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Embodied Vulnerability in Large Scale Technical Systems – Vulnerable Dam Bodies, Water Bodies and Human Bodies[1]

May-Britt Öhman

Prologue

The year after I was born, the rapids at the Skällarim stretch of the little Lule River - Unna Julevädno[2] had been silenced by the creation of a dam – creating the lake-like Letsi reservoir. The whole of this territory, lands and waters, north and south of Unna Julevädno, had belonged to members of my family, as so called "Lap Tax Land", since the 17th century, and possibly even before that (Ullenius 1932; Öhman 1992). The "Lap Tax Land" was a specific way for Sámi people to own landscapes and waterscapes created after the establishment of the Swedish nation state in the 16th century, in the Stockholm region followed by the colonization of the northern territories – Sápmi, the land of the Sámi. We, the Sámi people, were in this colonization process requested to pay taxes to the Swedish state for the land- and waterscapes that we were using. Each Sámi /Sámi family who owned reindeer had their own territory consisting of lakes and land. Within this territory the tax payer had exclusive rights to hunting, fishing and reindeer herding. The territories were inherited and could be sold. This system was in practice until 1928, when this system was dismantled and Forest Sámi – like my family – were forced by different methods to become Swedes (Lundmark 2006; Korpijaakko 1992).

The particular river stretch at Skällarim had been sold, or rather transferred by force to a relatively small compensation, to the State Power Board by my grandfather's eldest brother, Alfred Nilsson,

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[2] Unna Julevädno is the Lule Sámi name for "Little Lule River".

who as an eldest son had inherited parts of the "Lap Tax Land."[3] However, Alfred kept part of the landscapes and waterscapes, which, as he had no children, I – together with other relatives – came, by inheritance, to own. Thus, after the passing away of one of my uncles, in 2009 I found myself owning a stretch of land inundated by the Letsi reservoir, by the dammed and quieted waters of the Unna Julevädno.

[Fig.1. Standing at my stretch of the silenced regulated Unna Julevädno/Little Lule River. At the far end the Letsi dam can be discerned. Photo: M-B Öhman, July 2012 (placed at the end of the manuscript)]

When I grew up in the 1960s and 70s and became aware of this particular water body, there were no more white waters at this stretch of the river. My only consciousness of these rapids is a childhood memory of two bleached photos on the wall in my grandparents' living room. No one ever talked about these photos as far as I can recall. No one talked about the river. In my mind, this stretch of the river was but a big, calm and safe lake. The salmon, which earlier had been so plentiful that household helpers were reported to have had contracts that stipulated they would not have to eat salmon on Sundays, could no longer migrate here because of the many reservoirs further down the river. Although I had never been told about it, now as an adult I read Ullenius' (1932) notes about the Sámi life in this region and I learn that this particular stretch of the river was the most salmon rich of the whole of the Unna Julevädno. Nothing of this knowledge was transferred to me; no one talked to me about the silenced river. My own perception of the river became something totally different from that of Sámi peoples like Erik Olsson Rim. To me, the river was a still life, a big silent lake, where no fish could be caught any more. In school, as everywhere else in my surroundings, I was taught to understand the river as being 'under control'. In truth, I never thought of it as a river, as flowing water. Whatever it was, was just there for us, subsumed for the production of electricity, for the progress and modernization of Sweden. In Luleå in the 1970s, my father, a trained electrical engineer, made use of the river in terms of electrons to provide control programs for the steel factory. My father dreamt of an ever bigger factory that would give us wealth and a PROSPEROUS

[3] BN and SN personal conversation with the author February 3, 2014.

FUTURE. The forceful river was no part of this dream, it was just there. Nicely behaving and 'under control'.

Erik Olsson Rim, the State Power Company and the Julevädno at Bårjås

"Humans cannot control the big river. The dams won't resist the waters. Just you wait until the spring flood comes…" (Forsgren 1982, 21).

These were the words of Erik Olsson Rim, a Sámi and ancestral cousin of mine, uttered about a half century before I came into this world and learned to perceive Julevädno as nothing to fear. In 1911 he had been forced to sell a part of his "Lap Tax Land" to the Swedish state power company Vattenfall for the construction of the first large scale hydropower plant in Sweden at Porjus/Bårjås. Rim declared the attempt at taking over the river to be "ungodly" (Forsgren 1982, 21). This was the start of the 20th century hydropower colonization of Sápmi, the land and waterscapes of the Sámi, which left us all wired through electric transmission lines to the capital Stockholm, the water levels and courses falling under the control by the Swedish state.

