by society.

Hungarian flood control: past and future

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ABSTRACT

The geographical conditions of Hungary, from the point of view of flood risks, are rather unfavourable. The country lies at the lowest, deepest part of the Carpathian basin, with floodwaters arriving from the surrounding upland catchment areas (mainly from the Alps and the Carpathians at between 1,000-3,000 metres altitude), carried by the Danube, the Tisza and their larger 16 tributaries. These floodwaves have to be accounted for, since they can easily lead to flood emergencies.

The unfortunate geographical conditions of the country from the point of view of floods are worsened by the fact that Hungary is a country of climatic extremes: the wet, floody periods bring an abundance of water and these can be followed by long-lasting droughts. These two factors, the unpredictable nature of the weather make the improvement of flood defence more difficult: a longer dry period weakens significantly the social approval of improvements in flood protection, resulting in their financing becoming impossible.

Therefore, in the long term, we observe the improvement in the flood protection as shaped by the necessary, economical and social demands of the time; however, the more significant, concrete steps in its development have almost always been brought forward by a serious flood catastrophe.

In our article we follow the history of Hungary's flood protection from the first written note on a flood (AD 1012, Duna), through the primitive medieval local flood protection improvements and later the comprehensive river management and flood protection of the Tisza in the 19th century, continuing up to the current situation.

Until recently it was generally believed that the management of the Tisza in the 19th century – according to a plan, which, with its integrated nature, was considered to be at an outstanding level throughout Europe – would be a satisfactory and final solution to the serious problems experienced along the river. However, in recent years continuous rising of the highest flood waters (often 2-3 metres) have been observed. This was followed by the raising of the crown level of dams. Changes in opinion and the need for re-thinking was brought forward by the record floods of the last eight years (November 1998, March-April 1999, April 2000, March 2001, April 2006) that have caused serious casualties, sometimes even human deaths, and high expenses for reconstruction. The increasing maximum water levels of floods and the decreasing time between their returns has shaken the trust in the use of mathematical-statistical methods. It has become a re-occurring question whether the returning unusual floodwaves are natural in a statistical sense, and whether raising the dams ever higher is indeed a sustainable solution.

In relation to changes in opinion it is important to mention the shift in emphasis from flood defence to management and prevention, using solutions that are sustainable in the long term and which take into account the ecological considerations.

The relevance of the histories of water laws in Europe and its former colonies for the rural poor today

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Keywords: Roman water law, permits, water trade, customary water rights, poverty, gender, rural development, integrated water resources management.

ABSTRACT

Permits (or administrative water rights, licenses, concessions) are globally promoted as the supposedly best legal device to address growing water scarcity. However, a closer look at the history of this device in high-income Europe on the one hand and its low- and middle-income former colonies in Latin America and Africa on the other hand highlights critical differences that have major, but hitherto largely ignored negative impacts on poor water users in the informal rural and peri-urban economies of low- and middle-income countries. This paper describes these differential development paths and their contemporary implications. The paper starts with the origins of permit systems in Roman water law and their double dimensions of both obligation and entitlement. On the one hand, permits for using water declared as 'public' served as a tool for the collectivity to impose regulations in the common interest – an 'obligation' dimension which has been amply documented. However, by imposing state ownership and permits, Roman rulers also overruled prior water rights systems of conquered tribes, dispossessing those tribes from their prior claims. This aspect of dispossession intrinsic to permit systems has hardly received attention.

The paper continues by tracing how in Europe itself, Roman water law evolved into the civil and common water laws in which water users obtained considerable powers vis-à-vis the state. It was only in the 1960s that permit systems were somewhat revived to better address modern water problems, in particular pollution in by then highly sophisticated water economies. Effective allocation of water under scarcity through permits, and most recently trade in permits have remained rare in high-income countries. It only occurs in arid areas, like Australia and the Western USA, where permit systems have evolved over a century of intensive and legitimate state control over infrastructure and institutions.

This history is in sharp contrast with water laws in Europe's colonies in Latin America and Africa. Here, colonial rulers primarily introduced water law derived from Roman law because of the dispossession dimension. By vesting ownership in the colonial minority and imposing the obligation to register for a permit, prior claims to water by existing inhabitants were overruled. As evidence from a dozen low- and middle-income shows, the contemporary revival of permit systems, through various processes, risks dispossessing the large majority of citizens, typically including poor illiterate informal water users who highly depend upon water for their fragile agriculture-based livelihoods. Their current claims to water are governed by customary and informal arrangements that recognize water as a shared and commonly owned resource. The paper concludes with examples from governments in the Andean region and Southern Africa that contest the colonial legacy of dispossession of permit systems and increasingly apply more pro-poor legal tools for regulating the various aspects of water management.

Writing on a river: a biography as a method of writing environmental history

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Keywords: River, biography, environmental history, Vuoksi river

ABSTRACT

A river is many things at the same time. It can be a source of power, a border, and a source of livelihood and a basis of regional identity. How can all these aspects be studied without producing fragmented and unworthy information? In my presentation I will discuss the benefits and disadvantages of the biography as a methodological tool in environmental history and in water research. What is a definition of a biography of a river or of a natural target compared to more traditional meaning of the word? My question is why biography is a useful tool to make research on environmental history of a river? What theoretical perspectives and concepts support the idea of biography? Have Finnish researchers written biographies of rivers or other matters in water history research?

My discussion is based on research work done in South Karelian Institute's Vuoksi-project. We are currently writing a book about the river Vuoksi and I am also a PhD student and the subject of my thesis is "River Vuoksi as a common pool resource between Finland and Russia". The Vuoksi runs from Lake Saimaa to Lake Ladoga and it also runs through four power plants, two in Finland and two in Russia. The river was born some 5 000 years ago and it has experienced many changes both man-made and natural. Today the area of Vuoksi river basin is also an important recreational area. One of the main questions in my thesis is to discuss the concept of common in Walter research.

Towards the history of the Neva River fisheries: sources, methods, general tendencies (15th - 18th cc.)

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ABSTRACT

The river Neva is one of the most important rivers of the Baltic Sea basin. It flows from the lake Ladoga to the Gulf of Finland. The fish population in the River Neva is rather significant until nowadays.

At the same time the history of fisheries in the river Neva is not studied yet. The main attention was paid to the history of agriculture that was the most important occupation for the inhabitants of this area before the foundation of Saint-Petersburg. As for the history of the 18th c., the different aspects of the development of the city of Saint-Petersburg were studied. Thus, the paper proposed is the first attempt to start the investigation of the fisheries in the river Neva.

The Scribe book of the early 16th c. shows the distribution of the fishing stations in the Neva downstream. The significant population of the riverside villages possessed the fishing grounds in the region catching salmon and whitefish. In the late 16th c. these stations were controlled by the population of the town Oreshek (Noteburg).

In the 17th c. the territory was owned by Sweden. The Swedish 17th c. maps are the most important source of information on the development of the fisheries in the region. The fishing stations are marked on the maps among the other objects. The Swedish documents on the history of fisheries in this region in the 17th c. are kept in Stockholm and are to be studied later.

The maps are also one of the main sources for the history of the fisheries in Saint-Petersburg in the 18th c. According to the different maps the fishing stations were operated actively through all the 18th c. The newspaper St. Petersburg Bulletin is an important source for the further research.

Introduction

The Neva River is one of the most important rivers of the Baltic Sea basin and its fisheries was significant during centuries. The Neva River (74 km. long) is the shortest big river in Europe. It flows from the lake Ladoga to the Gulf of Finland. At the same time Neva River is one of the most full-flowing rivers in Europe, its average water discharge is 2530 m³ per sec. So, Neva is one of the most important fish rivers in the Baltic region. In 1987 46 species of fish lived there.

The history of the fisheries of St. Petersburg region is not studied yet. This branch of economy never attracted the attention of the historians, and no special works dedicated to the history of fisheries in this area were published. For the early period the main attention was paid to the history of agriculture that was the most important occupation for the inhabitants of this area before the foundation of Saint-Petersburg. As for the history of the eighteenth century, many different aspects of the economy of the city of Saint-Petersburg were studied, but not fisheries.

In this paper we propose to overview the early history of fisheries in the Neva River. The period under study is distinctly split into three subperiods: from the appearance of the first written sources, which reveal the state of economy of the region in the end of the 15th c. up to the Swedish conquer of the region in the beginning of the 17th c.; period of the Swedish power and the 18th c., when the Swedes were displaced and St. Petersburg was founded. This paper is devoted mostly for the first and third subperiods, as the state of Neva River fisheries under Swedish authorities need to be studied on the base of the Swedish sources.

Human impacts on hydrology in Mekong: past, present and future

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ABSTRACT

Globally the human impacts on hydrology e.g. due to land cover changes and other development activities as damming the water have increased remarkably during the last 100 years. The Mekong River is still quite pristine compared to other large rivers in the world. However, the rapid development due to the fast growing economies, especially in China, Thailand and Vietnam, is putting stress on the use of water resources, as hydropower construction and irrigation.

This article will give an overview of the present human impacts on the hydrology in the Mekong. It will also discuss about the future challenges and possible impacts due to climate change, rapidly increased hydropower development and large scale irrigation schemes. To understand the present and future, it is important to understand the past as well. Thus, the Angkorian time, between 8th and 15th centuries, and their human driven water management impacts on the natural hydrology in their capital Angkor are presented and analysed.

The main driver of the ecosystem productivity in the Mekong system is the regular flood pulse providing ideal conditions for e.g. fisheries. Changes in hydrology, as timing and volume of the flood, might have severe impacts on the ecosystem and people livelihoods that are, in many areas along the Mekong, fully depending on natural resources.

Driven by these challenges and research questions, the objectives of this paper are to:

- Give an overview of the human impacts on hydrology in the Mekong region in past, present and future
- Summarise and discuss the impacts of possible hydrological changes on ecosystem and its productivity
- Discuss the challenges the Mekong region is facing due to the possible hydrological changes in the future.

Water as a theme in Finnish art in the 20th century

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Keywords: Art, theme, landscape, symbol

ABSTRACT

Water in Finnish art reflects the mental landscape of the nation and the people, its changes with times, and their historical-political trends. The paper is a part of the thesis *Water in the Minds and Art of the Finns in the 20th Century*.

We can examine water in art in different ways. We can focus on its appearance in general and make conclusions on that. We can concentrate in it as a part of the artist's way of handling the water theme in a certain historical period. Water as an element of a painting can be seen in its basic forms in the landscape painting as a lake, a sea, a river, a pond, a well, or a fountain. In the landscape painting it can appear as rain or a rainbow, or as fog, snow or ice. It can appear in the relation to people's life and work. Water can be the source of power in a watermill. It can be a means of transport when people are sailing in boats and ships. It can be a source of livelihood when people are fishing or floating timber. It can be a necessity of household when people are taking water from a well or washing laundry, bathing in the sauna. Finally it can be a place of leisure. Water can have a purely aesthetic role in sculptures, especially in fountains.

The landscape was the most popular theme in Finnish painting at the beginning of the 20th century. It belonged to the rise of the national identity and the general patriotic pictography of the time. 90% of the landscape paintings between 1900 and 1920 contained water in one form or another. In most cases water appeared as a self-evident part of the landscape, or as a silent, passive background of activities.

Frequently water had a symbolic meaning in art. A fabulous sea surrounded the "island of the love". The dark river of Tuonela separated the land of the living from the realm of the dead. A rapid or a waterfall breaking its way through rocks or ice pictured Finland's struggle towards its national independence under the Russian rule.

Expressionism got a foothold in Finland in the 1920's. It meant a change in the choice of themes. Urban views, pictures of work and industry came in sight. On the other hand, artists became aware of the leisure with the popular beach life of the time. But the use of water in art diminished in general.

Modernism broke out in Finnish art as late as in the 1960's. Though art inclined towards the abstract water still existed in it, sometimes as a colour or an allusion only. Water appeared in a subconscious way as the frequent use of blue colour. This can be understood so that water still formed a hidden undercurrent in the souls of Finnish artists. Some artists were concerned of saving pure Nature. Concept art and performance art frequently used water as a matter itself or as the surroundings of the works. In experimental art forms water was used in its various forms of physical existence: liquid water, ice and steam. Besides, water alone or combined with sound and light is used in mixed artworks.

The changing role of water in Finnish art during the 20th century is emphasized in this study.

Irrigation management transfer: old ways for future water management

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Keywords: irrigation management transfer, local management, integrated water resources management, development.

ABSTRACT

Irrigation management transfer (IMT) can be seen as part of the “Blue revolution” in empowering local management and water related social capital that has roots in history. With inquiry IMT is seen as an approach towards Integrated Water Resources Management (IWRM) and further to development more generally.

Environmental history and future of the urban hydrological cycle in Helsinki, 1850-2050

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ABSTRACT

The paper aims to study main changes in the history of the urban hydrological cycle in Helsinki during three different stages in 1850-2000. The aim is to take a holistic look at the city and examine, on the one hand, how urbanisation has changed the state, uses, and representations of rain water, surface water, ground water and sea water in a coastal city. On the other hand the aim is to evaluate how changes in these water bodies and related water reserves have affected the city, its different areas and social groups. The following stages will be studied, pre-industrial town of the 1850s, the networked industrial city of 1900, industrial cities connected with networks in 1950s and post-industrial city in 2000. The possible futures of the urban hydrological cycle will be examined in 2050.

War and water in the city

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ABSTRACT

War is one of the biggest natural disasters to hit a city and its water resources. Some even predict that the future wars will be fought over water.

Water was not the cause of any major 20th century war. Water was, however, greatly affected by both World Wars. This was especially the case in the war zone, but also in the cities – even in those situated far away from the battles. In this paper I will discuss how wartimes led to water pollution and changed people's attitudes towards water in Finnish cities, especially in the city of Turku in South-West Finland.

The river Aura, which runs through the city, was already seriously polluted in the early years of the 20th century because numerous industrial establishments, as well as the new sewer system, led all waste water untreated to the river. Although Turku was far from the actual battlefields of the World Wars, both wars had striking effects on urban water and attitudes towards it.

During the First World War the local industry experienced an unforeseen boom manufacturing war products for Russia. Water pollution became a subject often discussed in the local press and in the meetings of the city officials. Turku also suffered from a serious lack of drinking water partly caused by the war: as the value of money plunged, the city had no means to build new water pipes or search for new water sources. After the war the city was faced by the grim fact: drinking water had to be taken from the polluted river.

The situation led to environmental improvements: a new sewage treatment plant was designed in the early part of the 1930's, although not yet built because of economic depression.

In the late 1930's the economy and industry again flourished. Even WW II did not reduce the amount of industry in Turku at all. On the contrary, Turku produced weaponry and other supplies for the Finnish army. After the war industrial production in Finland rose quickly because the country had to pay massive war reparations to the Soviet Union: at the time Turku was one of the main industrial centers in the country. This, together with the fast rising number of urban inhabitants, meant a considerable rise in water pollution right in the middle of the city.

The recession of the 1940's killed all hopes to build a sewage treatment plant in the near future. Industry and the growing number of water closets guaranteed that water pollution soon became the most urgent local environmental problem. This led to increasing awareness of environmental issues and visibility in the local press. The late 1940's already witnessed the first public meetings on water pollution and also the first restrictions imposed by the officials to industrial establishments.

Two seemingly very different kinds of wars had a very similar effect on urban water. War led to pollution and environmental deterioration, but soon also to growing environmental awareness.

Rivers, peripheries, and politics in the making of Japan's modern history: the case of Toyama

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Keywords: history, Japan, rivers, public works, development, dependence

ABSTRACT

This paper examines water history, particularly riverine history, and its relevance to setting the political and economic developmental agenda for Japan during the nineteenth century down to the present. In considering “river politics,” it explores the historical continuities evident in Japanese responses to environmental problems and the ways in which the usually contentious political interests of nation, region, and locality are apparent in the struggle to secure river resources and massive funding required for riverine control.

Toyama Prefecture's case captures representative dynamics of river politics in the making of Japan's modern history. In the actions of Toyama leaders we see an implicit understanding that reality, to borrow the Inuit word for the term, is “the thing turned towards you.” A very pointed reality for people in regions beyond newly created cores of central political power in Japan from the late 1860s was the threat of becoming politically irrelevant and economically underdeveloped. Falling off the central political map injured local pride, but more importantly the loss of a new national treasury's fiscal support threatened the creation of economic backwardness. In fact, the region in which Toyama is located came to be known as the “backside of Japan” early in the creation of a new centralized political order from 1868. Although the expression is considered politically incorrect today, it is still used and readily understood by people in and outside the “backside” zone.

In many regions, local politicians relied upon river politics, a paradoxical practice that both posited the locality's irreplaceable importance to the state and utter dependence upon it. Initially, this was not because of unmitigated respect for state authority or developmental priorities. But the strategy that at first encouraged national involvement in local affairs often fostered ever greater dependence on central budgets and a peripheral place in the ordering of state priorities.

This paper examines river politics as they developed in Toyama prefecture from the 1860s and the implications this pattern of development had for the entire nation and central political practice. Negotiations with the state over allocations for flood control and related projects helped create practices and asymmetrical relationships that eventually became routinized as the way the region must relate to the center. This was true not only for Toyama, but for other prefectures. The practice and its variants continue to be a deeply rooted part of Japan's contemporary political practice, one that has frustrated contemporary administrative and fiscal reforms, including those attempted by the recent governments of Prime Ministers Koizumi and Abe.

Watershed management: a link between history & future of Indian hydrology

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ABSTRACT

Recently, the population pressure in India has resulted in encroachment on forests and pasturelands for agricultural purpose. Moreover, the uncontrolled exploitation of forests for timber and firewood has caused degradation of watersheds. The streams draining these watersheds, now give rise to hydrographs of sharp peaks and narrow time base. They are also loaded with silt. The forthcoming climatic pattern is going to be harsher and is sure to accentuate these changes when the Monsoon rains would become more erratic, causing frequent flash floods in some areas and severe droughts in others.

Under these circumstances, there is a need to create a buffer or a resilient interface to absorb the shocks of the climatic changes and to provide some insurance for the water managers. A properly managed watershed, preferably a micro-watershed of a first order stream, provides such an interface. The soil surface with its cover of grass or forest, properly tilled farms with contour bunds, farm ponds, check-bunds on small streams or gullies, and contour trenches on hill slopes, are the meeting points of climatology on one side and hydrology/hydrogeology on the other side. India and also other low-income countries should therefore give priority to land-use planning and watershed management with people's active participation. This would be a strong link from glorious past to a sustainable future of surface and ground water resources.

Hydro archaeology as a methodology for a better understanding of culture development in a water history perspective: implications related to the flood history of lake Malaren, Sweden.

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ABSTRACT

Culture development in a regional setting is very dependent on the availability and use of water, rivers and lakes. The water history of geographic regions may explain many factors that still influences the modern culture of a place. One of the important processes that influences cultures is climate change. This is not a new phenomena and may have been dramatic in a regional historical context.