A decade later, at celebrations honoring the tenth anniversary of Vattenfall (literally, the Royal Waterfall Board, but typically referred to as the State Power Board), which had been responsible for the construction of the first dam at Porjus/Bårjås, a play was performed, portraying the hydropower exploitation of the Lule River – in Sámi, the Julevädno – as the 'taming' of a blonde giantess through the agency of alcohol, rather than force. In the production available as manuscript by Skjöld(1919), Erik Olsson Rim was characterized as a cranky "Old Lap Man" (Skjöld 1919, 21) motivated by greed, whose sale of his blonde giantess into slavery, he later regrets.[4]

[4] There are many interpretations that can be made in regard to the depiction of the river as a "blonde giantess", a woman to tame and also Swedish racist policies at this time in regard to the Sámi. The "blonde giantess" was the depiction of the Julevädno found in the production, made by engineers to perform in the Swedish capital, Stockholm. I have discussed this perceived taming of rivers as a taming of exotic by engineers in my doctoral dissertation and will not do the same discussion here. See Öhman 2007. The racist stereotype of Sámi physical traits was (Södergren 1910) – and to a certain extent still is - that Sámi are dark haired, dark eyed and short– thus quite the opposite of a "blonde giantess". As there is nothing written left from Erik Olsson Rim himself, there is no way to find out what he thought. However I find it highly

In these alternate perceptions, conflicting views of the relations between human bodies and water bodies in characterizations of the river can be traced. On the one hand, a prediction – or perhaps it was a curse? – by Erik Olsson Rim, in anticipation of the spring flood, declaring that the dam would not hold. On the other hand, the State power company's play celebrating their 'control' of the Julevädno in the 'taming' of the giantess. In this, an apparent dichotomy seems to be established between on the one hand, a celebration of the advancements consequent on human engineering's victory over nature, as opposed to a Sámi man's indigenous perspective of a water body as a force of nature beyond the human body's control.

It may appear as a case where a legacy of indigenous and local understanding of the Julevädno as 'untamable' is opposed by a modern dis-embodied understanding, where bodies of water are available to control through science and engineering, as displayed in the figure 2 postcard text: "The dam construction is particularly built to be able to withstand the pressure of the river's ice cover in winter."

[Fig.2. An early postcard by the Swedish Tourist Association, with a photo of the Porjus/Bårjås dam, finalized in 1915. The text reads: *Porjus power plant, the dam crest over the Great Lule River. The electric power for the Luleå-Riksgränsens railway line is received from the magnificent power station in Porjus which provides 82 000 horsepower. The dam construction is particularly built to in be able to with stand the pressure of the river's ice cover in winter.* Translation from Swedish by M-B Öhman]

Yet, despite seemingly contradictory views of the river, it is interesting that, upon closer examination, the deeds and doings of engineers and operators – in practice and in human perception – are not opposed to the local/indigenous Sámi understanding. Instead, what is evident is that engineers, in service to those dependent on the river, have labored meticulously and continuously to keep the river's body in control within a never ending porous exchange among human bodies, water

unlikely that he'd ever used a "blonde giantess" as a metaphor to describe Julevädno or even thought of the river as a woman to be owned or much less be tamed.

bodies and dam bodies. Engineers working with dams know very well how powerful the waters are, and what a failed attempt would cause, although they usually express it differently than Erik Olsson Rim.

While earlier 'indigenous knowledge' had been rejected as primitive and non-scientific, today it is often argued that that same 'indigenous knowledge' could provide important insight into the understanding of ecological sustainability sustainability (Berkes and Kislalioglu Berkes 2008). However, in my view, along with those of Linda Tuhivai Smith (1999), Sandra Harding (2010), Karen Martin (2003), Akhil Gupta (1998), Marie Battiste (1984), and Rauna Kuokkanen (2008), amongst others, 'indigenous knowledge', instead of being dismissed as mythical, exotic or primitive, should be afforded equal consideration and importance to what is referred to as modern western technoscience. My thesis will also argue that this modern western technoscience is, itself, far from detached, far from 'objective' or disembodied. Rather, bodies – whether human, water or dams (water mixed with stones, gravel, sand and soil to become concrete) – are involved and accounted for in both perspectives. The differences are a function of how knowledge has been perceived, identified and represented, and the status accorded to different 'knowledge' ideals, as well as those responsible for their transmission. Furthermore, of importance to me is that, as I am reclaiming and reconnecting ancestral knowledge and understanding, I do so as a means to deconstruct my own understanding of the river – of Julevädno – re-searching myself and re-attaching myself to my own ancestral ecology and to the lands and waters I inherited and of which I am part.

The Giant/ess Julevädno and Me

This article starts, follows and ends with my own river, Julevädno. Julevädno is the largest and today the most hydropower exploited river in Sweden. The name "Lule" River possibly derives from Lulij-jokko, a Sámi term meaning the river of the Forest Sámi or the river of the Easterners. In this article I use the Lule Sámi name "Julevädno", which is the Sámi name of the river on signs and maps accompanying the Swedish name "Lule älv" since 2007 (Språktidningen 2008). The Julevädno has its origins in the mountain areas on the border between Norway and Sweden. The river once continuously flowed through the Swedish Sápmi into the Gulf of Bothnia. For many centuries it was a central highway and an important economic link between the Gulf of Bothnia and the Atlantic

Ocean, and between eastern and western societies (Fjällström 1996). The importance for Sámi and other humans of the waterway is underscored by the name of the place Porjus, where the first large scale hydroelectric plant on the Julevädno (in 1915) was established. "Porjus" is a Swedification of the Sámi term Bårjås, meaning "a sail" (Porjus Bya- och Intresseförening undated; Sametinget 2014). Construction of the first stage of the regulation reservoir at Suorva, upstream from Bårjås, took place between 1919 and 1923. Since then the Suorva reservoir and dam has been enlarged three times, to its present level with a court order allowing difference of water levels of 30 meters up and down. Throughout the 20th century, the Julevädno was converted from a free-flowing river into an energy-producing factory. It is now a staircase of fifteen regulation reservoirs with attached power plants, a total installed capacity of 4350 MW, and an annual output of almost 14 TWh. The system produces more than ten per cent of the totality of Swedish produced electricity (Nilsson 1972; Hansson 1994; Svensk Energi 2013).[5] Or, as the state power company Vattenfall boasts, the Julevädno is "producing enough electricity to bring light to the whole of Sweden, 24 hours a day, 365 days per year " (Vattenfall 2008, 2). The waters of the Lule river which used to be a matter only for the riverine human and non-human residents has become intertwined with the lives of most Swedes and Sámi living within the Swedish borders as it provides for up to a third of all hydropower produced electricity in Sweden. But then, not only is Julevädno the single biggest producer of electricity within the country, but being a power-river – *effektälv* in Swedish – Julevädno is the river that the Swedish national grid ultimately depends upon to make the production of electricity balanced and stable, providing us consumers all with an even flow of nicely behaving electrons and ensuring that our electricity demanding devices do not suddenly break down and die.[6]

The fettering of Julevädno – commonly referred to as "harnessing" – is often referred to as a symbol of progress and modernity for Swedish engineering arts. At its upper end, where earlier seven small mountain source lakes served as the summer homes of Sámi reindeer herders, the Suorva dam is now responsible for the largest artificial reservoir in the north of Europe. My body,

[5] Electricity production in Sweden is to 90 per cent based on equal parts of hydropower and nuclear power, with the nuclear power functioning as a stable base, and the hydropower being easier to regulate corresponding to the different needs over the season (Svensk Energi 2013).

[6] Participatory observations combined with interviews by author with HS, TW August 2-3, 2011. Records available in M-B Öhman log book.

life and family history are intertwined with Julevädno in many ways. For instance, Erik Olsson Rim, on whose property – his inherited "Lap Tax Land" – the first large scale hydropower plant and dam on the river were constructed, was, as previously mentioned, an ancestral cousin of mine (Öhman and Silversparf 2011). I myself grew up further downstream of the Bårjås, sharing my time between the city of Luleå at the river's mouth to the Baltic Sea – the Gulf of Bothnia – and an upper stretch just before the confluence of the big/Stuor Lule and the Unna Julevädno, at Skällarim. In the 1950s, my father, a native from Luleå, as a young man went by boat, walking on floating timber on the lower river stretches collecting water samples to measure the soil transportations through the dam walls.[7] These are only a few examples, but all of my family has had a relation to Julevädno, for different reasons.