A hypothesis is that the effect of climate change on culture development can be further understood by the combination of several disciplines, in particular hydrology and laborative archaeology. In this paper it is called Hydroarchaeology. Also adverse effects of environmental hazards, such as water pollution from the technical environment and agriculture may be enlightened by such an approach.

The combination of contemporary methodology from the disciplines of hydrology and laborative archaeology applied on water history studies, may add many new findings to earlier analysis and conclusions in the field of water history. In the ongoing evaluation on the status of the worlds lakes by ILEC and UNEP, methodologies have been developed for a better understanding of lake histories as well as predictions for future development. This paper presents elements in such an analysis of Lake Malaren with the emphasis on the results from a flood history analysis on the Lake Malaren and its catchment area and also a hypothesis of how floods may have the influenced the regional culture development around Lake Malaren.

A limiting factor in the analysis of culture development, is the concept of water table. The surface level in the environment as well as in lakes and the sea, may be reconstructed with methodology from laborative archaeology. Precipitation as a major factor responsible for floods and changes of the ecosystem can be elaborated upon by new findings that tell us much more about the local water history when hydrology models can benefit the use of archaeological findings. The concept of water table and its level during a chosen period may be established with more accuracy including specific data, by such findings.

Historic engineering constructions in the catchment environment related to water and water control may cause unwanted interactions. It may cause changes related to design requirements that come from culture demands related to local values. These hydrology dependent factors are important to consider in relation to a more detailed analysis of culture development and this paper presents such an analysis of Lake Malaren. The paper will additionally present an analysis of elements that can be used in a combined methodology model as to how hydrology and laborative archaeology can support water history studies, a specific methodology for Hydroarchaeology.

Water history in Easter Island and extreme northern Chile

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Keywords: water history, water legislation and management

ABSTRACT

The United Nations Millennium Development Goals (2000) recommend a trend toward sustainable development principles in Tropical Regions, encompassing social, economic, political and environmental components. The concept of environment incorporates the physical amounts of renewable and non-renewable resources, water being the most essential natural capital. The paper focuses water history in Chile and its relevance to local economies development through times, using two case studies that currently represent opposite water management approaches from quite frail ecosystems: i) A tiny Pacific island without a single river, located far away from the mainland, which water legislation and management have so far been devised without aboriginal peoples participation, yet fulfilling basic social needs; ii) Remote South American territories, mineral rich Andean semi-desert areas, whose water management has been dictated by economics. Water legislation in analysis will be one sole, for both territories are part of the Republic of Chile. Water legislation has not been equally applied to the whole country though, making the illustration of contrasting water privatisation and centralised management models possible in a single Latin American country. Case studies display diverse jurisprudence, based on disparate historical background and political status of regions, on mineral availability and exploitation through times, and resulting into dissimilar eco-environmental impacts. In fact, while climate change, water privatisation and high intensity industrial activity have impacted a near desert environment and are provoking dramatic surface and groundwater shortages in Extreme Northern Chile, on Easter Island rainfall fed hydrous systems have not been targeted by water concessions to private businesses so far, the vital good being provided by exclusive public servicing, founded on historically centralised policy options that have maintained freshwater quality and quantity over a remote, poorly resource provided and rather critical Pacific island ecosystem.

Challenges prompting water utility restructuring In India

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ABSTRACT

Economy of India and life of majority of the population are closely related to agriculture, the largest consumer of water. Agriculture consumes nearly 70% of all available freshwater. Agriculture and related activities contributed nearly 25% of the total Gross Domestic Product (GDP) of India. Agricultural products account for 12% of total annual exports of the country. However, 62% of the cropped area is still dependent on rainfall. Indian agriculture continues to be fundamentally dependent on the weather. Here lies the importance of the protection and management of water to envisage future challenges.

India is rich in water resources, being blessed with a network of great rivers and vast alluvial basins to hold groundwater. Though the rainfall over India is slightly above global average, its uneven distribution leads to occasional floods and droughts, in different parts of the country. This disparity in rainfall is reflected in water resources and this is a permanent issue in water management in India. Under the pressure of rapid population growth, the available resources of water are being developed and depleted at a rate faster than replenishment. Integrated plans for protection, management and efficient utilization of rivers become important in this context.

Exploding population, measures to maintain food security, urbanization and industrialization pose serious threat to the availability of reliable water. Population increase is expected to stabilise at 1.5 Billion, nearly 50% more the present level only by 2050. India is going to face a very serious water scarcity in two or three decades, unless new resources are identified and effective conservation and management measures are not resorted. Two-third of India's available freshwater is lost due to evaporation and runoff into the Sea, while there exists a freshwater crisis in many parts at different times of a year

There are number of factors that affect the water quantity and quality in India including industrialization, agricultural development, changing land use patterns, overuse of surface and groundwater, and after all the careless use and inefficient institutional mechanism for the management and conservation. Rapid urbanization and urban migration not only pollute the water tremendously, but also makes the water resource allocation very complex. Only 35% of the farm area is irrigated, when majority of the water runs off into the Seas unutilized. A comprehensive assessment of the water resources of India and the relevance of the existing water policy in a changing environment is attempted in this paper. Results show a rapid decrease in the availability of reliable water in all parts of India in near future, highlighting the importance of the efficient management of water resources in maintaining food security and national economy and also the life security of millions of poor that depends on agriculture. Despite extensive efforts to conserve and manage water resources, water demands continue to rise, and availability continue to fall. According to the report of The Guardian. (2006) in much of India, the rivers have long-since dried up, and the only water is underground. In the last decade, more than 20 million farmers have bought drills and cheap Yamaha pumps to bring water to the surface and irrigate their crops. As a result, water tables that were until recently only a few meters from the surface are now hundreds of meters down..

Reformation in agricultural sector is urgently needed in maximum and efficient use of water and in minimizing input of pollutants. Policy packages using a mutually reinforcing mix of institutional and policy reform, and legal, economic and management instruments will be needed. Strong political decision by the state to implement the rules and regulations is most important.

Hygiene, societal consciousness and dacha space around St. Petersburg (2d half of XIX – beginning of XX c.)

Olga Yu. Malinova

ABSTRACT

Urbanization, together with development of science and technology in the second half of the XIX c., among other things caused multiple changes in district division of large towns and cities, their dwellers' everyday life and consciousness. This conclusion hardly ever produces disagreement, yet the middle link in the argumentation seems to be missing. No doubt, changes in everyday life of a city are not possible unless society gets involved – in this case, unless a considerable part of the city population gets acquainted with scholarly ideas partially implemented in practice, and formulate their response to these ideas. One may not avoid discussing this aspect while studying the development of dacha space around St. Petersburg – territories adjacent to the city precincts and transportation lines, where city dwellers would buy or rent houses for summer. In the second half of the XIX – beginning of the XX c. the city outlines were changing under the influence of all the factors mentioned above. This work focuses on the process whereby results of scientific developments in the area of medicine were tuning into “everyday non-reflected faith,” shared by common people and supported by everyday practices such as persistent struggle with miasmas, organic remains, and later, with microbes. B. Latour, an outstanding historian of science, defined this process as a “concluding stage in successful efforts of scientists to make the world believe in scientific facts discovered.” Focused research of the process thereby citizens of St.Petersburg appropriated new medical knowledge and the way this knowledge turned into “knowledge-faith” is an important aspect in the research of everyday life of the city, as well as the mass culture of pre-revolutionary period.

History of water in Tanzania: past, present and future

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Keywords: Water Wealth, Indigenous technology, Cost Recovery, Willingness to Pay, Private Sector Participation

ABSTRACT

Systematic state interventions in the water sector in mainland Tanzania began around 1930, when the government started to use public money to build water schemes. The beneficiaries were towns and townships as well as few private estates and missions, and the beneficiaries would pay for all post-construction costs. The Department of Water Development was founded in 1945. It constructed schemes for local authorities, private estates and Native Authorities. Beneficiaries paid for operation and maintenance costs and some or all of the capital construction costs.

By way of reference, the one titled "What is Africa's Wealth? Water is Wealth" (EALB, 1956) is another example on how water development was treated in the early stages of development in Tanzania. In summary provision of water for various needs (livestock, domestic, irrigation, etc) was considered out of need of the users. As such the felt need would put the people in a condition to participate fully in the process of provision of water for their own good. If one rewinds even further back in time 1951 we find that water development was already an indigenously done by people. In the Koenig (1951) in a paper entitled "The Ancient Wells of Ngassumat in South Maasailand" we see how the Maasai organised themselves and the livestock. Indeed the technology was so refined that some schools of thought had that it was imported from the Phoenicians or Jewish explorers.

The 20 year rural water supply programme by the government of Tanzania was put in place in 1971. The thrust of the policy was to achieve 100% coverage in the rural by the year 1991. Even with the population in the 20 years and sizable development partner's money, it would be concluded that foreign assistance for rural development had a miserable record of successes in Tanzania. An issue of cost recovery and willingness to pay as a philosophy was introduced as a necessity and perhaps as a bridging stage to full appreciation of water as a resource. By the turn of the last century the Government realized the need for paying for the services whether water supply or sanitation. As such, the National Water Policy (NAWAPO) was enshrined in the government books by 2002. It was clear that Cost recovery was no longer a philosophy but a reality. Private Sector Participation (PSP) in the provision of water and sanitation services was then put in place by 2003 (Mashauri, 2005).

The future of water in Tanzania is at stake due to rapid population growth and increase in economic activities and also due to recurring droughts. The surface river flow regime and moisture conditions in the country correspond to the general rainfall pattern which is becoming erratic in recent years. Effective assessment, planning and management of water resources as well as for effective monitoring instituting preparedness, response and remedial action against adverse effects of environmental degradation such as pollution of water bodies, drought and desertification and floods, meteorological and hydrological information is needed.

Historic water management of the river basin of the Baaksche beek and the adaptations to the water system as a result of change in land use

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Keywords: historic water management, peak flow flood wave, hydrologic sponge, reclamation, historic maps, climate change.

ABSTRACT

In the Netherlands climate change will result in increasing amounts of precipitation and this is expected to give increasing peak flow flood waves in the Dutch large rivers. In future measures should be taken for adaptation of the water system, to prevent for catastrophes in dense populated areas and in areas with intensive agricultural activities. In the past adaptations of the water system were necessary to make agricultural use and change of land use possible. By studying the reaction of the water system on these adaptations, we can acquire knowledge to solve future problems.

For this study a drainage basin in the relatively high and sandy part of the Netherlands was selected. First information was gathered about the hydrological properties and about hydrological data, such as surface water levels and discharges. Several sources were investigated, such as old maps, reports on hydrological measurements and historic descriptions. From these sources a basin was selected in the eastern part of the Netherlands, the Baaksche beek basin. The chosen period investigated was the period 1850-2000, because relatively much historic data could be gathered for this period. The whole basin is situated within the Dutch border, and the basin was in 1850 in a fairly natural state, with large areas of woods and moorland.

It was found that great changes took place on the water system between the period 1850 and 2000. A great deal of natural depressions in the landscape were connected with a water course, this meant that the possibilities to store water in natural depressions decreased as well. This property can be described as a hydrologic sponge; it acts as a hydrologic sponge by storing flood water temporarily on the soil surface in depressions and releasing it slowly later on. The smaller water courses inundated frequently to the adjacent areas. These inundations are very rare nowadays, about once every 100 years. In the past these inundations were annually returning phenomena. Recovery of the hydrologic sponge property can be used as a strategy against the negative effects of climate change on the peak flow flood waves.

The Water Resources Board: England and Wales' venture into national water resource planning 1964-73.

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Keywords: Water resources, planning, England, Wales, Water Resources Board.

ABSTRACT

Post Second World War Labour Governments in Britain failed to nationalise either land or water. As late as 1965, the idea of public ownership of all water supplies appeared in the Labour Party manifesto and a short-lived Ministry of Land and Natural Resources 1964-66 had amongst its duties the development of plans for reorganising the water supply industry under full public ownership. However, instead of pursuing such a politically-dangerous takeover of the industry, in July 1964, a Water Resources Board (WRB) was set up to advise on the development of water resources. In its first Annual Report (1965) WRB claimed its role as "the master planner of the water resources of England and Wales". Despite its advisory role, WRB had a great deal of influence justifying its national planning role by promoting large-scale supply schemes such as interbasin transfers of water, large reservoirs and regulated rivers. Feasibility studies were even carried out for building large storage reservoirs in tidal estuaries. Less progress was made on non-technical issues which included the biological consequences of mixing river waters and economic pricing was considered to be unlikely to limit demand for water overall. Also underestimated was the political resistance caused by separation of environmental costs of storage development in rural areas from its benefits experienced only in distant urban areas. Yet the seeds of WRB's demise were contained in its restricted terms of reference. The lack of any remit over water quality was a fatal handicap. Quantity and quality needed to be considered together. Review of the work of the WRB has resonance for understanding the current state of water resource planning in England and Wales today.

Chlorine as a point of use drinking water treatment option

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Keywords: Chlorine, drinking water, point-of-use, effectiveness

ABSTRACT

Diarrheal disease is a major cause of death worldwide and has been important in the history of drinking water treatment. Chlorine disinfection at the household (POU) level has the potential to reduce morbidity of diarrheal disease by 25 to 40%. POU treatment systems are advantageous in areas without reliable drinking water infrastructure and can reduce the likelihood of recontamination. Chlorine disinfection is not as effective in reducing diarrheal disease under certain water quality conditions, and it must be used properly. Not all users are aware that chlorine treatment requires proper dosing and a sufficient contact time. Many studies that report the effectiveness of POU chlorine differ from the real world due to the complicated transmission pathways of diarrheal disease, inconsistent reporting methods, and publication bias. Chlorine has a strong potential as a POU treatment option but must be part of a comprehensive plan to effectively interrupt the spread of diarrheal disease.

Water and risk society: water management and historical understanding of water in East Asian societies

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Keywords: social risk, East Asia, water management

ABSTRACT

My paper is based on applying the theories of social risk to water management and historical understanding of water in East Asian societies, primarily Japan, China and Korea. I illustrate the emergence of sophisticated systems of hygiene and sanitation that contributed to public health as well as provide examples of water management – well before historians usually are talking about modern environmental policy. For instance, the Edo period Japanese with its large-scale water systems minimised health risks, contributed to public health and avoided wasting and polluting environment and scarce natural resources. Without the early successes of these policies Japanese society would not have been able to increase its population so rapidly or maintain such large and dynamic urban concentrations as it did. Against the risk society discourse the key question is whether and when the East Asian societies developed reflexive relationship with environmental risks and, in particular, an awareness of the need to save and manage water resources.

Struggling for business survival: water supply in Spain during the Franco dictatorship and the changes in regulation. “Aguas de La Coruña, 1939-75”

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Keywords: infrastructures, institutional framework, municipalisation, public utilities, regulation, water supply.

ABSTRACT

Different legal and political regulatory frameworks have operated throughout history. Their influence over business success or failure has received increasing attention by economic historians, both at the national, regional and local level. This issue is related to other extended discussions, that is, the dichotomy between public and private enterprise, particularly in those activities where efficiency and the interest and welfare of the population are merged. One of these services has been water supply, a sector in which there exists a growing concern about what is the system of property and management that guarantees a higher efficiency of provisioning, that is to say, public (municipal) or private ownership.

The aim of the paper is to examine the factors determining the changes in the systems of management of water supply in Spain during the Franco dictatorship (1939-75). Therefore, our aim is to determine the impact of a specific – anomalous – institutional framework upon business success or failure, through a case study. The unit of analysis is a water supply firm situated in a Spanish medium-sized city, in which the management of the service at the beginning of the twentieth century was commended to private enterprise, under a municipal franchise (concession) system. Nevertheless, with the advent of the new political regime after the Civil War (1936-39), the regulatory environment underwent a gradual transformation, exhibiting dramatic effects in the change in attitude of public authorities with respect to collective services. We attempt to put the research into context, attempting to compare this case with the experiences of other countries in the management of water supply.

The argument of the paper can be summarized as follows. The management of water supply by a private firm suffered an increasing pressure during the dictatorship, with the objective of reverting the control to public authorities, specifically to local – municipal – authorities. In fact, over the long term, this strategy was partially successful, given that it gradually transformed the systems of management of public services in Spain, to such an extent that municipal management became dominant by the 1960s. As a consequence of the tensions that arose during those years, the private company had to face numerous difficulties, which conditioned a more efficient management. Although it is necessary to admit that the latter was negatively restricted by the prevailing autarkic context (which made the purchase of machinery, inputs, technology, etc., very difficult), the transformation of the institutional framework (increasingly interventionist), was probably the decisive factor that restricted the possibilities of expansion of the firm. This process of transition might serve as a platform to enrich recent debates about the systems of management of modern urban services in Europe.

Fluxing relations in water history: conceptualizing the range of relations in transboundary river basins

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Keywords: conflict, cooperation, intensity of conflict and cooperation, transboundary river basins, Transboundary Waters Interaction Nexus (TWINS)

ABSTRACT

The purpose of this paper is to identify the range of relationships that states may realize in the context of transboundary river basin management. There has been much literature on how states have been in 'conflict' or have achieved 'cooperative' arrangements. However, they are often case specific conceptualizations of conflict and cooperation. Conflict has been very usefully conceptualized. Cooperation has not been effectively theorized. Descriptive studies of cooperation have often treated it as an end product of negotiations. This perspective comes from looking at the 'water issue' per se: agreements to share water or treaties to clean up poor water quality.

A wider perspective including the past and ongoing relationship of basin states would show the evolution of basin relations in a comprehensive manner. The advantage of this approach would be, for example, to provide explanations on why certain aspects of river management were failures in a specific time period but were more openly negotiated later on. This paper highlights the scope of actions a state may take in realizing its interest in the use and management of water resources in shared river basins.

The paper introduces the Transboundary Waters Interaction Nexus (TWINS), a conceptual model of some of the complexities of riparian relations. By conceptualizing the levels of intensity of both conflict and cooperation, it shows that these two types of strategies *co-exist* at various points in the history of a river basin. The paper uses the upper Orange River basin and upper Ganges River basin to provide empirical evidence. By dividing the historical time frame of the respective basins, the TWINS model shows the trajectory of relationship; different levels of conflict and cooperation are observed in different periods of development. Analysis shows that the upper Orange has experienced a more dynamic history of transboundary water relations, while such relations in the Upper Ganges have been much less dynamic. The model recognizes the concepts of Hydro-Hegemony that relations over water resources are asymmetric and determined by power relations. A hydro-hegemon – in the absence of international government and international water law – tends to achieve its water management goals. The analysis will also identify the costs of conflict and cooperation strategies.