Through my efforts of understanding the Julevädno and in particular through my research projects dealing with both situated knowledges of the hydropower exploitation, followed by a research project on what is today referred to in terms of "dam safety,"[8] I have become aware that this stillness and calmness of the river is but an illusion shaped into images and language. I now perceive it as an erasure of memory, where the floods and other behaviors that do not fit the 'modern' parameters disappear beneath a technical jargon measured in figures stating sedimentation transports, cusecs, terawatt and rain or snowfall. The Julevädno, as Erik Olsson Rim knew the giant/ess, has been silenced, and maybe to a certain extent tamed. But, every now and then, the river decides to step out of its nice behavior to manifest its gigantic powers. It has happened several times and it will happen again. Dams do not last forever. Eventually they get sick and cave in to the immense pressure of water. It is just a matter of time. The question is not if they break, but when. One to two large dams fail every year; smaller dams fail all the time.[9] Thus, given the statistics of dam failures, the question is not *if* the Julevädno will escape its restraints and take back its freedom,

[7] SÖ, personal interview with author, May 25, 2012.
[8] In my doctoral thesis, Öhman, 2007, there is a chapter on the Julevädno, my PostDoc project funded by Swedish Research Council (VR) 2009-2010: "Situated perspectives on hydropower exploitation in Sápmi: Swedish technological expansion in the 20th century and its impacts on indigenous peoples" focused entirely on Julevädno and was followed by research project funded by VR 2010-2012 "DAMMED: Security, Risk and Resilience around the Dams of Sub-Arctica", where Julevädno again was the main focus, along with another river.
[9] There is no official statistics on dam failures available. What is available is the ICOLD ICOLD website, page on "dam safety" as well as a Wikipedia page mentioning major dam failures (Participatory observation by author at ICOLD meeting, Dam Safety technical committee, June 4th, 2012, Kyoto).

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but rather a question of *when* this will happen. To rewrite the narrative of the dammed Julevädno, in language that would make accommodation for the river's majesty and its capacity to resist, would be to rewrite the understanding of the dammed river. This goes for Julevädno as well as for other regulated rivers; thus, affording humanity the opportunity to draw into its own consciousness, and embodiment, its profound interrelationship – intimate and boundless – with the river(s) and all bodies of waters.

[Fig. 3. At Harsprånget, Lule River/Julevädno, waterfall 10 km south of Porjus/Bårjås. Constructed in the 1950s, it is the hydropower plant with the largest installed capacity in Sweden, 977 MW (Vattenfall 2010). In this postcard photo produced by the Swedish Tourist Association, STF, the waters were still untouched. The text reads: "Harsprånget on the Great Lule River. About 10 kilometers south of Porjus the river forms the renowned Harsprånget, the mightiest waterfall in Europe. The drop is 74 meters, or 2 1/3 times the drop of the Trollhätte falls". Photo: Ludvig Wästfelt (1883-1957) Translation from Swedish by M-B Öhman.]

I understand my own human body as part of the Lule River/Julevädno not only because of my family histories in terms of losses of salmon fishing, the dead rapids and ugly dry river beds, as well as the benefits in terms of electricity for my daily life. My body is also integrated with the Julevädno down to its very cell level. This is because as the river is not only producing electricity or providing fish, it also provides the drinking water for all households within its catchment area. It provides both for private wells and for the municipalities' common water provisions. Having a family history by the Julevädno means as my parents bodies were fed by the Julevädno, the very egg from my mother joining with the sperm from my father that became me as a fetus were constituted in part by the waters of the Julevädno. Social science – including historical work on rivers, waters and dams – tends to assume a humanist point of departure. It is mainly an account describing how humans have built different structures aimed at control of the waters. But by focusing entirely on the narratives of human beings laboring to control the waters and rivers, something is lost. What is lost is the agency of water and its relation to the porosity of human bodies: the inundation of soils and forest; the drawing out of heavy metals from the soils; fifty years of bombshell testing within the catchment area; the prospect of mining; and further downstream, oil spills from the power plants and their

greased machines – what has been done to the water bodies of the Julevadno has been done to me, to my human body.[10]

Asking the seemingly simple question "which river are you?" provides a point of departure. Each of us humans is inherently part of a river or a stream, or, as travelling subjects and consumers of world migrating food resources, are tributaries of many different rivers and streams. The waters we take into our bodies, liquid or in the shape of food, derive from a specific stream or river. When the water leaves our bodies, it returns to a stream or river. I, like all those who reside along the river, have been inexorably tied, through my cells and since conception to the legacy of these waters that provided for and sustained my growth and survival, to the catchment and free flowing of this particular river.

Maybe Erik Olsson Rim, as he spoke his prediction, was reflecting on his own intimate relationship and dependency on the waters. But if he did not reflect on his own cell-level intimacy with the water bodies of the Julevädno, he was not different than most of the so-called modern human beings, who despite having learned in school and through daily life about the intimate relationships between our bodies and the water bodies, do not consider them.

As I explore the human, including my own, perceptions of rivers and waters, i.e., the human experience as it is and has been informed by water/human bodily interactions, one main focus is on the perception of human bodies seeing themselves as being *in control* or being *out of control* of the dam bodies and the water bodies. I start from the understanding that the ideal of control presented and represented within our modern society should be read as an illusion, a trick masked in a manipulation of vocabulary (Haraway 1988; Pretty 2011), which serves to dismiss Sámi traditional knowledge and local understanding. As I have tried to understand my own position in this game, I

[10] ELT, personal conversation with author, Aug. 1, 2011. In regard to oil spills –there are several known incidents on the Lule river solely. Amongst other, in 2005, 2000 liters of turbine oil was spilled out from the Laxede power station on the Lule River. See Åstrand 2008. In regard to mining, there is currently a mining project going on within the Unna Julevädno –at Kallak/Gallok, where permissions were granted for test mining fall 2012. Military bomb tests have been carried out since the 1950s within the catchment area of Julevädno. See Sommarström 1991 and Thunqvist 2014.

have had to examine how I perceive the river, and why. How have my own perceptions changed over time; and, if so, in what direction? And, could these changes of perception represent a process of decolonization with regard to my own mind and body?

Doing this exercise, I have sought to decolonize my own colonized body from a century of Swedish state hydropower colonization of my river through retracing Sámi understanding on human cultural interconnectedness with nature as suggested by Martin (2003) and Wyld (2010). Through water, through this river with which I personally feel a proprietary connection, we are all intimately connected and related. As Debra McGregor (2009, 38) states: "Indigenous knowledge tells us that water is the blood of Mother Earth and that water itself is considered a living entity with just as much right to live as we have." The machines constructed by humans to assert control are part of the game. There are several feminist technoscience concepts used to describe these relationships, such as "material-semiotic" (Haraway 1992), "material-discursive" (Barad 2007), and "socio-material" (Suchman 2007). In short, the natural and the cultural, the material and the discursive, are inextricably intertwined.

I have found comfort in my attempts to bridge the understanding in the work of hydrologist Malin Falkenmark who, during a lifetime of work, has drawn public attention to the importance and vulnerability of bodies of water, arguing, amongst other things, for a view of water as the "bloodstream of the biosphere" (Falkenmark 1993, 53). Falkenmark has identified a fragmentation of knowledge with regard to water, a "water blindness" (Falkenmark 2001, 17) as a severe threat to biodiversity, of which human life is one part. I am not alone, and work from all sides seeks to understand and conceptualize these relationships.

My work blends engineering/scientific, feminist technoscience, post-humanist and local/indigenous understanding and stories about waters – in this case rivers, and how they are their own agency and that it is but a matter of time, until the human bodies, who may think they are in control of the waters and rivers, perhaps, become painfully aware of this boundless relationship in both unanticipated and unfortunate ways. Whereas this boundless and porous relationship has been identified in numerous accounts by both engineers and natural scientists, it is often referred to in

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contemporary technico-political language in terms of "environmental pollution" or, when a water body's agencies become overwhelming to our human bodies, as "disasters," (O'Keefe, Westgate and Wisner 1976), in ways that question whether boundaries and control are an actual possibility.

The term "technoscience" in the feminist vocabulary not only denies the existence of boundaries between "science" and "technology" but also questions the multitude of actors – human and non-human – involved as well as cultural, societal and political implications (Haraway 1997). From this point of departure, this article builds on a co-constitution of auto-ethnography, writing the history of my own personal experience, and applying the methodology of oral history through the study of existing archival documents, websites, postcards, images, fiction and scientific monographs. The article draws, in particular, on four years of concentrated participatory observations[11], interviews and personal communications with local inhabitants (Sámi and Swedes), mainly along the Julevädno, though it also involves experiences drawn from other rivers in Sápmi, Sweden, researched within the *DAMMED: Security, Risk and Resilience around the Dams of Sub-Arctica* research project.[12] The presentation also involves stories from professionals within the dam sector, at the Julevädno and also at SwedCold (Swedish Commission for Large Dams) symposiums held fall and spring each year in Stockholm. I personally attended two meetings of the ICOLD (the International Commission for Large Dams) and I have studied the literature and proceedings from ICOLD annual meetings and congresses as well as ICOLD's website. Since June 2008 I have kept a personal log in which I have entered both discussions with informants and my reflections on these encounters as well as my encounters with the environments that I move around and within.