Ain Zubaida: past, present and future

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Keywords: History, Islam, Engineering, Qanats, Groundwater, Distribution network

ABSTRACT

In the seventh century, the number of pilgrims to the Holy City of Makkah was increased sharply due to spread of Islam over most of the world. As a result, rapid expansion of a city and the surrounding holy places (Arafat, Muzdalifa, and Mina). The fact that the holy places are located in an arid zone of desert with hot dry climate, the residents and pilgrims suffered an acute shortage of water especially during the Hajj season. Princess Zubaida, wife of Caliph Haroon Al Rasheed directed experts of water resources to solve the water shortage problem in holy places. Therefore, they considered collecting groundwater from upstream of Wadi Naaman and transferring it through a network of subsurface canals (qanats) to the downstream holy places. Since ancient Abbasi times, these qanates or Ain Zubaida as named by people provided a good quality of groundwater. The acceleration expansion of holy places in the recent years has resulted in destruction of many parts of Ain Zubaida water distribution network. The new construction of buildings and bridges foundations caused discontinuity of groundwater over the years. Due to lack of a complete sewer system, wastewater has been seeping into the downstream parts of Ain Zubaida and mixed with the groundwater. King Abdullah of Saudi Arabia sponsored a research project to study the possibility of rehabilitation of Ain Zubaida damaged parts in order to resume groundwater flow and get use of it as a supplementary water source for Makkah city and holy places. Also the efforts are continuing to keep Ain Zubaida as historical Islamic engineering construction for the future tourism purposes.

Water history and its relevance in southern Africa

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ABSTRACT

Scholars have long established the value of water a subject of historical inquiry.¹ Water resources of Southern Africa share two broad characteristics: one physical – natural and the other legal – historical. First, the physical conditions such as climate determine, to a great extent, the availability and distribution patterns of rainfall, rivers, floods and drought. Secondly, Southern Africa region also shares a profoundly similar legal history that, in turn, has influenced the governance of water resources in various countries. The legal history based on Roman Dutch law was one of Jan Van Riebeeck's most lasting items of his baggage on arrival at the Cape of Good Hope in 1652. This essay sets out to achieve two objectives. First, it sketches the major physical characteristics of water resources in the region. Secondly, it traces the history of major principles of water law and the political character of water in the region.

The essay argues that a combination of natural, physical, ecological features and human action and or inaction, law, political governance and social institutions that determines the destiny of a people, their relationship with the environment and brings out the importance of water history. The physical and political –legal factors are important in the construction of the water history of Southern Africa. In turn, the water history of the region is significant in appreciating the value of water and provides the bedrock of understanding the fragile patterns of water in the region and how to deal with it. For example, the availability and unavailability of water affect the social, economic, and political lives of the people of the region.

¹ See for instance, W.O. Mulwafu, 'Does water have a history? Water use and management in Malawi' in J.W.N Templehoff, *African Water History: Transdisciplinary Discourses* (North West University, Vanderbijlpark, 2005), p1-14.

History and current status of integrated water resources management from a policy transfer perspective

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Keywords: IWRM, global discourse networks, policy transfer, strategic planning, GAP.

ABSTRACT

As a conceptual solution to the complex problems of water management the concept of Integrated Water Resources Management [IWRM] has recently come to prominence. Though institutional transfer of IWRM from the international to the domestic arena has been widespread, this process is arguably undermined by a lack of clarity and agreement about the IWRM concept, which has recently come in for a good deal of criticism. This paper attempts to address this problem by looking at the hitherto under-researched area of the history and theory of IWRM, in particular focusing on how deeper analysis of the conceptual framework of IWRM and its history can enhance the current understanding of the institutional transfer of IWRM to the national level. The paper consists of three parts.

The first part deals with the history of the IWRM concept looking at the 20th century American experiences and relations of IWRM to other theories (e.g. rational comprehensive planning, conservation movement, strategic planning). The main outcome of this part is a conclusion that the principles behind IWRM are newly emerged since the 1992 Dublin and Rio Conferences, but have been developed and used in the USA since the 1920-s. Another important outcome is identification of the striking similarities between IWRM and the concept of Strategic Planning, widely used in the public and private sector since the 1960-s.

The second part is devoted to the history of the institutionalization of IWRM at the global level. It utilizes the policy networks and policy transfer approaches to explicate the development and the current status of IWRM from an international perspective. Three periods in institutionalization of IWRM on the global scale have been identified: 1] knowledge-generation from bottom-up; 2] policy standardization and formulation at the international level; 3] “marketing” and promoting policy transfer from “top-down”. It has also been shown that different types of actors were involved at different stages. The final part includes analysis of the on-going process of institutional transfer of IWRM from the international arena to the Guney-Dogu Anadolu Projesi (GAP) in Turkey. The GAP has been significantly influenced by both national and international discourses in water resources management and beyond, and finding out the patterns of this influence with the help of specially developed *policy transfer networks* methodology could be very beneficial in the future research.

The main methods used in this research are critical content analysis of contemporary and historical literature on IWRM and planning theories, qualitative analysis of global networks involved in IWRM and instrumental case study of GAP. This research has both theoretical and practical contribution. It developed the notion of policy transfer networks in application to global water discourse on the theoretical part, and suggested a promising way of studying the GAP project on the practical part. It is also worth stressing that this research has pioneered the study of the institutional transfer of a *concept* (IWRM) as opposed to transfer of techniques.

¹ Insightful comments for and revision of this paper by Dr. Aleh Cherp and Dr. Alan Watt at the Department of Environmental Sciences and Policy of Central European University are hereby gratefully acknowledged

Conciliating hydropower conflicts in industrialising Finland

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ABSTRACT

The use of waterpower resources has caused conflicts between various interests groups. Jurisdiction has provided the important basis for conciliating disagreements. The Finnish legislation governing the use of rivers and watercourses is derived from the provincial laws, which prevailed during the thirteenth century in the Kingdom of Sweden. This legislation was based on two main principles. firstly, the unchanged basis of the law relating to watercourses was stated in the provincial law of Swedish Helsingland: “He owns the water who owns the land”. Secondly, the private proprietary rights of watercourses did not, however, mean an exclusive right to use them; instead, the owners’ right to utilise their watercourses was limited by common interests. According to Swedish-Finnish laws, an open mainstream, called *kungsådra* (king’s vein) serving common needs should be kept at the deepest sport of all rivers excluding minor ones.

The function of the mainstream was to secure the free flow of water, the movement of migratory fish (salmon, trout, and whitefish), guarantee the prerequisites for ship and boat traffic, and, later, the proper conditions for timber floating. Near the banks of rivers, flour saw, saw mills and other industrial mills were allowed to use water power. As a result of industrialisation, a new group, big factories rose to compete for the rights to use flowing water in rapids and waterfalls. Their needs for power were huge and therefore, they started to demand the rights to dam rivers, also the mainstream. This was the major cause for conflicts between interest groups involved in the use of waterpower.

The paper will examine how conflicts related to the use of flowing water were solved in Finland in the 19th and 20th century. This issue will be examined by comparative analysis of interest groups and strategies as well as studying conciliating efforts of the government.

Water supply in municipal politics in Cape Town and in Grahamstown in 1850-1920

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Keywords: history of water supply, Cape Town, Grahamstown, urban history, South Africa, sanitation

ABSTRACT

Augmentation of the water supply was amongst the most important municipal issues in Cape Town and in Grahamstown in 1850-1920. The development of this issue impacted on the development of the municipalities and interacted in the process of the transformation of its economy and society. With this paper I will show the importance of water for the municipal development. The building of reservoirs and pipelines needed spending of considerable amounts of funds and people usually had different ideas about the importance of these spendings. What kind of role this issue had in political battles amongst the municipal councillors? There were clashes amongst the dominant class for instance about the amount of the degree of municipal power and the costs of projects. There were also interesting political alliances between different classes around this issue. What were the reasons for instance why the working class was against improvements that were supposed to better also their living conditions? Why didn't they see it to be in their interests to get drains and sewers working properly? Even the appealing to the improvements in health situation didn't change the attitude of the working class. It seems also that the area where councillors were living affected their opinion on desirability of the improvements. These two towns represent different kind of geographical locations and their ethnographic structures were different. Comparative study of how they solved their water supply and related health problems could illuminate from its own viewpoint the working of municipal administration and its ability to respond to the needs of citizens.

Helsinki water: From a joint stock company into a public commercial enterprise

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ABSTRACT

The organizational structure of Helsinki Water has been reformed to meet modern demands. The shortage of clean water turned into a difficult problem during the development process of Finland's capital, Helsinki, in the middle of the 1800s. As population was increasing rapidly, water services became one of the key issues in the development of Helsinki. Situated near the sea, the capital did not have enough sources of groundwater in order to acquire clean water. In addition, the quality of water in many wells was extremely weak, causing many epidemics, such as cholera. One tried to solve the problem with a water distribution system. Models were sought from elsewhere in Europe, especially from England, Sweden and Germany.

The first water treatment plant in Finland was established in Helsinki in 1876. In Helsinki it was considered extremely necessary to establish the water utility but also expensive. The city funds were insufficient for the plant. Therefore, the construction of the water supply system, at first, became the responsibility of a private company. However, the construction became more expensive than expected and soon the City of Helsinki acquired the water company.

At first the water plant had no organization of its own. Instead, a few persons were employed with the responsibility of managing issues dealing with water to the Administration of the City. In 1883, the water affairs became the responsibility of the public works office of the City. When the area of operations of the water plant was expanding, more staff members were employed and soon it was considered necessary to establish an organization for the water plant. This was done in 1892 when the water distribution office of the City of Helsinki began its operations. In 1911 the name was changed into Helsingin kaupungin vesijohtolaitos (Helsinki Waterworks).

Problems related to the lack of sewerage appeared at the turn of the 20th century. The condition of the inner bays off Helsinki weakened and the need to treat wastewaters and to construct a sewerage system became apparent. The first wastewater treatment plants of Helsinki and Finland were built in Helsinki in 1910, but they were not the responsibility of the Waterworks. The City Engineer and the street and sewerage department of the public works office were responsible for the treatment of wastewaters and sewerage.

This is how water services continued in Helsinki during the following decades. The most significant change took place only in 1984, when the organization of water services merged and the wastewater and sewer treatment authority of the City of Helsinki was

formed into the Water Utility of Helsinki. The most important reason for the merger was the cost savings it could accumulate. A similar kind of change in other cities was caused by a law reform that came into force in 1978, the objective of which was to make sewerage operations profitable.

The pressure to reform the Water Utility increased during the early years of the 1990s. The opportunity for the change was provided by the reform of the local government act of Finland, which enabled the cities to transform organizations into public commercial enterprises. The Water Utility in Helsinki was the first department to be transformed into a public commercial enterprise. At the same time, the name was changed into Helsinki Water. The objective of the public commercial enterprise reform was to modernize the administration practices of the city, to improve the productivity of the enterprises and increase their comparability, by, for instance, moving in cost accounting from administrative bookkeeping to business accounting. Soon after the change into Helsinki Water, also the departments of energy, traffic and harbor in Helsinki were transformed into public commercial enterprises. Ownership still remained with the City of Helsinki, and it receives some income from the public commercial enterprises of their turnover in accordance with agreements.

Water services have been developed in Helsinki, and in general in Finland, to meet the present challenges. The following turning point can be related to the increasing of regional cooperation. In order to further improve cost efficiency, the following challenge might be the merging of the water utilities in the municipalities of the metropolitan area in the future decades. The merging of the water utilities in the three large cities, Helsinki, Espoo and Vantaa, was under consideration already at the beginning of the 1990s, and it has become topical again along with the changes in municipal economy.

Adolf Erik Nordenskiöld: explorer of the arctic waters

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Keywords: sea route, merchant shipping, environmental literacy, Nordenskiöld, Siberia

ABSTRACT

Water routes are important for the world economy. The Swedish/Finnish explorer, (Nils) Adolf Erik Nordenskiöld (1832-1901) opened up a new sea route when he, in 1878-79, as the first man, sailed through the Northeast Passage; the 6500 km long water route, from the Atlantic to the Pacific Ocean. That was a deed many had tried but not succeeded before him. It was also a turning-point in the development of merchant shipping during many centuries.

Portuguese explorers found the sea routes from Europe around Africa to India, Indonesia, and China already in the 15th and 16th centuries. With the Spaniards they held the monopoly of the Southern routes to the eastern wealthy markets quite a long time. The Northern waters were left free for the sailors of other countries. During centuries many captains searched a short cut to the Far East through the Arctic waters but did not succeed.

Why Nordenskiöld was the first man who managed to find the sea route in those unexplored waters? When he left for his voyage the economic potentials of Siberia were, presumably, acquainted to him. Already, as a young man, he had traveled in the Urals and Russia, and in 1875-76 he accomplished two expeditions to the big Siberian rivers, the Obi and the Jenisei. On his travels he observed carefully also the environment and made useful conclusions on what he saw. He had a good environmental literacy. He also knew the arctic waters and circumstances well. He knew the great potentials of the rivers in transporting goods, and he knew how to use the new technology: steam engines.

Environmental literacy is a combination of observations, experiences, knowledge, attitudes, and values, which together result in interpretation, definition and a holistic understanding of nature. The capability to perceive environment holistically is grounded on environmental literacy with its personal and cultural aspects. It is always interlinked with communal, cultural, societal and historical factors.

Public opinion and water cleaning in 20th century Stockholm

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Key words: water pollution, public opinion, water cleaning

ABSTRACT

This paper is about measures taken by the local authorities in Stockholm to improve the water quality and how these political decisions might have been influenced by public opinion. Two periods are of special interest. Firstly, the period 1928-1933, which started with a lively newspaper debate on water pollution in the summer of 1928, followed by a proposal for the introduction of mechanical water cleaning in the 1930 Master Plan which was approved in 1933. Secondly, a new intense media debate on water pollution broke out in the summer of 1953. Demands were made for more effective sewer systems for the entire metropolitan region. Perhaps as a consequence of this media debate, the 1952 Master Plan, approved in 1954, included a proposal for the introduction of biological cleaning. However, not until the introduction of chemical water cleaning processes in the early 1970s, do we see more substantial improvements in the water quality in Stockholm.

The “illegitimate” side of South African water management history: time to uncover the hidden truths

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Keywords: water management, history, indigenous knowledge, South Africa

ABSTRACT

Historians have argued that history is viewed through many different lenses. This line of reasoning alludes to the fact that history is never truly neutral, nor immune to influence. Rather it is filtered and interpreted, and as a result becomes significant and true to those who write it. The path of history is therefore never one-sided, and in the case of South Africa, no one history has been sufficient to tell this country's great and complex (chronicle) story. For many years, South Africa's written official water history excluded the 'non-white' majority of the population and it was only with the advent of democracy in 1994 that concerted efforts were made to “re-write” history in order to include the contributions made by indigenous groups.

A good example of this exclusion is the written historical records that exist around issues of water management in South Africa. Initial research has shown that while there might be a plethora of historical information available regarding the official state management of South African water resources, very little published information exists to place this rather one-sided history within a broader context. The historical documentation of water management history in South Africa almost exclusively focuses on “white”, colonial documentation and quite often starts with the arrival of the Dutch in 1652. Such a one-dimensional account is typical of *Apartheid* supported ways of creating legitimate (ie. white) and illegitimate history (ie. black). It also excluded any contributions made through oral historical accounts of indigenous groups such as the Khoisan. This paper therefore proposes to uncover some of the “illegitimate history” of water management in South Africa against the backdrop of an “other”, more “legitimate” detailed historical story already written.

The use of historical trends in the governance of water and sanitation services to predict the future service level: Kenyan perspective

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Keywords: History, colonization, water supply, sanitation, governance, policy

ABSTRACT

The history of modern Kenya can be traced back to the late 1880s when the region came under the administration of the Imperial British East African Company (IBEAC Co.). After the advent of the British rule, the country underwent a series of rapid changes that transformed it from a scarcely delimited entity of autonomous ethnic groups to a colonial territory, the British East Africa Protectorate (BEAP) from 1895 to 1920. In 1920 BEAP was changed into the Colony and Protectorate of Kenya. In 1963, the country gained its independence from the British.

In that respect, the history of Kenya as a nation and the provision of water and sanitation services are quite young when compared on international timeline. However, the process of water development (mechanisms of use and supply) is intricately intertwined with the history of Kenya and its people. Records available strongly show that the development of water supply and sanitation closely followed colonization pattern. This sessional paper will explore the historical trends in the provision of services right from the origin around 1900 to 1980s by examining the concept of water governance that were in place in the development and management of water resources and the delivery of water services at different levels of society.

After four decades of development as an independent state, in the late 1980s, it became clear that provision of water and sanitation services to the residents was not effective. Arguments such as lack of clear allocation of responsibilities; and limited national economic growth had not created enabling environment for effective management of water and sanitation services in country. The weaknesses in the institutional framework (organizational structures, lack of autonomy, and unclear definition of roles and responsibilities) led to conflicts. In particular, the ministry in charge of water affairs role included that of being the primary service provider and principal regulator. This led to some weaknesses that include: poor coordination between sector institutions; lack of adequate skills to manage and operate water supplies; and inadequate logistical and institutional capacity for effective maintenance, material supply and cost recovery to operated systems.

It is through these arguments of the 1980s that this paper will examine the historical trends in the effectiveness of water governance over time and outline historical discourses and colonialism challenges that were faced overtime to establish proper governance.

The historical discourses will be thoroughly evaluated with an aim of unearthing any discontinuity between the recent past, present, and thus predict the future success of the current water sector reforms that came into operation in the 21st century.

The History of integrated water resources management: analysing the inconsistencies

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Keywords: river basin, integrated water resources management, technical hydropolitics, hydropolitical history.

ABSTRACT

Since water is a very important natural resource in terms of its quality and quantity, its management reflects some political processes. The policy of water management has strategic implications for water security, food security and environmental security of nations. Integrated Water Resources Management (IWRM) is an evolving hydropolitical concept which is expected to fulfill determined *unified* outcomes for water resources management. Nevertheless, there is a serious discussion about the meaning of IWRM and its practice. Revision of the concept to give it more practical content with respect to water security is a serious concern. According to the field scholars and water profession, the concept of IWRM encompasses water management issues but not the water problems involved in implementation. In addition to the political deficiencies in practice, scientific background for policy often remains shallow in terms of research, since the IWRM concentrates on technical water planning operations. Besides, the water profession usually brings up the issue as a buzz-word. An important question might be: is it really a practical water policy tool in resolving water management problems? This paper will try to contribute to the answer by examining the hydropolitical history of the concept.

Towards viable environmental infrastructure development in East African cities

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Keywords: waste and sanitation, urban environmental infrastructures, East Africa, Modernised Mixtures

ABSTRACT

The rapidly growing urban centres in East Africa are facing major problems in clean water provision, sanitation and solid waste management, as also has been acknowledged in formulating the Millennium Development Goals. Solving this challenge requires an integrated approach that deviates both from the well-known western large-scale high-technological grid-based systems, as well as from the familiar small-scale, low-tech, decentralized technologies. Such a modernized mixtures approach combines (eco)technological, economic, social and governance dimensions of new environmental infrastructures, simultaneously developed at different scales, against the background of the specific context of East African cities.

This paper will present the conceptual framework for such an approach which forms the basis of the academic research programme, PROVIDE, that is currently being undertaken in Kenya, Tanzania and Uganda (2006-2011). This conceptual framework will constitute the basis for an integrated approach for sanitation and solid waste management developed in collaboration with and responding to the needs of the urban poor.

Water in photographs

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ABSTRACT

In 1836, Louis Jacques Mandé Daguerre undertook the first outdoor test of his Daguerreotype, taking a picture of the River Seine in the heart of Paris. William Henry Fox Talbot's similar ambition to develop a technique of fixing natural images was triggered three years earlier by his failure to draw the picturesque Italian waterscape of Lake Como to his own satisfaction.

The depiction of water in photography began with the invention of the first camera. Photographic images not only reflect how we see water, they also contribute to our perception and understanding of it. This paper tracks the appearance of water in photographs through crucial phases and developments in European and North American photography, and examines the concepts and impressions these images conveyed. The paper will examine a selection of significant photographs dealing with water before concluding with a discussion of their contemporary uses and impacts.

Documentary photography involving water increased during the second half of the nineteenth century in conjunction with increases in travel, exploration and colonialism. The twentieth century saw an increase in the photographic documentation of environmental and humanitarian crises. Over recent decades, water crises have been the driving force behind the photography of socio-cultural, agricultural and industrial water usage. The resulting images have been used extensively in media and information campaigns that contribute to the shaping of public opinion on water.

The classical modern period brought about new photographic perceptions of water in the 1920s and 30s, particularly with regard to the material and symbolic qualities of water. Two examples are the series of clouds photographs by Alfred Stieglitz, representing 'Equivalents' for the artist's mental images; and the photograph 'Goldfish bowl' by Herbert List, which is at once landscape, still life and metaphor for the human condition. Interestingly, it is the latter image that has in recent years inspired a series of audiovisual advertisements for different electronic consumer goods and telecommunication services.

Meanwhile, today's explosion of photographic imagery has led to unprecedented numbers of images of water being produced and disseminated. As of January 2007, the world's largest online photo library, Flickr, lists more than 900,000 images tagged 'water' (counting only tags in the English language).

It seems clear that, from its very beginning, photography has helped to realise the desire to create documentary and artistic images of water. The impact of this cultural phenomenon on past and future human interactions with water deserves further investigation.

Damming the Danube, symbolizing the dam: the environmental history of the Gabčíkovo-Nagymaros dam project

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ABSTRACT

This paper will analyze the environmental history of one of the largest water related infrastructural projects in Central-East Europe, the Gabčíkovo-Nagymaros barrage system. The planning, construction and politicization of the project touched Hungary, Czechoslovakia (Czech Republic and Slovakia) and Austria; and became a source of series of controversies, debates and legal battles in the past two decades on a regional, national and international level.

The governments of Hungary and Czechoslovakia started talks on the possibility of a barrage system between Bratislava and Budapest in 1958. After long years of negotiations, a Czechoslovak-Hungarian joint expert committee agreed on the major technological and economic terms of the project by 1970. Based on that agreement, the two governments signed a treaty aiming to build a joint dam project in 1977. Later, on the idea and the construction of the project became highly contested by a number of actors and led to an international scandal by the end of 1980s.

However, the legal and international political discourse over the dam has been well documented and analyzed, not much has been written on the politicization and symbolization of the dam, the River Danube and the region's environment. Therefore, this paper will answer when, how and why various events contributed to the politicization of the barrage system and the River Danube? Beyond the interpretation of reactions and actors, this paper will clarify discursive practices and various layers and levels of discourses. In addition, it aims to analyze the intense symbolization of the project, during which social resistance towards the barrage system led to mass-protests in Hungary in the mid-1980s. At the same time, for many of the Slovaks, supporting that dam became an act of political and cultural self-definition.

The paper is based on a large variety of source materials, such as previously undiscovered governmental and corporate documentation, all available and oral interviews with key actors in the past.

Ganga water: the spirit of Hindu life

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ABSTRACT

Water is a vital element for survival of man and for this reason civilization has grown on the bank of the rivers and near perennial sources of water from time immemorial. India has been gifted with fresh water in abundance by nature. Ganga (in Hindi and other Indian language) is the 'spirit of life' for millions of Hindus which flows through a vast, fertile and densely peopled plain. The general direction of the river is from north-west to south-east. She covers about one million sq. miles before meeting the ocean and flows through the state of Uttar Pradesh, Bihar and West Bengal, its tributaries drain from Himachal Pradesh, Punjab, Haryana, Rajasthan, Madhya Pradesh and the Union Territory of Delhi and join the neighbouring country like Bangladesh. Though Ganga is more revered by the Indian states through which it flows, it is certainly revered by people of other states too.

To Hindus all water is sacred, especially water of river like Ganga which is also known as Ganges. It is the most important holy river of India and is the cradle of Indian customs and civilization since Vedic age. People of diverse culture and religion pay same respect to Ganga as Hindus. In a long journey of life, i.e, from birth to death, Ganga water is used in each and every Hindu ceremony and rituals, though the main functions of water are agricultural use, industry, as an energy source, transportation, drinking, bathing and baptism. The water of Ganga irrigate vast areas especially in Uttar Pradesh. It is a source of religious tourism of thousands of Indian people and economic activity having direct and indirect impact on all other sectors of the economy thereby contributing towards generation of employment and earning of foreign exchange. The water is used in Indian Medicine (Ayurveda, the science of life) also. Thus it is a natural treasure and about 450 million people in India depend on it.

Impacts of water and sanitation, the past and the present

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Keywords: Water, Sanitation, Slums, UK, India.

ABSTRACT

In the nineteenth century Edwin Chadwick's report on the sanitary condition of the labouring population of Great Britain documented the importance of water and sanitation services on public health, without the slightest concession to the claims of curative medicine (Chadwick, 1842). This paper will highlight the impacts of water and sanitation in present day scenarios, whilst linking back to the much earlier public health engineering movement. The paper will focus on a concept called Slum Networking pioneered by Himanshu Parikh which proposes comprehensive water and environmental sanitation infrastructure as the central and catalytic leverage for holistic development. At costs less than the conventional 'slum' solutions, it tries to penetrate a high quality urban infrastructure deep into the slums to assimilate them into the city rather than lock them in as disadvantaged islands. Further, it transcends resource barriers and 'aid' through innovative partnerships and the latent resource mobilisation potential of the so called 'poor'. There are parallels between the property tax issues raised in Sanjaynagar Slum in Ahmedabad, India now to the taxation issues raised by Chadwick and Chamberlain for the working classes in the nineteenth century in the UK. Parallels between the Slum Networking approach of topography management and Chadwick's views on drainage and topography will be drawn.

Over the last few years data my own research has involved the collection of data from individual households in various settlements in India on family background, incomes and expenditure, infrastructure provisions, education, health and tenure. The study validates the technical approach of Slum Networking and shows 100 percent community satisfaction giving modern support to the now almost 150-year old argument that physical infrastructure rapidly alleviates poverty with tangible improvements in health, education, disposable incomes and quality of life.

Schmutz in the Baltic: capitalist nature and pollution in historical materialist perspective

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ABSTRACT

The paper I propose adopts an historical materialist approach to trace the origins and outcomes of major pollutants in the Baltic to explore the boundaries between capitalism and nature; the connections and disconnections in politics and social production around the sea since the middle of the 20th century and a 'capitalist nature' thus constituted. With the peculiar geomorphic qualities of the sea itself, the Baltic is a repository of long term industrial processes, urban water management, social, political and ecological connectivity. Traces of these historical processes remain suspended as particles of industrial and biological pollutants in the water of the sea.

Pollution itself has entered a murky sort of commodification as state and commercial interests seek solutions to ecological problems-- including factoring in the costs of inaction-- mobilizing the threats of ecological degradation to engage in the re-allocation of funding into new institutions, into old surveillance technology and new sciences, in the processes of 'cleaning-up'. Seen in this light, the contemporary clean-up of the Baltic can be seen as one of the last of the Cold War Projects.

This paper thus treats pollutants as commodities and maps out a methodology for addressing them following the models laid out in anthropological commodity studies. The specifics of local urban water treatment, local agricultural and industrial effluents articulate with those of other localities as well as the policies and politics of many states, and the global financial and corporate bodies that have historically shaped them.

Starting from the recognition that capitalism would even seek to profit from environmental degradation, this project traces the historical sources of industrial and biological pollutants in the Sea itself and the historical, social, political and ecological dynamics in play in dealing with them.

Why the *Compagnie Générale des Eaux* did not die with the 19th century?

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Keywords: *Compagnie Générale des Eaux*, concession contract, water supply, French history

ABSTRACT

With the 19th century died the concession contract as an option for French municipalities to organise their water supply. The increasing disagreements between local authorities and their water concessionaires disclosed in administrative courts, and the most conflicting were sentenced by the last appeal court, the *Conseil d'Etat*. These cases dealt with a common issue: the conditions to renegotiate and/or terminate concession contracts.

The *Compagnie Générale des Eaux*, already the biggest French water company, could have died with the concession contract. Though it found in the *Conseil d'Etat* a reliable protector of its contractual rights, the Company lost its biggest concession contracts and had to curb its strategy by negotiating new contractual arrangement to recover from the concession failure.

The debates on privatisation of the water sector in England, the Netherlands and Germany

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Keywords: water, privatisation, advocacy-coalition, policy-learning

ABSTRACT

By analysing debates on privatisation of water sector companies in England, the Netherlands and Germany the paper aims at explaining policy-outcomes, namely privatisation, remunicipalisation and prohibition of private sector involvement. In a first step the 'advocacy coalitions' involved in the controversies on privatisation will be identified. Secondly, the explanatory power of Howlett and Ramesh's 'policy learning-approach' is tested. Howlett and Ramesh identify three types of policy learning: experiences with certain instruments in the history of the country, experiences made in other policy-sectors and experiences other countries made with the instrument. (Howlett and Ramesh 1993: 260).

In all three countries debates on structural changes in the water sector (competition, privatisation, cooperation) have been conducted. In most of the cases the Ministry of Economic Affairs served as an agenda setter and studies suggested the introduction of competition and privatisations. Whereas the English and Dutch case represent the extrema of a scale between full privatisation and the prohibition of private shareholdings in water companies, the German case is more complex. Since the municipal level is responsible for the water sector, too, one has not only to analyse debates on the federal level but on the municipal level as well. This paper presents three different cases comprising enterprises delivering several services (water, electricity, public transport) called *Stadtwerke*, an enterprise owned by a city state, and the oldest private water undertaking. In all these cases debates about privatisation and / or 'remunicipalisation' took place.

Reform or adjustments? From the liberal and neo-liberal policy reform process in Honduras

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Keywords: Honduras, path dependency, public management reform, decentralization, institutional reform, water institutional reform.

ABSTRACT

This paper examines both the liberal reform period (1873-1919) and the neo-liberal period from the 1990s undertaken in Honduras. The aim of this paper is to analyse the context and process of institutional reforms in Honduras and answer the question if the institutional process in the neo-liberal period is following the same patterns as from the liberal period. Similarities and antagonisms are sought.

The case study is firstly reviewed under the theory of path dependency, and secondly, the performance analysis is carried out through some of the criteria from the public management reform. As the name suggests, Honduras, during the liberal reform period, faced an institutional reform that was not successful since the government was not able to establish strong institutions in the end. Today, the Honduran government is undertaking an Institutional Reform that began in the 1990s under a neo-liberal period. The water sector is among the sectors that since 2000s are facing institutional reform. Understanding the historical and political context within the liberal reform will give more insight to the analysis, studying the recurrent attitudes and approaches of governmental decision makers. Even though these two periods are almost a century apart, the findings in the analysis for both periods reflect similarities in the process of building institutional framework, and implementing strategies and decision making approaches. Moreover, the results in this paper shed light in the gap created by the national government, local government and civil society. After the analysis and comparison, the questions for today's institutional reform remains open: Does Honduras have experienced path dependency concerning its institutional reforms?

**Making a difference:
strategic planning in a water utility**

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Keywords: strategic planning, strategy communication, public water utility, Finland

ABSTRACT

Strategic planning and successful implementation of related action plans are a challenge for many Finnish water supply and sewerage utilities because of low number, if at all, of staff used to strategic thinking. Popularisation, involvement of all and communication skills are of utmost importance. In this paper new ways of developing and implementing strategies in Helsinki Water are presented.

Development of sewerage and wastewater treatment in Lithuania

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Keywords: wastewater treatment, sewerage, Lithuania, Kaunas, Siauliai, Vilnius

ABSTRACT

The organisational structure of water pollution control in Lithuania has undergone a number of radical changes since the 1930s. During the Soviet period (1940-1990) municipal water and wastewater utilities were nationalised and local administration had only a minor role to play. Water and wastewater services were developed and operated by Lithuanian engineers and staff, but the practices, rules and regulations came from Soviet central institutions in Moscow.

Pollution control was managed nationally, and a system of permits and pollution charges was developed. Some standard systems for wastewater treatment were introduced for collective farms. In larger cities wastewater treatment plants were gradually constructed, e.g. in the city of Siauliai a biological activated sludge treatment plant has been in operation since the 1960s. By the time Lithuania regained her independence in 1990, there were altogether some 800 wastewater treatment plants in the country. Roughly half of these were activated sludge treatment plants. Collective farms typically had oxidation ditches.

After Lithuania regained independence, the responsibility for water and wastewater services was transferred from state companies to municipalities. At that time, the level of wastewater treatment varied enormously even between large cities. Municipal utilities have also faced dramatically reduced water use and the resulting smaller wastewater volumes, which have left the utilities with excessively over-dimensioned structures. On the whole, the efficiency of wastewater treatment has improved remarkably during the last decades. One good example is the capital city Vilnius, where the BOD load to watercourses was reduced from 27 000 tons in 1979 to less than 300 tons in 2005.

Water in scientific works of Royal Medical Society of Caucasus”

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Keywords: History of medicine- mineral water- medical society

ABSTRACT

The scientific basic for studying of healing-mineral waters in Georgia was laid in the second half of XVIII century. At the initial stage the scientific study of mineral waters had an episodic character. (Perevalenko V. “Description of Abastumani Mineral Waters”, military-medical journal, Tiflis, 1851; Verzein I. “Description of Abastumani Mineral Waters”, 1851; Andreevsky E. “Abastumani, Borjomi and Uraeli are the Main Mineral Waters of Kartli” Tiflis, 1852). In the second half of XIX century researches acquire wider character.

In 1864 in Tbilisi (capital of Georgia) was founded „Royal Medical society of Caucasus”. The member of society were famous medical doctor and scientists of Georgia and Russia.

Empiric knowledge about mineral waters is changed due to the data, received as a result of researches. Since that period society systematically began to publish articles.

We have studied 150 scientific works of „Royal Medical society of Caucasus”. On the basis of analysis the works of society we can make the following conclusion:

- in Georgia in XIXc. were distinguished two types of mineral waters: first was drinkable mineral waters which have been used to treat internal diseases, urine-genital system disorders, second were mineral waters used for bathes and cure skin diseases;
- society published not only scientific works with descriptions of location of mineral waters, chemical analysis and compounds of the waters, but also popular articles for population about the methods of healing, prescriptions and contraindication for healing;
- the members of „Royal Medical society of Caucasus” have made a great contribution in researches of the mineral waters of Georgia and generally of properties of mineral waters.

Transition to sustainable water management

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Keywords: Water distribution network, water quality, rehabilitation.

ABSTRACT

Restoration of independence in Estonia in 1991 was followed by rapid and significant changes in the quantity and price of water consumed. Different projects, with funding from the EU structural funds, have been realised in most Estonian towns. They were aimed at the renovation of existing and at construction of new water supply systems. Water consumption has decreased substantially and rapidly since 1991.

The old water supply networks had been designed and built considering high water consumption and were based on Soviet design standards. Pipe diameters in water distribution networks were too large for the decreased water consumption and the residence time of water before the consumption was too long. This has caused critical deterioration of water quality in the network. Pipe diameters had to be reduced during network reconstruction. The application of new water purification technologies and the reconstruction of networks have improved water quality. However, the price of water has been continuously increasing. In the construction of water networks in new residential districts an essential factor is the amount of water necessary for fire-fighting purposes, which has been determined by the Rescue Service. The water company of Tallinn has been privatised, but water companies in other Estonian towns have remained in the administration of local governments. This paper will analyse the rapid changes in water management of Estonian towns (Tallinn, Viljandi, Pärnu and Haapsalu) during last 15 years. The relationship between the price of water, consumed water quantities and investments will be presented. All changes in water consumption during last years required changes in the Estonian design standards for water supply and sewerage systems and their harmonisation with relevant EU standards.

Case study method in water history: cases Hämeenlinna, Porvoo, Espoo and Vantaa, Finland

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Keywords: case study method, environmental engineering, history, water supply and sanitation, Finland

ABSTRACT

Water as a resource is threatened by problems of quantity and quality in a time of heavy population and industrial growth. Sustainable water use is vital to the well-being of both rural and urban dwellers, the national economy and urban water supply. Insecure access to water resources has led to conflicts in many societies throughout the centuries. Water and sanitation services are part of the urban infrastructure and are too often taken for granted; often their real importance is realized only when something goes wrong. While water management is one of the biggest challenges of mankind (UNDP 2006), in historical perspectives clean water is regarded as the most important service of mankind. In January 2007, sewage disposal and clean water supplies, among other aspects of sanitation, were chosen over 15 key medical advances named in an international poll by the British Medical Journal (BMJ).

Case study method is widely used in many disciplines and it is also used in the field of water history and environmental engineering. But what does case study method really mean in these sciences? How are case studies actually carried out? The paper will include examples of successfully finalized case studies on long-term development of water and wastewater utilities in the cities of Hämeenlinna, Porvoo, Espoo and Vantaa, Finland. We will further discuss what the case study method can give to water history and what are its weaknesses?

Historical case study reveals the complexity of water supply and sanitation-related issues on the verge of social/economical/political transitions and provides many answers for futures research. As already proved by authors and others in many cases in Finland, any sensible scenarios of the future must be based on historical analyses.

We have to learn how earlier choices affect today's available options and development paths of alternative and available futures. We can look back to history to pin-point factors of success, turning points and strategic decisions. Thereby environmental history offers us almost laboratory-like conditions vis-à-vis historical case studies. We can understand, interpret and analyze long-term historical developments in urban infrastructures, which contribute to our understanding of the economic backwardness and social and environmental problems of the case countries, and can thus have significant relevance globally.

In search of effective local water governance - lessons learned in Nepal

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Keywords: Nepal, local governance, water, sanitation, history.

ABSTRACT

Effective local water governance is a key to sustainable sanitation and water futures. It is claimed that failures are often more attributable to profound failures in water governance rather than to the natural limitations of the water supply or lack of financing and appropriate technologies. This is particularly relevant for Nepal which over the past decades have not lacked in development initiatives, programmes and related funding, and where a number of appropriate technology options have been successfully applied albeit not always in a sustainable way. Two key definitions are used as a point of departure: *water governance* which refers to the range of political, social, economic and administrative systems that are in place to regulate the development and management of water resources and provision of water services at different levels of society, and *effectiveness and efficiency* as processes and institutions to produce results that meet needs while making the best use of resources. Effective governance therefore requires well established institutions, whether formal or informal, to reduce uncertainty and clarify the everyday rules of the game. Formal institutional framework includes such as laws, regulations and government structures where as informal institutions shape the unwritten codes of behaviour. Both are relevant, especially during the turbulent times when formal institutions face grave challenges and changes every day.

Local governance is an ancient practice in Nepal due to geographical realities and the fact that until 1768, what is now known as “Nepal” was made of a large number of small kingdoms and city-states. However, Kathmandu Valley was already the centre of power, culture and development in the early Kingdom of Licchavis since 464 AD. Local village-based decision making and communal irrigation management appear to have roots here in the agriculture-based economy where the local matters were managed by the village assembly of leaders (*panchalika, grama pancha*). Among the additional labour works (*Vishti*) allocated for the peasants was the maintenance of irrigation works. There were no serious attempts to develop the country during the Rana regime (1846-1951), and the state involvement and humanitarian interest in well-being of all people is fairly recent. In the 1970s the water supply development interest was expanded from the urban centres to the district headquarters, and drinking water was included under the social services together with health and education. In the 1980s during the International Drinking Water Supply and Sanitation Decade the scope further broadened to outlying areas, and participatory approaches to community involvement were introduced to most rural water projects. The Dublin Principles (1990) emphasized management of the water resources at the lowest appropriate level. This matched well with decentralization efforts in Nepal at the time as the role of the District Development Committees and Village Development Committees became more pronounced towards the beginning of the 2000s. In the 1990s water sector became one of the priority sectors of government investment as a part of the poverty reduction strategy, and continues to be so. In 2006 Nepal is stepping into a new era with the Government of Nepal which is not His Majesty’s Government anymore.

Water supply and sanitation: pasts and futures in Nepal

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Keywords: Conservation water bodies, Stone Spout, Users friendly technology, world heritage city

ABSTRACT

Kathmandu, a cultural, historical and World heritage city is situated in central part of Nepal. All the rivers and rivulets that originate from this middle mountain valley, drain into the major river Bagmati, a tributary of the Ganges. Not so long ago Bagmati, which is sacred to all the Hindu populace, used to be the source of livelihood to people, fauna, and flora living in the valley and down stream. At present all the sewerage system within the valley is fed directly into the streams nearby. The pollutants thus being fed into the tributary streams have rendered the river useless and serve just as a wastewater drain. Rapid urbanization, negligence and absence of reliable wastewater treatment facilities are the major causes of rivers pollution.

Though Nepal endowed second position in water resources in the world, comprises more than 6000 rivers, but now in the capital city Kathmandu supplying just about 120 million litres water daily against the demand of 294 MLD. In the valley stone spouts, ponds and dug wells were started to build in 550 AD in Lichchhibi regime. In the sixteenth century wide expansion of construction of stone spouts took place and culture and traditions were linked with these water bodies. Now in this valley there are more than 362 stone spouts and supplying water more than sixteen million litres daily even in dry season. At present these beautifully made stone spouts, ponds and wells are going to be vanished due to above mentioned factors.

In Nepal Human excreta reuse had been practiced in agricultural purposes since ancient times but the personal and community hygiene was not taken into account in this process. In this indigenous technology, a long pit like surface drain of about to 40-60 cm deep and 30 cm wide was used for defecation purposes for 10 to 15 people at a time, separately for male and female. Similarly "Naugal" a pit situated below the staircase of almost every house was used to collect the night time urine along with the ash. As the conventional treatment technologies require high investment and operation and maintenance cost, the Dry ecological toilets that can be dealt with limited financial resources are the only suitable option left for sanitation for the 21st century. To reduce the environmental degradation and overcome this problem, Ecological toilet is only the realistic option in the context of Nepal. This work has used appropriate technology and studied their performances in the context of Nepal with full involvement of local people.

This paper deals with the different types of Dry ecological toilets, their performances and feasibility study in the context of Nepal, based on complete laboratory analysis and the regular monitoring. The result advocates the implementation of ecological toilets to save the valuable water wasted in flushing as well as the resources used to treat the waste. Similarly the importance and conservation of ancient valuable water bodies like stone spouts and ponds and wells.

The Silent Valley Reservoir 1923-1932

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Keywords: history of technology, nature, water, reservoir, sovereignty, compressed air

ABSTRACT

In the late 19th century water from the Kilkeel and Annalong Rivers in the Mourne Mountains was diverted 35 miles to provide for the growing industrial city of Belfast in the North of Ireland. A reservoir in the mountains was also planned at a later date but this was delayed by the Great War and then by Irish political instability. The Silent Valley Reservoir was the first large scale civil engineering project after the division between the North and the South of Ireland. Before being completed the project had to overcome several obstacles. Firstly, the Mourne Mountains were claimed by the South of Ireland and thus subject to the Boundary Commission of the Anglo-Irish peace treaty. Secondly, the combination of fluid subsoil and the failure to locate bedrock at expected depth brought construction to a halt while an engineering, political, and legal solution was sought for the expensive and now publicly controversial project. An air shaft device for excavating under increased atmospheric pressure had to be designed taking in mind both technical and political difficulties. Today the 3000 million gallon reservoir, first imagined in the late 19th Century, continues to be a major water source for the city of Belfast.

One man's waters: a Finn's lifelong relationship with water and waterways

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Keywords: environmental relationship, individual, physical environment, water, waterways

ABSTRACT

Water and waterways are part of our physical environment. They are essential in the individual environmental relationship. Here I examine Finns' water relation in the 20th century. My approach is micro historical and my case is Frans Lind (1903–1988), an interior painter and amateur artist, who lived in the small industrial town Varkaus, Eastern Finland. All his life he lived near Lake Haukivesi, never further than 200 meters from the shore, either with his parents and siblings or his own family first in company dwellings and since 1935 in his own house. – My main research question is: What are the most important characteristics of Frans Lind's water relationship during different seasons and phases of life? I also ask: Where and how did Lind (and his family) get fresh water? How did he use it? What did he do with the wastewaters? How did he use the waterways? My premise is that the individual environmental relationship is a lifelong, gendered and social or shared process. My primary sources are observations, interviews and about a dozen landscapes painted by Lind. For several years I could personally observe his activities and in the 1980s and 1990s I got information concerning his water relationship in 28 interviews, 25 with Lind and 3 with relatives and neighbors. Here I analyze my material with the topical content analysis method in the frame of individual life course. – Frans Lind used water from wells, lake and clouds for various purposes. Drinking water was fetched from wells and lake. Lake water was used for bathing and laundry and for animals and plants. Lind never had water pipes or drain in his dwellings. He hardly considered his wastewaters to be a problem; he poured them in compost or let to the lake. In the 1950s, the pollution of Haukivesi became everybody's concern in Varkaus because of the local pulp mill. Fish died and water smelled. People could not swim or use the water for household purposes. They suffered and only complained in privacy since the polluter was the biggest employer. – Lind used waterways in several ways. As a child, in summer he swam in the lake, he rowed for fun and to fish. In winter, he walked, skated, skied and rode kick sled on the frozen lake. As an adult, in summer he also swam and rowed his boat to transport people and goods locally. He drove to the islands by motorboat. In winter, he walked across the lake to work. – Lind's lifelong water relationship can be characterized as social, traditional, economic, logistic, recreational, and sporty. I even suggest that it was slightly womanly since he did certain chores traditionally considered as women's works. The paintings with lakes, ponds and streams added an aesthetic aspect to the water relationship. Frans Lind's individual lifelong water relationship depended on five factors closely entwined: geographical location, housing conditions, tradition, lifecycle, and interests.

Traditional water purification

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ABSTRACT

Mankind is grateful to nature for providing herbs which can act as natural coagulants and disinfectants. Natural materials have been used in water treatment since ancient times. It is left to our curiosity and attempt to discover the contribution of nature in our endeavour to tackle water purification in a natural manner. In rural context, the availability of material used in the purification and its acceptability, as environmentally safe, has to be ensured. Locally available material can be exploited towards achieving sustainable safe potable water supply. Natural material can significantly reduce treatment cost if available locally. Lack of knowledge on the exact nature and mechanism by which natural material work has impeded their widespread application and they have been unable to compete with the commonly used chemicals. In recent years, there has been a resurgence of interest to use parts of herbs for water purification due to cost and associated health and environmental concerns of synthetic organic polymers and inorganic chemicals. By using natural coagulants, considerable savings in chemicals and sludge handling cost may be achieved. In Charak samhita and Sushruta samhita, they have mentioned about purification of water. Sushruta suggested use of natural herbs; *S. potatorum* (nirmali) seeds for clarification of muddy water. VarahaMihir has suggested in BrihtSamhita, a mixture of powdered herbs; *M. Umbelletum*, *C. rotundus*, *V. zizanioides*, *L. cylindrica*, *P. emblica* and *S. potatorum* for purification of water. In the Hindu religion, purifying leaves from the sacred *O. sanctum* (tulsi) plants are added to the water used for worship at home and to water offered in temples. In Central India, The natives for clearing muddy water employ the ripe seeds of *S. potatorum*. In Tamil Nadu villages, *S. potatorum* seeds are still rubbed for several minutes against the bottom or wall of an earthen jar before it is filled with muddy water from a tank or a river. In Southern Kerala (India), wiry roots of the rhizome from *V. zizanioides* are laid in a clay jar, which has a few tiny holes in its bottom. Water filtered through this layer of roots is not only clearer but has also acquired a pleasant smell. In India and some parts of West Africa, it is believed that the tiny roots from *V. zizanioides* cool the water if they are put in the bottom of the water jars. In Southern India, dusting with seed coats from *E. cardamomum* is used to improve the effectiveness of clarification. In Northern Kerala, *N. nouchali* is introduced into ponds and wells polluted with animal wastes. Water drawn from such a source is considered to be clearer than before and to have lost its bad smell and taste. In Tamil Nadu, people carry leaves from *P. emblica* to muddied open wells, throw them into the water and wait for some time. Most of the leaves are taken out again. Apart from being clarified, the water is given a pleasant, sweet taste. Research was carried out to develop an ecofriendly, biodegradable, easily available, safe to human health and cost effective plant based substitute for chemicals used in coagulation in water purification. This paper presents an investigation on the suitability of herbs for coagulation. Studies were carried out to assess effectiveness of various herbs for coagulation. Herbs were screened for evaluation of their efficiency as coagulant, coagulant aid. The detail results and discussions is discussed in the paper.

Effects of urbanization on a small stream: environmental history of the Mätäpuro Brook, Helsinki, Finland

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ABSTRACT

The Finnish capital, Helsinki (in Swedish, Helsingfors), provides an excellent setting for the study of urban environmental history, as the most significant human-induced changes in the city have taken place only during the last two centuries. Founded in 1550 at the mouth of the Vantaa River, Helsinki remained a minor town until the annexation of Finland by the Russian Empire in the early nineteenth century. Anxious to sever the close cultural ties between Stockholm and the Finnish provincial capital Turku (Åbo), the Czar in 1812 made Helsinki the official capital of the Grand Duchy of Finland. Fuelled by profound changes in the Finnish society and economy, Helsinki soon experienced an unprecedented urban and industrial growth in the Finnish context: between 1860 and 1940 the city's population doubled every twenty years. By the year 2000, the greater metropolitan area included some 1.2 million inhabitants, or, well over twenty percent of the entire population of Finland.

The rapid urbanization of Helsinki inevitably resulted in enormous changes in the city's natural environment. Among the natural systems most affected by urban and suburban development were the city's numerous small streams. This paper examines the changes in one of these streams, the Mätäpuro Brook, in the western part of the city. The Mätäpuro is the second largest stream in Helsinki with a drainage area of 11.2 km² (4.6 sq. miles) and length of 6.9 km (4.3 miles). Land use changes in the stream basin from the mid-18th century are reconstructed by an examination of maps and other archival sources. Attention is also paid to the water quality in the Mätäpuro since the mid-20th century, when the city began to monitor pH, alkalinity, and oxygen levels and the amount of bacteria, dissolved substances, and nutrients present in the stream. Despite continuous urban development within the Mätäpuro's catchment area and a persistent littering problem, the water quality in the stream has improved considerably during the last two decades. Much to the surprise of urban dwellers and city planners, the endangered anadromous brown trout (*Salmo trutta*) again reproduces naturally in the stream. The ecological and recreational value of the Mätäpuro is today acknowledged by the city, as evidenced by its inclusion into the Helsinki Small Streams Program in 2006.

The quest for water in Barcelona: wells, dams, water transfers, desalinisation plants and beyond

David Sauri, Hug March & Elena Domene

ABSTRACT

This paper will examine the history of water supply in the city of Barcelona since 1950. We use the recent theoretical insights developed in political ecology regarding the relationships between urbanization and the environment to trace the history of water supply in the Barcelona area as one ridden with competition and conflict. As other major cities, population and economic growth in Barcelona has necessitated increasing quantities of water from more and more distant sources. Some of the proposals, especially water transfers from other river basins, have not succeeded because important public opposition. Recently and despite many calls for a “new water culture” emphasizing demand management rather than supply enhancement, water planning and management has turned its attention to the desalinisation plants. Ever-increasing supplies, however, do not solve the tensions that accumulate in the hidrosocial cycle of Barcelona: rising prices and taxes that appear unable to curb consumption in the affluent suburbs of the city and hurt the popular and immigrant classes of the metropolitan cores; a chronic problem of water quality which forces many families to buy expensive bottled water; the pitiful state of the fluvial network of the region; the uncertain economic and environmental costs of desalinisation, etc. Pricing and taxation, water saving technologies and behavioural change by consumers are possible avenues to curb consumption but the truth is that Barcelona and its region are still far of solving their water problems with equity and efficiency.

Our historical account of water in Barcelona reverberates with one of the basic tenets of the relationships between urbanization and the environment, in this case the never-ending quest for new supplies and the transformation of nature and society brought about by the continuing expansion of the built environment. Some decades ago, in Barcelona the main preoccupation was to ensure ample supplies for the industrial sector to the detriment of the urban classes. Today, one of the main objectives is to satisfy the growing demands of the suburban settlements despite calls to sustainability and conservation. The nature of water has also changed. In the early 1900s water drunk in many neighbourhoods probably came from nearby aquifers. Today and in a few years time, water will come from two different rivers, and (desalted) also from the sea, and drinking water (bottled) probably comes from springs and wells still far more distant. In this sense, it can be said that urbanization creates and recreates natural resources endlessly but urbanization is also an arena of social conflict and change. Thus the anarchist premise of access to basic quantities of water for all applied in 1936 is echoed today by the popular struggles against excessive taxes of the late 1990s and against mammoth water transfers of the early 2000s.

The role of anthropological archaeology: addressing the global water issue

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Keywords: Ancient Maya, Balinese, technotasking, labortasking, concave microwatershed, convex microwatershed

ABSTRACT

Environmental studies and assessments without a complementary social component are highly constrained and limited in their predictability and use value. Humans have directly and indirectly impacted the earth's ecosystems since the advent of agriculture by 10,000 BC, if not before. Most of today's endemic and intransigent problems associated with finite resource exploitation and allocation have been previously experienced by complex societies as early as 5500 years ago. What has been successful within the context of specific past environments and social structures provides another research avenue for evaluating our current decision-making criteria for living well on the planet.

Anthropological archaeology provides an underutilized disciplinary data set for addressing aspects of our present-day water management crises. Because our data sets are rich in carefully collected and assessed environmental parameters contextualized by social activities and cultural adaptations, archaeology is positioned to significantly reflect on the stability and resilience of ecological communities broadly conceived.

This presentation will examine two archaeological case studies from semitropical settings in assessing the rate and process of water management manipulation and landscape alteration. The ancient Maya will be compared to the living Balinese in considering the pace of landscape change stimulated by water use. The role of labor organization and technology will be evaluated.

Great Lakes pollution: Canadian/American attempts to address the shift from point to non-point sources of pollution after the Great Lakes Water Quality Agreement in 1971

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ABSTRACT

Canada and the United States signed the Great Lakes Water Quality Agreement in 1971, renewed the Agreement in 1978, and amended it by Protocol in 1987. In the decades leading up to the signing of the Great Lakes Water Quality Agreement, the primary contaminants in the Great Lakes were domestic sewage and phosphates from detergents, both of which entered the lakes primarily from 'point sources' such as urban sewers.. Acting upon provisions of the Great Lakes Water Quality Agreement, Canada and the United States made significant strides in reducing point-source pollution. Even as the two nations achieved success with point source pollution, a profound change took place in the sources and the nature of the pollutants contaminating the Great Lakes. A range of pollutants, such as toxic substances, nitrogen and other nutrients, trace elements, and heavy metals increasingly found their way into the Great Lakes from non-point sources. Non-point pollution proved difficult to regulate; linked land use planning with lake management; and necessitated integrating science with policy making in a political environment characterized by fractured jurisdictions that cross national, state, provincial, and local boundaries.

This presentation will draw upon comparative, primary research in Canadian and U.S. repositories to examine the international response to a significant shift in the nature and sources of pollution in the Great Lakes in the last third of the twentieth century. The paper will examine the historical processes that contributed to the shift from point to non-point pollution of the Great Lakes; it will assess Canadian and American efforts to reduce, regulate, and control pollution of the Great Lakes; and it will connect to a broader discussion of the history of attempts to control non-point pollution of other waterways with multiple jurisdictions.

The legacy of Arthur T. Cotton's plans to link India's rivers

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Key words : Arthur T. Cotton; India-rivers; India-irrigation

ABSTRACT

A solution often proposed to remedy India's increasing scarcity of water is the linking together of rivers via canals to transfer water from water-surplus regions to water-deficient regions. Such a scheme would be extremely costly and is largely impracticable, yet it continues to capture the imagination of many and has much popular appeal. This paper investigates the origins of the plans to link India's rivers in an effort to question its persisting popular appeal.

Though rarely mentioned in contemporary dealings on the subject, the idea to link together India's rivers by a system of canals appears to have been first envisioned by Arthur T. Cotton (1803-1899), a British civil engineer who designed the earliest "modern" dams (anicut) and canal systems in two south Indian river deltas (Cauvery and Godavari, completed respectively in 1837 and 1852). The apparent success of these projects, for which Cotton earned knighthood, prompted him to envision and propose a master plan for linking India's rivers. The plan was detailed in his *Public Works in India* (1854) and it had a two-fold objective: (1) reduction of famine by transferring water from regions of plenty to regions of scarcity, and (2) providing a transportation infrastructure relatively inexpensive to build and use. Work on some initial linkages between rivers proved to be technically difficult and resulted in financial failures. Added to this, the more influential proponents of technologically superior railroads spelled doom to the second objective of Cotton's plan.

Though losing the support of the colonial government, Cotton's plan continued to have certain philanthropic appeal, winning such supporters as Florence Nightingale, who further argued that Cotton's plan could help to improve the health of people in India. After his death, Cotton's biographers further emphasized his sense of philanthropy, while highlighting his persistent struggles against British and colonial officialdom. For his Indian biographers, who wrote mostly in Telugu, Cotton's philanthropy took on an anti-colonial and nationalist flavor. Thus, once India gained independence, Cotton became a model for the new nation's quest to improve the welfare of its citizens. While the initial focus of Nehruvian India was in building "modern temples" (large dams), the idea of linking India's rivers often was and continues to be resurrected, especially during periods of drought.

Almost since they were first envisioned, plans to link India's rivers have been fraught with failure when being executed. Yet, because the plans have assumed a strong philanthropic nature and contribute to a strong sense of national identity, they retain appeal in the popular imagination. That popular figures have in recent years contributed large sums of money toward the cause of linking rivers (for example, in 2002 Tamil mega cine star Rajnikanth promised one crore rupees to this cause) only enhances the philanthropic association of this plan. Breaking this plan's strong association with philanthropy may divert attention away from it to more feasible and effective means of reducing water scarcity in India.

The first water-privatization debate: Colorado water corporations in the Gilded Age

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Keywords: law, privatization, corporations, distributive justice, beneficial use, speculation

ABSTRACT

Contemporary debates over the worldwide trend toward privatization of water systems and supplies have a historical precedent in the controversies that raged in Gilded Age America over the control of irrigation-canal systems by eastern- and foreign-owned corporations.

The involvement of corporations funded by outside capital in Western water projects was seen as a threat to the contemporary yeoman ideal of small, family farms, an ideal that many hoped would solve the social and economic ills of the time. The paper discusses several concrete legal issues that arose in Colorado in the 1880s and '90s, demonstrating how the principle of public ownership of water and the use requirement were applied to curtail the power of water corporations and preserve the profits of irrigated agriculture for small-scale farmers.

In conclusion, the paper challenges the common typology of property, in which private property is opposed with public, demonstrating that these two ideas can be in harmony, with the more important dichotomy distinguishing between widespread, diffuse ownership and concentrated ownership. Paradoxically, history shows that private property in water may be used to prevent undue concentration of the resource and its control by the wealthy and powerful. Moreover, even corporate ownership can be harnessed to serve the needs of the broad public.

Upscaling in the Dutch water supply sector: a historical perspective on water supply provision in the province of Friesland

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ABSTRACT

The history of water supply in the Netherlands is similar to that of other countries. Development of water supply was triggered by increasing urbanisation and industrialisation, and increasing understanding of water borne diseases in the second half of the 19th century. Initially the development of water supply was left to local initiative by either municipalities or private operators usually servicing a single city or town. At first, service provision was limited to the larger and richer municipalities where the municipality and private service providers were ensured of sufficient rates of return on their investments. In this era of 'local initiative', which lasted from 1854 to about the middle of the 20th century, the number of utilities grew rapidly. Just before the Second World War the number of utilities operating in the Netherlands reached a high of almost 230 (mainly private and municipal) water utilities.

From the high of 230, however, the water supply sector in the Netherlands embarked on a process of upscaling, which continues until this day. In this article we examine the process of upscaling in the Dutch Water Supply sector by analyzing the nature of upscaling of water supply companies and the drivers behind the upscaling of these water supply companies. The article aims to show that over the past 50-80 years the nature of upscaling in the water supply sector has changed from 2 one which included merging and upscaling operational activities to one in which especially administrative and managerial activities are merged. Moreover, the driving forces behind the upscaling process have changed from government-steered upscaling to mergers which are initiated and executed by the water utilities themselves. This is done by focusing on organization of service provision in the province of Friesland.

Ancestor of the Southern African power pool: Congo River's Grand Inga hydro-electric scheme

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Keywords: Africa, rivers, electricity, water shortage, power pool, Grand Inga.

ABSTRACT

Historically, Europeans have seen Africa as a resource-rich continent inhabited by backwards people. Governments and corporations exploited both people and landscapes for extra-continental markets and revenue generation. Electricity reached Africa soon after its commercialization to service exploiters' interests. In the 21st century hydro-electricity generated on the Congo River could either follow or break this pattern. WESTCOR's proposed Grand Inga Hydro-electric Scheme would divert the entire lower Congo River through generators in an adjacent valley to produce 39,000 GW of electricity before returning the river to its natural course. There are regional and global environmental significance when continental water shortages and the realities of climate change are considered. With a continental electricity grid, Grand Inga could replace all African thermal plants; support, if not replace, failing hydroelectric plants; and eliminate the need for new power dams. Doing so would reduce continental contributions to greenhouse gasses (and global climate change); some rivers would be spared further disruption by dams; and others might have their flow regimes restored. Alternatively, plans for intercontinental power exports could fulfil colonial dreams of relieving European power shortages; enrich a new elite; and lead to construction of more power plants and dams because the new southern African electricity spot market transformed electricity from a component of development to a new kind of 'cash crop'. Which model will be used for Grand Inga's development: the SADC Energy Protocol's social and environmental agenda or neoliberal economics?

Dam removal: a taxonomy with implications for economic analysis

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Keywords: dam removal, river and ecosystem restoration, economic analysis

ABSTRACT

This paper develops taxonomy of dam removal projects – from the simple to the complex. The dimensions of this dam removal taxonomy extend over a range from: (1) small to large dams; (2) single purpose to multipurpose projects; (3) positive to negative impacts of sediment movement; (4) dam is a liability rather than an asset; (5) removal benefits are certain rather than uncertain; (6) removal generates market benefits versus non-market benefits; (7) removal generates positive versus negative externalities; (8) the scope is local versus national; and (9) removal benefits occur sooner rather than later. Dams at one end these scales are easy to evaluate while those at the other are far more complex.

The history of Tammerkoski and its impacts on the development of Tampere

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ABSTRACT

The evolution of the Tammerkoski area into its current form was a process that took centuries. A place where water systems and ancient routes over land and water come together, Tammerkoski attracted settlement early on and gave rise to a marketplace. Latest research indicates that the Tammerkoski rapids were created about 7,500 years ago. As the lake basin tilted towards the southeast, the waters rose and eventually broke with enormous force a new outlet in the south. Although Tammerkoski had a crucial effect on the development of the town of Tampere in historical times, it was important already in prehistory. The rapids offered an excellent fishing site that was open also in the winter.

Although fishing remained an important livelihood in historical times, the rapids were quite early on used as a source of power. There are mentions of mills at Tammerkoski as far back as the 15th century. Mills were among major usufruct rights, which were taxed and disputed in the courts. In 16th-century land registers, the name of the village in the area was still Koski (Rapids), until it was replaced by the names Tammerkoski and Tammerkoski. The inhabitants of the small village of Koski tilled the land, reared cattle and fished, salmon in particular.

In the years following the Peasant Revolt of 1596-1597, the village came under the ownership of one man, the master of the Manor of Tammerkoski. King of Sweden Gustav III gave in 1779 the final push to industrial development of the area by establishing in the manor's lands the town of Tampere, whose inhabitants would earn their living by handicrafts, trade and industry.

“Nature herself has in this broad country created as a suitable place for a village and a trading post one place in particular that lies on the banks of a rapids called Tammerkoski in the parish of Messukylä. The rapids can best be compared with those in Norrköping because of its fine waterfall and the suitability of its location, which allows many and diverse water-powered installations to be established, such as sawmills and corn mills, paper mills and glassworks, etc.

Extract from a Parliament motion for the establishment of the market town of Tammerkoski in 1772.

The newly founded town had about 400 inhabitants. Alongside small manor sawmills and village corn mills there gradually appeared fulling mills where waterpower was used to turn the wheels of manufacture. However, the Tammerkoski rapids flowed almost unobstructed up to 1783, when the first factory in Tampere, a small rag paper manufacturing plant, became operational at the middle rapids. It is the establishment of this mill that the beginning of industrialisation in Tampere is traditionally dated from. The lowermost of the rapids remained essentially rural in character for a long time.

In 1809 Finland was annexed to Russia, and the new rulers sought to promote the industrialisation of Tammerkoski in many ways. In 1920 a cotton mill, Finlayson, was founded on the western bank of the uppermost rapids. From the start, the factory represented the state of the art technologically. In the 1840s the most modern paper mill in the country, the Frenckell plant, was established to utilise the power of the middle rapids. In the mid-19th century, the small blast furnace on the eastern banks of Tammerkoski grew into a major engineering workshop, and was soon accompanied by a linen factory. The company would later develop into Tampella, one of the world's largest suppliers of mechanical pulp and paper mill machinery. Water turbines made by Tampella still produce the majority of water power in Finland. A broadcloth factory was established downstream of Tammerkoski, as well as a roofing felt factory on the western bank, marking the start of major paper and paperboard industry, today's Tako, in the 1870s.

Finland's independence in 1917 improved the status of knitwear and footwear industries as well as the paper industry. After World War II, industry in Tampere was diversified to pay the war reparations. The population of the town grew rapidly. By 1930, there were 55,000 people in Tampere, 60% of them employed in industry. In 1956 Tampere became the second largest city in Finland after Helsinki.

In the 1960-70s industries relocated to the fringes of the town, emptying industrial premises in the town centre. Where the town of Tampere had been created by industrialisation, with the changes in economy as well as industry, the town now had to consider how to bring empty industrial premises back to life. In the 1970s, the solution was refurbishment and demolition. The value of the industrial townscape was understood in the 1990s, when protection, re-use and integration of new buildings became the catchwords. Industrial areas previously closed from the public were developed into an open central district for cultural life in Tampere, a place for the meeting of cultural milieu and urban nature. Today the former industrial buildings house offices, theatres, art centres, workshops, shopping malls – and also museums, which are charged with preserving the industrial heritage of Tampere.

The main factors why Tampere became the place it is today are its advantageous location between two extensive water systems and the Tammerkoski rapids flowing between the two. One thing has led to another. The rapids gave power to industry. Industry developed further the methods for producing power, as well as industrial processes and technology in ways that have created economic benefits. The utilisation of water power is thus a significant factor in creating the preconditions for the emergence of the contemporary Finnish welfare state.

Monstrous and monumental water towers: from engineering to urban design

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Keywords: Water Tower, Elevated Tank, Urban Design, Skyline, Landmark

ABSTRACT

In the United States, water towers are viewed solely as part of the infrastructure of an urban water utility. New water towers in American cities are sited without proactive land use planning and designed using utilitarian engineering criteria, with minimal regard to the community, architecture, urban design and compatible land use. The outcome is often monstrous, not monumental, and these landmark structures end up being clutter in the skyline rather than prided landmarks. New guidelines are needed for the siting and design of water towers such that the result will enhance the affected community with a positive landmark.

Influence of water, food and economy on the livelihood of people in the world

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Keywords: water, food, crop, farmer, income, calories

ABSTRACT

Although the earth is considered to be a water planet, water available for human use is very small. By 2025, there will be an estimated 2 billion more people to feed. More food will be consumed, more water for agriculture meaning less water for environment. To produce one kilogram of grain, plants use from 500 to 4000 liters of water (Fraiture et al 2004). For beef production, water necessary is 14379 liters per kilogram while that for tomato is 130 liters per kilogram. However considering both rain fed and irrigated agriculture the amount of water consumed by agricultural ET may increase from 6,100km³ to 9,700km³, given current trends in population growth, improvements in living standards and water patterns (Rockstorm et al 1999). Approximately 70 percent of the world's poor live in rural areas with limited livelihood opportunities outside agriculture (World Bank 2004b). A reliable source of water makes it possible for them to move beyond subsistence farming. Although irrigation development has negatively impacted the environment it has positively impacted poverty. Of course irrigation does not have to be large scale to have impact on poverty. The introduction of small scale water harvesting and ground water pumps for supplementary irrigation in rain fed areas is having a dramatic effect on incomes and food security in some of the world's poorest communities. Affordable small plot irrigation technology, combined with a move to diversified, high value marketable crops, can add up to an estimated US\$ 500 to the annual incomes of people currently living on less than \$ 1 per day (Polak 2004). Sri Lanka is an island located in the Indian ocean to the East of the Southern tip of India from which it is separated by the Park-Strait. The island lies between the latitudes 5° 55'N & 9° 55' N and longitudes 79° 42' E & 81° 52'E. The majority of the population in Sri Lanka still live in rural and estate areas. Agriculture has been the traditional source of income for them. Crops grown in the areas had been facing problems of crop failure due to drought as there is neither major irrigation scheme nor tank water for supplementary irrigation. Farmers have been using sloppy lands which are susceptible to erosion, under rain fed condition. Consequently field studies were undertaken to evaluate the influence of coconut frond as a mulch on the yield of Cocoyam (*Xanthasoma sagifolium*) which is a root crop having both local and export market potentials. The results showed approximately 500% yield increase over the control treatment without a mulch. Thus a poor farmer holding 0.1ha land could get an income ranging from Rs 6000 to 7000 per month (60 to 70 US \$) from Cocoyam under rain fed condition. With rising incomes, most people in rural areas be relieved of poverty. The study also revealed that annual soil loss was 5t/ha from the control treatment without a mulch where as it ranged from 0.5t/ha to 01t/ha for the treatment with coconut frond as a mulch.

It is concluded that there is too much complacency about water and food issues. But there are alternative paths that could lead to better future. The most promising approaches are gains in water productivity and up grading rain fed systems through better water management. The ecological restoration also be considered when dealing with water issues.

Different attitudes and language habits: German water supply experts and environmentalists in the late 20th century

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Keywords: engineering, environmentalism, water history, artificial groundwater recharge, self images, language habit.

ABSTRACT

With my paper I want to contribute to the conference's major theme "Water history and its relevance". A historical analysis seems appropriate to emphasize, for example, why water supply experts (here especially engineers and chemists) and environmentalists thought and acted in their specific way at a definite time. A historical analysis also seems useful to exemplify the persistence of specific attitudes and language habits that refer to the self-image as well as to the perception of technology and nature. Naturally, (water) history should keep in mind the (professional) history of these groups. Beyond this, it should consider the socio-cultural framework within their members communicated with each other. Thus, historicizing water and technology oriented conflicts might offer a better understanding of previous disputes. Additionally, it might allow to accomplish the possible benefit that counterparts in future controversies will talk to each other insightfully.

On the basis of the so-called "*Rheinwasserinfiltration*" I demonstrate the potentials a historical analysis might provide. This project has been developed and funded since the late 1970s. Its central idea was to take water from the then heavily polluted Rhine river, purify it and let it trickle away in the south-Hessian region "*Hessisches Ried*". This area is situated approximately between the cities Frankfurt on the Main, Wiesbaden, Darmstadt and Mannheim. Because of its originally enormous resource of groundwater this region had been the backbone for the water supply of numerous urban, industrial, and agricultural consumers since the late 19th century. But since the 1960s several water distribution companies and municipal authorities came into conflict with each other about the water resource that became more and more limited. In the wake of repeated dry summer seasons between 1970 and 1976 the groundwater table fell dramatically. Based upon enormous investments and the construction of a highly engineered water preparation works, the infiltration concept aimed at restoring the status quo and to banish water shortage once and for all. Unexpectedly farmers, municipal and regional authorities, and above all, environmentalists objected to this project. Although the government gave its go-ahead at an early stage, the opponents' objection hold up the implementing of the water preparation and infiltration installations for several years.

Focusing on the involved water supply experts and environmentalists I will work out the discourse's central positions and arguments that arose in the sketched context. I am interested in their particular self-image and their conflicting opinions about technical potentials and the way natural resources should be handled. Referring to the water supply experts I want to show that the roots of their attitudes and language habit concerning technical potentials and scientific standards can be traced back to the late 19th century. In the late 20th century these aspects had been objected. The attitudes displayed and the language habit employed by those water supply experts were no longer passed unchallenged by the public.

Development of community financing and its implementation experience in rural water supply and sanitation in Ethiopia

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ABSTRACT

Community management and especially community financing is very new concept in Ethiopia. The traditional way of direct funding and communities participating has been experienced the past 15 years with not encouraging results at all. Three years ago in the Government of Finland funded Rural Water Supply and Environmental Program (RWSEP) in Amhara Region the community management approach was designed including community financing. The experience during the past three years has been very promising. The approach has been fully accepted by the districts and communities and developed to cover the financing of institutional latrine construction as well. The integration of sanitation promotion, environment protection and gender into the approach has also succeeded well. As a result the capacity of the communities has developed to take responsibility of similar development projects in future and simultaneously the water supply, environment and equality have been improved. Experience in Ethiopia has shown many advantages compared to traditional direct fund financing approach in rural water supply. Only resistant to further replicate the approach has been shown by the higher government authorities because of the fear of the decentralization of the fund usage down to the people themselves.

Water supply in the Roman and Byzantine armies AD 1-1000: a brief introduction

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Keywords: Rome, Byzantium, army, military, city, water supply.

ABSTRACT

The research paper seeks to find out what were the different forms of water usages in the Roman and Byzantine armies c.1-1000 AD. The focus of discussion is threefold: Firstly, the paper presents a brief study of the water supply of the Romano-Byzantine armies and its implications for the civilian state structures and future of Europe, Middle East and North Africa; Secondly, the paper also analyses the role of the water supply in military campaigns; Thirdly, the paper describes how the Romano-Byzantines employed water as a weapon in warfare. Particular attention will also be paid to the spread of diseases in the Mediterranean region. The findings are summarized at the end of the paper.

Through Livingstone's eyes: perspectives on water in nineteenth century southern Africa¹

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Keywords: Indigenous water systems; David Livingstone; water management; malaria; communications; Zambezi River; Southern Africa; Angola; Mozambique; Victoria Falls.

ABSTRACT

David Livingstone (1813-1873) was one of a memorable breed of explorers to open up Africa to the English-speaking world in the nineteenth century. In *Missionary travels and researches in South Africa*, (1858) a classic narrative of African travel, he provides some information on the manner in which he experienced water, whilst travelling on a subcontinent that was, at the time, still largely unexplored by Europeans. Livingstone's observations on water provide insights into the manner indigenous people interacted with the aquatic environment. It also sheds some light on how they traditionally managed the available water supplies in their daily activities.

Livingstone made observations on how Europeans (particularly Victorians) experienced water. Many of his impressions reflect attitudes that were influential in shaping ideas about British colonial expansion in the second half of the nineteenth century. These attitudes had an impact on the transformation of the indigenous traditions of using and managing water supplies.

In the paper an overview and summary will be given of the way in which Livingstone experienced the realm of water in the natural and cultural environment of southern Africa in the mid-nineteenth century. His awareness of water provides some food for thought in contemplating the manner in which colonial culture transformed indigenous perspectives on the management of water supply and demand.

¹ Paper presented at the 5th International Water History Association (IWhA) conference, "Pasts and Futures of Water", Tampere, Finland, 13-17 June 2007.

A story of two dams: government, industry and civil society in north-eastern South Africa 1994-2007

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Keywords: Kruger National Park (KNP); Accelerated and Shared Growth – South Africa (ASGISA); large dam construction; eradication of poverty; biodiversity; Olifants River; Luvuvhu River; Limpopo Catchment.

ABSTRACT

The construction of dams in South Africa's Limpopo and Mpumalanga provinces have in recent years caused diverse responses from civil society, intent on protecting the environment. Two examples are the De Hoop and the Nandoni dams, situated respectively in the provinces of Mpumalanga and Limpopo. These dams have an impact on South Africa's world-famous Kruger National Park. The rivers in which they are situated pass through the nature reserve.

Apart from opening up the regional development of some of the country's most impoverished rural regions, these dams serve the interests of industrial development. The South African government is currently working on a development strategy aimed at eliminating poverty in society by 2015. Working in collaboration with the business sector is considered to be a certain way of realizing the development objectives, outlined in policy strategies. However, environmentalists have questioned many aspects of these proposed developments.

In the paper attention will be given to the manner in which civil society, government and the business sector have collaborated in negotiating essential water storage facilities in a water-stressed country. Particular attention will be given to the history of dam planning, construction, execution and development in the north-eastern parts (the Limpopo and Mpumalanga provinces) of South Africa since 1994.

The evolution of the principles governing the management of international watercourses: the history of international water law

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Keywords: cooperation, no harm, equitable utilization, ecosystems

ABSTRACT

This paper will try to present a history of fresh water resources from a legal perspective, focusing on the United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses, which was adopted by the General Assembly in May 1997. The convention is the result of long negotiations between the states, incorporating the principles of the law of the sustainable development of international watercourses. What are these principles of law and what is their legal status? What was the legal framework for the management of international watercourses before the adoption of the UN Convention?

These are some of the questions that this paper is going to examine. Having as starting point the fact that before the UN Convention the interests of the upstream and the downstream states were in conflict, the ambiguous legal status of some of the principles of water law is going to be discussed. The riparian states borrowed these principles from the field of international environmental law and applied them in the needs and special *ad hoc* circumstances of international watercourses. However, the ambiguity of the principles prompted the states to find a solution to the future crisis in the sustainable development of water resources by adopting the UN Convention on International Watercourses.

The second part of the paper will examine the legal characteristics of the UN Convention as well as its efficiency. The convention, an expression of the state *voluntas*, incorporates all those principles that the states borrowed from international environmental law, creating a new field within international law. However, it is argued that this new law is itself in crisis, since it does not clarify which principle has priority and how they could be accommodated to achieve a balance. Therefore, the history of the principles of international water law calls for a new approach, the so called 'ecosystem approach', which can provide future perspectives for the sustainable development of international watercourses, as well as consist the new step forward to the legal history of water.

This paper will try to provide the reader with an overview of the history in the legal regime for the management of international watercourses as well as some food for thought for what the future holds.

Drivers for socio-political analysis of water supply and sanitation services institutional development: a long term perspective

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Keywords: water sector – long term institutional changes – analytical drivers

ABSTRACT

The paper proposes some drivers to guide the analysis of long term development of water and sanitation institutions, which could be very helpful to understand current changes in this sector. They consist in analysing five axes of policy building and reform in this field: i) *the role of public and private sector* in services provision; ii) *the legal competences of local and central governments* regarding such services; iii) *the relationship public authority-operator*; iv) *the relationship operator-regulator*; and v) *the relationship operator- users*. It stresses the importance of analysing the historical development and the actual status of the institutional framework that involves water supply and sanitation services along these axes not only for a better understanding of its potential and limitations, but also for a realistic evaluation of its development possibilities and conditions.

Assisting nature: William Dibdin and biological wastewater treatment

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Keywords: biological treatment, London, sewage, Thames, microbiology

ABSTRACT

From the realization that infectious diseases such as cholera and typhoid are carried by microorganisms, to the identification of these specific microbes, the microbial world of the 19th century was thought to be the great enemy that had to be conquered. It is no wonder then that the objective of wastewater treatment at that time was the destruction of microbial life. The recognition that microbes can be beneficial in nature, and specifically, that microbes can assist in the purification of domestic and industrial wastewater was slow in coming, and the final proof was more an accident of scientific wrangling than a conclusive demonstration. The man credited with understanding the benefits of microbial action and then, in the late 1880s, of building the first large-scale biological treatment plant, is William Dibdin. This presentation traces the work of those who led up to the recognition of the benefits of biological treatment and focuses on the career of William Dibdin.

Future of water services infrastructure ownership

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Keywords: Water, wastewater, infrastructure, public, private, equity

ABSTRACT

Many companies producing water and wastewater services, mostly in the UK but also elsewhere in Europe, have been sold, or are currently being sold, to Private Equity (PE) funds. A fairly new form that has attracted PE financing is infrastructure funds, the main customers of which have mostly been pension or insurance funds wishing to match their long-term liabilities with long-term assets. This paper argues that public ownership of infrastructure assets will in the future be a more rational option than private ownership, not only because the involvement of PE in water undertakings entails a more complex regulatory framework but also because publicly owned water infrastructure can be operated profitably in compliance with health and environmental regulations. This claim is supported by financial data from Finnish publicly owned water services utilities from the period 1997-2006.

Water for Saldanha: war as an agent of change

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Keywords: saldanha bay, berg river, water scheme, south africa, second world war

ABSTRACT

Saldanha Bay is one of the best natural harbours in the world and was recorded as such even before the Dutch set foot in the Cape in 1652. However, when the British occupied the Cape in 1795, no development had yet taken place at Saldanha Bay. The British saw great potential in Saldanha Bay as a naval base, but never exploited it. The principal reason for this lack of development was the absence of fresh water. The prospect of diverting water from the nearby Berg River to Saldanha Bay had been contemplated ever since the Dutch settlement, but never came to fruition until the mid-twentieth century. The fact that war is a powerful agent of change was demonstrated once more when Saldanha Bay acquired access to a sustainable supply of fresh water during the Second World War. This paper traces Saldanha Bay's 'waterless' history to 1943 and explores the Bay's acquisition of strategic importance during the Second World War, resulting in the South African Engineer Corps being tasked to tap into the Berg River to quench Saldanha's thirst. The paper concludes with a brief outline of the immediate and longer-term impact this wartime lifeline had on Saldanha Bay and its inhabitants.

Obstinate chemical health hazard: lead in water

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ABSTRACT

Lead is a toxic substance and in drinking water it seldom if ever originates from natural sources. The purpose of this study is to examine how the toxicity of lead in drinking water was realized in different periods from antiquity up to modern times. Lead was well known already in antiquity and because functional pipes can quite easily be made from lead, it was widely used in water supply systems. Lead was, however, considered to be hazardous to health already in antiquity and for that reason it was not a recommended material for water pipes.

Throughout centuries, evidence of toxic effects of lead accumulated but in spite of this many water supply distribution systems in the world were made of lead. Concerns about lead exposure from leaden plumbing systems continued to be expressed since the 16th century. Despite several reports of waterborne plumbism (chronic lead poisoning), especially in the 19th century the use of lead in plumbing systems continued.

After the Second World War it was recognized that the old lead pipes can expose people to elevated lead concentrations in water. Replacement of the old lead pipes, which are still present in many old water supply systems in the world, has been considered expensive and economically unfeasible. The health-based recommended maximum values for lead in drinking water changed upwards and downwards during the last half of the 20th century.

Sustainable criteria for water minimisation in municipal economy of Ukraine

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Key words: urban water management, water minimisation, sustainable criteria, water efficiency, decision-making process.

ABSTRACT

Urban water problems are growing more complex and acute all over the world. Without efficient urban water management cities face critical challenges as lack of water supply and sanitation, aging infrastructure, growing competition for the use of fresh water, and deteriorated environment, among others. The precautionary water minimisation measures help to reduce the level of water use of major water consumers, improve environmental, economic and social sustainability of urban areas development. Decision-making tools to include sustainable indicators and criteria should support the implementation of such measures. Sustainable criteria are defined as a set of factors used to assess the range of options and, in this case, to analyse the current situation of water use and to propose the minimisation of water use based on the principles of sustainable development. Aims and objectives of this research paper are to determine measures leading to reduction in public water use; to identify appropriate indicators and criteria for assessing the sustainability of measures for minimisation of water use; to formulate the principles for the decision-making support of water conservation measures. Following the pilot investigations done in the city of Kharkiv, Ukraine, a set of economic, environmental, technical and social factors of water minimisation the sustainable water indicators and criteria has been generated. Options for dealing with water minimisation were consequently identified with the use of such an approaches as human behaviour changes, water control implementation and introduction of water saving technologies. The situation of doing nothing was evaluated, as well.

Asset management by water and sewage works in Finland

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Keywords: asset management, water and sewer systems, service life, maintenance, reliability

ABSTRACT

Significant investments in maintenance of ageing water and sewer systems will be needed also in Finland to maintain the reliability and value of this buried asset. Investments in rehabilitation of pipelines should be well-timed and allocated that quality of service, i.e. the water quality, price and delivery reliability will stay on acceptable level despite of the limited budget and resources.

Four Finnish waterworks, a Finnish software company and VTT (Technical Research Centre of Finland) are co-operating in a research project known as AssetVesi, the main objective of which is to develop new methods and tools for the asset management of water and sewer systems. The research will be based on the processes and procedures found in the literature, results of previous researches and guides and tools used currently for asset management purposes throughout the world.

The data collected by the four co-operating city works will be exploited in the development work. The research will identify the most essential technical parameters of water and sewer systems from reliability point of view. Tacit knowledge in the form of expert data is being used complement the data acquired from the information systems.

The main results of the research project will include: procedures and tools for assessing reliability and criticality of water and sewer systems; utilisation methods of expert data and data analyses for estimation of different variables of water and sewer systems; procedures for developing asset management strategies for waterworks and a tool for benchmarking technical performance of waterworks.

Harvesting the rain: indigenous practice to means of socio-economic upliftment of rural poor. A case of Daugha village development committee of Nepal

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Keywords: Holy ponds, Rainwater Harvesting, Rural Poor

ABSTRACT

Clean drinking water is basic need as well as fundamental right of human being. Due to diverse geographical structure of Nepal (Altitude variation from 90 to 8848 meter within 150 km span), single technology can not be applied throughout the country to facilitate users with clean drinking water. Piped water supply through gravity system in hill and mountain, and ground water abstraction in plain area is common in Nepal. The people residing at the peak of hills where electricity is unavailable to lift the water are still unable to get water facility and devote their valuable time to fetch water for household use, resulting increased drudgery; especially to women and girl child. It has impacted adversely in health, education and economic status of rural people.

Collection of rainwater in ponds at higher situations of settlement for cattle feeding and other household utilities are common in Nepal from ancient period. According to Hindu Religion, such ponds are considered as holy place and worshiped in different occasions. It is good practice to conserve the ponds. Water collected in such ponds fulfils the domestic water need of people and also help to recharge the water springs at lower altitude.

Considering the alarming water scarcity where people need to spend more than three hours time to fetch single bucket of water (15 liter), Government of Finland supported Rural Water and Sanitation Support Programme (RWSSSP) introduced rainwater harvesting technology at household level in 1995/1996 for the first time in Nepal from Daugha VDC of Western hill, where people used to drink pond water and suffered from different water borne diseases. RWSSSP developed and designed appropriate technology suitable for the hilly area where there is no road network for transportation and have low quality of local construction materials. The entire structure consists of Rainwater harvesting Jar, Gutter system, Water flushing and precautionary management system. Safe handling and proper operation and maintenance is critical in the poor, less educated and remote villages. Considering the fact RWSSSP has trained all households in the matter and established participatory monitoring system in facilitation of Rainwater Users' Committee. Daugha is the place where people of other area did not allow their girls to marry there due to water hardship. After 10 years of RWSSSP intervention, the scenario of Daugha VDC has been changed and the facts reveal that economic status of people is increased through kitchen gardening and other income generation activities. Health status is improved and enrolment ratio of girl child increased and school dropping out ratio is decreased. Rainwater Users Committee has mobilised the revolving fund for the households who want to increase the number of Rainwater Jars and household latrine construction.

After the high acceptance of the technology by the community, it is replicated in other part of the country by other development agencies including Government institutions of Nepal. The technology is gaining popularity and spreading throughout the country. The technology pioneered by RWSSSP has proved milestone in history of drinking water in Nepal.

Competition about water quality: past and present

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ABSTRACT

Our solar system contains plenty of water. Water is a fundamental precaution of active life, at least on our Earth. However, suffering and dying for thirst are common. The mankind has failed in controlling the global water resources. Hence, competition on water is common. Access to water is important, but equally significant is the quality. The system can be seen as ecosystem trading. Human economies take water from natural resources, but cannot buy it, as the nature does not acknowledge currency. The use of water bodies as wastewater recipients is similar. Once taken to the urban or rural economic communities the raw water quality can be adjusted with technological means for different purposes, and the product can be transported and sold to users. Those processes are heavily influenced by economic and technical parameters. In the bigger model they are subsystems, which ends up to ecosystem trading again. Pollution is often cheaper than wastewater treatment. Luckily, it has become cheaper along with bigger plants and better knowledge of purification technology.

Competition between users has become harder, as the big cities and industries have increased their needs. Agriculture was earlier the biggest and fastest growing consumer of water resources, as irrigation development created the current capacity to maintain high food production for the rapidly expanding human population. Even presently, old rural people like to think that their drinking water should be free as it rains from the skies. It is hard for them to accept high fees as a payment for safe quality and pipeline. In the future, agricultural water needs will grow slower in comparison to municipal water supply. Population growth seems to continue exponentially, and more people need water services as they gain wealth. Big industries could save a lot of their current water consumption, if they apply appropriate technology.

Based on the development from past to present, we can predict some features of our future. A new factor is climate change, and changes in weather patterns. Traditional agriculture will be able to maintain high productivity only by applying more technology, and by redesigning the seasonal activities. Safety of big municipal and industrial water supply requires proper integrated water resources planning, to address the contest on water and its quality between different users. Development cooperation gains importance, as water technology and knowledge have to be shared with the poor. That is the only way to win the global game.

Limits to corporate political activity: private sectors' success and failure in promoting change in the Finnish water sector

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Keywords: Water Privatization, Lobbying, Corporate Political Activity, Structural Change, Finland

ABSTRACT

This paper evaluates the success and failure of lobbying as part of corporate political activity in the case of the Finnish water sector. Private sector companies' attempts to promote privatization are reviewed by a qualitative social network analysis and interviews from and about these companies. The period under investigation lasts from 1995 to 2005 and the results of the study show that corporate political activity had concentrated during this time on the local government level and enjoyed success only in those few cases, where private companies were in fact able to adapt to the local government's interests. Hence, lobbying and corporate political activity was rather limited in the case of promoting private sector interests and privatization in the Finnish water sector. By comparison of different companies' political activities, three key success factors for corporate political activity were extracted, comprising *awareness, agency, and adaptability*. Although the extent to which private companies' lobbying efforts call for constant watchfulness and awareness, their ability to affect their environment may be overrated, at least in countries with fairly functioning institutional frameworks and processes, such as Finland.

Exploitation of groundwater in Iran, from the last century to the present

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ABSTRACT

Iran is ranked among the arid and semi-arid countries whose average annual precipitation does not exceed 250 millimeters or one third of the world average. Some parts of Iran just receive a rainfall of 50-100 millimeter a year, so scarcity of permanent surface streams have made these regions live off groundwater resources. Groundwater which has traditionally been obtained by means of Qanats has always played a vital role in the survival of this area.

This paper investigates how our groundwater resources were exploited before the advent of modern technologies when Qanat or shallow well was the only way for people to extract groundwater. Also, the paper presents a history of pumping deep wells that impacted Qanats and led to increased salinity and diminished aquifers in some arid and semi arid regions. Our hypothesis is that the technological changes in exploitation of groundwater not only created unrest in environment but also corrupted the society's traditional attitude toward this natural resource. It is impossible to keep the new technology away from people's access, but it is possible to promote environmental ethic of the society to make them believe that overpumping groundwater can spell a serious crisis sooner or later of which the next generations would have no way out. We can still learn from our traditions how to live in harmony with nature, if we want to control the misusing of modern technology in terms of groundwater resources. People and nature can live side by side as long as we manage to look at nature from the same angle as our ancestors did, even though we are equipped with the newest means to extract natural resources.

The Lule River: hydro power exploitation in the northern parts of Sweden

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ABSTRACT

The regulation has most of all destroyed the migration route above Suorva. The letting out of water causes ice barriers. These are due to the storms bared of snow and very slippery, pointing in different angles. Add to this cracks and holes in the ice. [...] To dare to go out on such a lake with a herd of pregnant reindeer does is a sure death.

The words above come from Ms Inger Utsi (1914-1984) a female reindeer herder and Sami, describing some of the impacts on the reindeer herders of the hydro power exploitation in Sweden. Her words are part of an article published during the height of Swedish hydro power exploitation in the 1950s. However, her words did not help much, as about a decade later, the fourth and last regulation of the Suorva dam took place. When Ms Utsi wrote these words, the regulation level was 18 meters. Today, the former five small mountain lakes have been turned into one single large reservoir, the largest reservoir in Sweden, with a up and down level of 30 meters, according to the demand for electricity in the southern parts of Sweden and neighboring countries linked to the water through long transmission wires stretching out over the landscape.

Emerging Strategies in the deliverance of Water Services to the urban poor- the case of Kampala, Uganda

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ABSTRACT

Are systems of small-scale informal providers the answer to the riddle of how to supply growing urban populations with water? Or is the use of pre-paid technology the way to go? In either case, fundamental changes must be made in the provision systems in order to break away from unsustainable modes of service provision that have their roots in early colonial times. Governments in several African countries are increasingly faced with the challenges of providing water and sanitation, especially to the expanding informal settlements, while the progress towards the water-related Millenium Development Goals is slow. The responses to the situation differ in scale of action and motives, and are embedded in place-specific contexts. They vary from the range of new strategies and patterns of organisation undertaken by local communities, to national reforms and international initiatives by NGOs, governments and global institutions. Under the related processes of globalisation, privatisation, and informalisation, the structures for provisioning have been affected while still being subject to influence from long-term historic processes.

In the Ugandan capital Kampala, small-scale providers and NGOs are mainly the ones to provide water services to people residing in informal settlements as large-scale infrastructure established in the colonial period has not been expanded to the poorest groups. The public water and sewerage utility has recently adopted a new strategy which involves decentralized management and pre-paid technology in the informal settlements. From the dynamic changes in the sector, emerge new coalitions and broad-based partnership arrangements, comprising the public and private sectors as well as NGOs and small-scale providers. What is seen as a pragmatic response to the problems faced by the public sector, originates from contemporary governance agendas that put forth the involvement of multiple stakeholders and public participation. In the implementation of these governance agendas, the boundaries between the public and private, the formal and informal, the state and civil society sectors are increasingly blurred. Moreover, large-scale technical systems as well as their institutional frameworks develop over long periods of time and generally are subject to inertia: resistance to change. Introducing new technologies and a new organisational structure must therefore be matched with new institutions that can bridge the 'old' monopolistic structure with a small-scale peripheral provision system.

This paper will examine the politics of water provisioning, and address how the above mentioned dynamics are played out in Kampala, Uganda in the contemporary setting as well as in a historic perspective. With a focus on provisioning of water services to informal settlements, it will examine the consequences of the changes in the sector, and what kind of challenges and/or opportunities the new governance practices pose.

Framing the Water Challenge – Institutional change within the water and sewerage sector in Ghana 1957 – 2005

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ABSTRACT

Despite half a century of Official Development Assistance to the Water Supply and Sanitation sector in Ghana the situation still remain far from satisfactory. In Ghana only 51 % of the urban population have access to an improved water resource while 34 % have access to safe sanitation.

Throughout history, opinions on what is best practice to provide more people with WSS services in Ghana have changed. Ideas about public and private responsibilities have shifted over time as well as ideas on the most appropriate governance models, centralized or decentralized etc. In addition ideas on the very nature of water and the problems associated with scarcity of this precious resource effect what actions are considered as appropriate to improve the situation for those in need.

The paper follow and analyze institutional change in the Ghanaian WSS sector during the post independence era 1957 – 2005. The concept of problem frames is used as an analytical tool in order to illustrate how ideas change and replace each other but also to highlight how problem frames are growing more complex as experiences are gained and knowledge sharing increase.

What were the previous trends and ideas driving development and motivating the institutional set up in the water and sewerage sector during different time periods? What solutions were generated from different problem frames? Who made the rules, for whom and what were the arguments?

The paper argues that that time and context limits the choice of action during different time periods. History also matters in the sense that one historical period tend to give way to another. In the case of Ghana this has often resulted in radical shifts in development policies where the pendulum has swung from one extreme position to another. Finally WSS sector development in Ghana has largely been determined by shifts in international policy trends rather than by local development strategies. However, recent trends indicate that as civil society is growing stronger this also effects policy development in the Ghanaian WSS sector.

The future of the past – contextualising to understand and cope with uncertainty

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Keywords: history of water management, uncertainties, managing risks

ABSTRACT

Within fisheries science, Pauly (1995) described the phenomenon of shifting environmental baselines. He affirmed that each generation of scientists subconsciously views as 'natural' the way the environment appeared in their youth. This phenomenon is general and applies to all sectors of society. As one generation replaces another, people's perspectives change such that they fail to appreciate the extent of past modifications (Saenz et al. 2005)

Within the water sector, there are almost no improvements when developing new techniques or/and new models and/or instruments regarding water resources management that take into account the already existing compliance of more than a century of research and no end of centuries of implementation of techniques in the water sector (Manez, forthcoming).

An appeal will be done with this presentation on the importance of past implementation strategies in countries dealing with droughts. Examples show that local historical water research help to cope with the uncertainty of emerging water and climate related risks, as illnesses. For example, in regard to integrated water resources management in the Mediterranean an emerging problem is the health of the ecosystems due to a high amount of pressure on them. Some climate scenarios reveal the rising of illnesses that were eradicated from Western Europe, like malaria. As an example of past strategies to reduce malaria, a legend says that bats were domesticated by the Moors in Valencia to diminish the mosquito populations around the marsh and succeeded in eradicating malaria in the time of droughts when the lake and marsh around Valencia tended to have stagnant waters, e.g. the perfect ground for the mosquitoes' reproduction.

This does not mean that modern societies should use the same strategies than older societies but it means that ignoring the technical and non-technical measures of the water sector developed locally in the past from earlier societies would help us to understand the present crisis and challenges.

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The use of historical trends in the governance of water and sanitation services to predict the future service level: Kenyan perspective

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Keywords: History, colonization, water supply, sanitation, governance, policy

ABSTRACT

The history of modern Kenya can be traced back to the late 1880s when the region came under the administration of the Imperial British East African Company (IBEAC Co.). After the advent of the British rule, the country underwent a series of rapid changes that transformed it from a scarcely delimited entity of autonomous ethnic groups to a colonial territory, the British East Africa Protectorate (BEAP) from 1895 to 1920. In 1920 BEAP was changed into the Colony and Protectorate of Kenya. In 1963, the country gained its independence from the British.

In that respect, the history of Kenya as a nation and the provision of water and sanitation services are quite young when compared on international timeline. However, the process of water development (mechanisms of use and supply) is intricately intertwined with the history of Kenya and its people. Records available strongly show that the development of water supply and sanitation closely followed colonization pattern. This sessional paper will explore the historical trends in the provision of services right from the origin around 1900 to 1980s by examining the concept of water governance that were in place in the development and management of water resources and the delivery of water services at different levels of society.

After four decades of development as an independent state, in the late 1980s, it became clear that provision of water and sanitation services to the residents was not effective. Arguments such as lack of clear allocation of responsibilities; and limited national economic growth had not created enabling environment for effective management of water and sanitation services in country. The weaknesses in the institutional framework (organizational structures, lack of autonomy, and unclear definition of roles and responsibilities) led to conflicts. In particular, the ministry in charge of water affairs role included that of being the primary service provider and principal regulator. This led to some weaknesses that include: poor coordination between sector institutions; lack of adequate skills to manage and operate water supplies; and inadequate logistical and institutional capacity for effective maintenance, material supply and cost recovery to operated systems.

It is through these arguments of the 1980s that this paper will examine the historical trends in the effectiveness of water governance over time and outline historical discourses and colonialism challenges that were faced overtime to establish proper governance.

The historical discourses will be thoroughly evaluated with an aim of unearthing any discontinuity between the recent past, present, and thus predict the future success of the current water sector reforms that came into operation in the 21st century.

It's all politics

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Keywords: water governance, implemenation, transaction costs, policy

ABSTRACT

Implementation is all too often seen as a technical step, whereby agencies carry out the directives of decision makers. The question posed in this session essentially implies a similar view, whereby decision makers should adopt the smart ideas put forward by knowledgeable experts. However, Eugene Bardach (1977) has long ago shown that implementation is anything but certain. The passing of a bill or a decision of the executive branch is only the opening stage of a political game that he termed the implementation game. This is even more the case when we ask why decision makers, who are usually politicians, don't take more heed of professional advice. In this short note I suggest that the fault lies with the experts, who don't take heed of politics, rather than with the decision makers.

The first fault lies in the proposals experts advance. Some of the most widely espoused concepts are IWRM and basin management. Yet, the establishment of such regimes, especially in transboundary settings implies exceedingly high political transaction costs. These transaction costs are an outcome of three factors that need to be overcome if such a regime is to be established. One, a transboundary regime may imply that states need to forgo some element of sovereignty, something no state is eager to do unless it has a very strong incentive to do so. Two, a new regime is likely to transgress on the authority or operation of existing institutions and agencies. Such players have often many discreet ways in which they can impede the establishment of a regime they do not support, as these players are very adept at manipulating the multiple administrative details that need to be addressed in establishing such a regime. Three, such a regime may counter existing power structures and reduce the power held by various interest groups. Hence, they may face strong internal or local opposition, which can be very effective.

The second fault lies with the disregard of many water experts for political opportunities. Kingdon (1984) has shown that in order to advance policy proposals and turn them into policies a great deal of entrepreneurship is needed. Actually, he terms the professionals that push such proposals in the policy arena policy entrepreneurs. If water experts want to advance various ideas it is insufficient to write them up and explain their merits. Rather, there is a need for long term political action. In particular it is necessary to wait

for the opening of 'policy windows' and then to frame the proposals in the way that would make them attractive to decision makers in that specific circumstance. This requires political skills that experts all too often lack.

The third fault lies in the studies water experts conduct. Most of the studies presented at water conferences have to do with the way water has been or should be managed. It is quite rare to hear an implementation analysis in the water sector. That is, there is a need to conduct analyses of the factors that support and those that impede water policy adaptations and innovations.

Finally, it is worth noting that in some cases experts may be wrong. Dams were politically attractive in many parts of the world, and thus many were constructed. Actually, it can be argued that too many have been built, especially when experts became adroit policy entrepreneurs (Reisner, 1986). Thus, it is always important to maintain an effective, skeptical, checks and balance system, lest half-baked or too narrow policies be adopted, which will later have wide adverse implications.

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A Methodology for Studying Ancient Canal Systems: Peru and Mexico

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Keywords: peru,mexico,prehispanic irrigation,colonial irrigation

ABSTRACT

Archaeological Field work carried out in the 1970's, following Paul Kosok's pioneering 1940's fieldwork in the desert of Northern Peru, on 88,000 hectares of preHispanic canals and fields in the Jequetepeque Valley are the basis of a field methodology that has carried over into the study of Colonial Irrigation Systems in Mexico. Emphasis is given to the ability to carry out on the ground irrigation studies of abandoned and extant systems in areas that have undergone changes due to modernization. Laboratory work, notwithstanding the Historical background from Archives, with hard copy of maps and aerial photographs, along with ground verification field work methods are essential in the successful reconstruction of older abandoned canal systems.

The Politics of Damming in Postcolonial Africa: The Case of Ghana's Volta River Project

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ABSTRACT

In 1962, Ghana's first president Kwame Nkrumah proclaimed that the Akosombo Dam, the center piece of the Volta River Project, would transform the nation's economy and symbolize "this scientific and technological era now dawning in Ghana." At a time when international optimism in the project waned, Nkrumah remained the project's premier booster. On January 22, 1966, after years of negotiation with the United States, Great Britain, and the World Bank on the project's design and financing, the resettlement of 80,000 people, and the formation of the world's largest man-made lake, the dam was formally inaugurated. At the ceremony, Nkrumah recounted the travails of the planning and construction process, concluding with the hopeful proclamation that the project was "a concrete symbol of the type of international cooperation which can [...] forge world peace." A month later while on a trip to China Nkrumah was overthrown by a coup, leaving the 463-foot high Akosombo Dam as one of his lasting legacies.

With water needed for the irrigation of cash crops, during the colonial era rivers were key resources in colonial agricultural development efforts. Following the Second World War and African independence, the development agenda of many African nations changed from one based almost exclusively on agricultural production and mineral extraction to one that sought industrial development. Having fought for their nations' political independence, postcolonial African leaders like Nkrumah looked to industrialization as a means of securing economic independence from their former colonial masters. In order to achieve these goals, electricity was needed. Foreign and African planners and engineers argued for the construction of hydropower-producing dams, leading to debates with African communities and international funders over which rivers to dam and for what purpose. However, instead of spurring an African industrial revolution, the reliance on foreign funding to build capital-intensive projects such as large dams led many African nations to become heavily indebted to multilateral and bilateral funding institutions.

Drawing upon archival and fieldwork conducted in Ghana and Great Britain, this paper explores the internal forces that shaped decisions about damming in post-independence Africa by examining how the Volta River Project influenced Nkrumah's political standing within Ghana and the ways in which the project impacted other dam projects across the African continent. Project boosters like Nkrumah used local needs—ending harmful flooding, providing stable water sources for agriculture and domestic use, producing hydropower—to justify the high costs of such projects. The future sale of excess power to other African nations was seen in terms not only of national economic growth, but as means to foster regional stability and African cooperation. Eager to increase their own and their party's prestige among their citizenry, their African counterparts, and skeptic foreign interests, African leaders looked to their nations' rivers to provide the power that would fuel economic growth. The decision of whether to dam or not dam became central to the political legitimacy of many postcolonial African leaders. With the decision of many international agencies to once again fund large dam projects, a discussion of the forces shaping decisions over damming is remains both relevant and timely.

Accepting Realities of Multiple Systems? Water Resale and Vending throughout Dar es Salaam's Water History

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ABSTRACT

Piped water has in Dar es Salaam always been the privilege of a minority. The majority has relied on water from other sources or accessed piped water indirectly by way of those connected to the piped system. Whereas the practices of water resale and vending have generally been ignored by official statistics as well as the urban authorities, this paper argues that they have been an important feature of Dar es Salaam's water system all along. Population and housing census data only distinguish between piped and ground water. Various health and budget surveys further distinguish protected and unprotected sources, but make no distinction between whether water is accessed for free from neighbours or paid for to vendors. It is unlikely that the few public standpipes that have been functioning in Dar es Salaam could have been supplying the 'unconnected' majority. Instead, the high volumes drawn from household connections clearly indicate that onward distribution take the route of domestic resellers.

The authorities' stand with regard to water resale and vending has vacillated between silent acceptance and instances of repression. There were early attempts at banning water sales from mosques, but also decisions as to ignoring the business of water carriers. After independence, there were attempts at deporting water vendors from Dar es Salaam, along with other 'loiterers.' However, water vending appears to always have been an important part of water distribution, although by some comparisons not as proliferate as in some other African urban centres. At present, however, water resale and vending is the lifeline of water access and distribution in Dar es Salaam. The importance of these practices is also recognised by the authorities. Nonetheless, a constructive acceptance and systematic inclusion in the overall functioning and strategies for Dar es Salaam's water system is yet to be produced. This paper argues that a longer-term strategy for extending the piped system needs to include also shorter-terms strategies for improving the effectiveness of informal water markets and its complementarity to the piped system.

From research to consultancy

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Keywords: water management, policy development, complexity, stakeholders, role of researchers

ABSTRACT

The issue of poor interconnections between the scientific and policy development communities has been recognised and addressed in the HarmoniCA project (Quevauviller et al., 2005), with special reference to the implementation of the Water Framework Directive. A number of causes were identified: different languages spoken by scientists and policy makers, different interests and targets, different agendas, different timetables. Solutions to be developed were identified: linking products and requirements, building a web-portal, close cooperation within the Pilot River Basins of the WFD.

This paper puts forward the proposition that it is the responsibility of the researchers to adjust the presentation of their results to the characteristics of the situation. It is not a plea to forget past practices, but rather to broaden the range of role playing options to choose from and make an adequate choice. In doing so, the researcher takes up some of the behaviour of a consultant. The options are brought about by the widened horizon of water management in general, which is illustrated by the following three questions.

1. Who are the relevant players?

The four main categories of players in water management discerned here are policy makers, water managers, researchers and water users (after Quevauviller et al., 2005). An illustrative scheme was offered by Blind (2006). Over the past decades, the increasing number of interaction points between the different categories have brought about increasing complexity in water management (Pahl-Wostl, 2002). Increasing pressure on available resources leads to more (potential) conflicts between stakeholders, to the need of stronger interactions between officials of different government layers, and to the need of more interactions between officials of different government sectors.

2. How can the playing field be defined?

Generally speaking, the developments in the playing field reflect those indicated under Question 1. As problem complexity increases, problems are less likely to find a solution within the realm of water management only. Adjacent sectors are drawn into scope, eventually leading to what is nowadays indicated as integrated water resources management (IWRM). An important feature of the broadened playing field is the increased uncertainty that is associated with it. Uncertainty about data and models, about relevant actors, their motives and their behaviour, about developments such as climate change etc.

3. What are the rules of the game?

The traditional approach to water management issues has been top-down. Gradually this approach has been adapted, making room for input from stakeholders and public, assigning increasing influence to stakeholders, and designing policy development procedures with alternating top-down and bottom-up approaches. An interesting recent development in Dutch water policy development is the introduction and promotion of a number of 'paradigm shifts'. One of these paradigm shifts is from 'top-down detailed regulations' towards 'offering room within stimulating frames' (DGW, 2006, in Dutch). This implies a recognition of the fact that in certain instances the central government cannot direct processes but is dependent on the willingness to co-operate of its counterparts, and should apply its efforts accordingly.

What lessons are here for scientists

The statement put forward here is, that if scientists want their research results to be implemented, they must adjust their behaviour and results to the situation at hand. In doing that they become something of a consultant. That implies that they are aware of the broader scope of the problem: which steps and parts in figure 1 are relevant, when, and for whom. What are the characteristics of the players, the playing field and the rules of the game. And how does all of this relate to their expertise. Straightforward questions and answers in simple 1-to-1 relations still exist. In certain cases however, increasing complexity will demand more context sensitivity, more interactions with water managers and decision makers, and more willingness to include insights of adjacent research fields.

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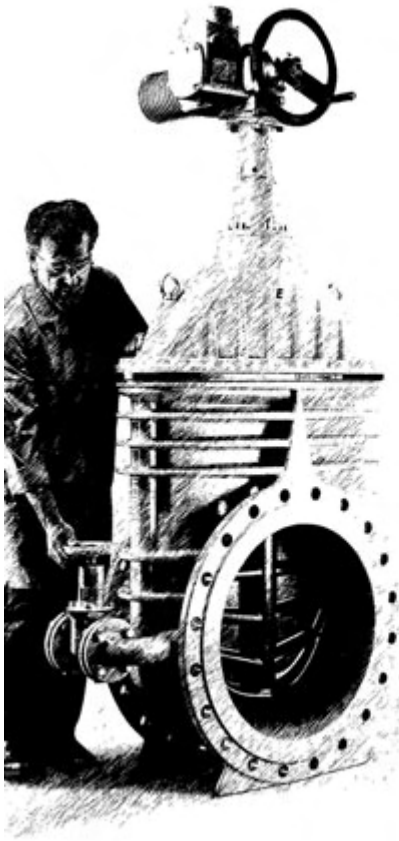
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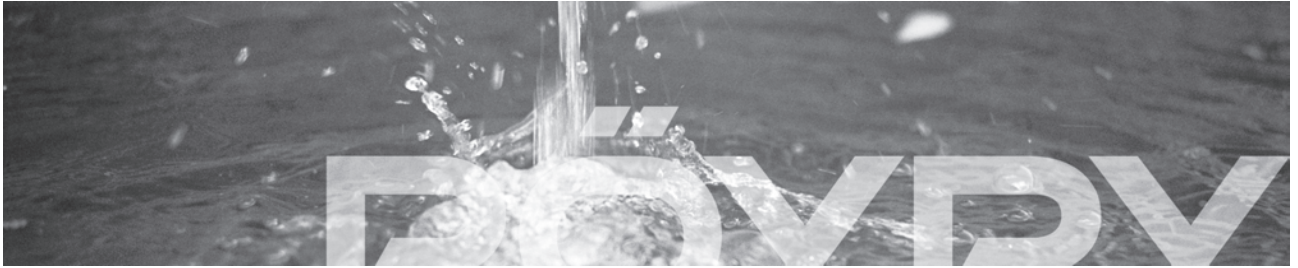
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