Often, when writing and speaking about hydropower and large dams and regulated waters, I tend to be challenged and questioned within a framework of being for or against hydropower; for or against modernity; for or against electricity. It is a highly contentious arena for political conflict between

[11] The participatory observations I have made are at a hydropower company control station. These were in the form that I was allowed to be at the control station observing the work and asking questions to the persons working. I was not involved in any way in the work and would sit quiet when any situation that demanded attention by the staff. Each such occasion lasted during around 2-4 hours for up to 4 days in a row. I have tried to come during different time of the year, and those occasions have been in February, April, August and October. Other participatory observations have been more of actually involving, this has been at the ICOLD and SwedCold meetings mentioned.

[12] Financed by the Swedish Research Council, 2010-2012.

human bodies living in different places upstream or downstream of a river, humans of different origins, pursuing their livelihood from different sources, drawing benefits or paying the costs in terms of sometimes fatal impacts (Wittfogel 1957;Öhman 2007, 2010; Summitt 2011). Although these conflicts of interests are often painfully relevant to those who suffer from their consequences, in my work the primary aim has been to break away from these presumed dichotomies and focus on the conflicts and interactions between human bodies, water bodies and dam bodies.

Thus, the intent is an attempt to extract humans from the center of the equation, challenging the illusions of control and boundaries, to produce a water-centered reading of rivers, waters in general and dammed rivers in particular. I do this by reading the dams as vulnerable bodies, as living organisms, to a certain extent constructed by humans, but that then take on a life of their own. Like Frankenstein's monster, revived by the electricity from the thunderstorm, the dams turn into life as the waters flow into them, through them and out from them bringing soils, oils and toxins and sometimes succumbing to the continuous pressures of ultimately untamable waters. Water bodies, dam bodies, human bodies dancing together.

Julevädno dancing with the humans

Six decades after the flow of the Julevädno was entirely blocked for the first time, the river had been subdued by a total of 15 hydropower stations and as many reservoirs regulating its flows and turning its powers into electricity. Yet, over time, the prediction of Erik Olsson Rim has nearly become reality on several occasions. For instance, holes threatening to dam life and human life, in engineering terms referred to as *sinkholes*, appeared at the dam crest of the Messaure dam just after constructions had been finalized and the dam was almost completely filled with water in 1963 (Bartsch 1999).

Fig.4. Sinkhole at Messaure, Stuor Julevädno, in 1963. Photo: Vattenfall

Twenty years later, another sinkhole appeared at the largest dam Suorva, upstream of Messaure, and upstream of Porjus/Bårjås. This was in October 1983 after the occurrence of an extra strong spring flood. Thanks to a Sámi man, John Tomma, who had his summer residence below the dam wall, the waters seeping through were discovered at an early stage. I am told it was sheer luck that the necessary machines and engineers were on site, due to other work being carried out, and the sinkhole that had appeared could be quickly investigated and taken care of (Bronner, Fagerström and Stille 1988; Nilsson and Norstedt 2004).[13] The river did not breach the wall this time either and the entire river valley was spared from an enormous tsunami from the full Suorva dam containing around the equivalent of forty thousand million bathtubs of water, dragging along with it masses of soil, houses, cars, trees, industrial pollutions, toxic waste and human and animal corpses.[14]

In 1985, after several large rivers in Sweden – not only the Julevädno – were behaving badly and showing themselves more forceful than expected by their human tamers, a specific committee of experts was established – the so called Flow committee.[15] The ultimate purpose was to understand how to keep the water bodies stable and well behaving for the production of electricity.[16]

Today, as I continue my work on the Julevädno, I examine how the river is managed and watched by descendants of riverine Sámis and migrant settlers from other Sámi territories as well as from further south. These operators and engineers – a majority of them are men, but there are also women involved in this work – put their honor and lives into maintaining the river as calm and stable, to deliver Julevädno's force in electrons only. Some of these humans travel around to watch over the shackles, measuring water seepages, looking at the instruments, smelling the interiors of the power plants, feeling the vibrations in the turbines with their human bodies. Other humans do their work shifts at the control station, at Vuollerim, where until 1967, the two arms of the giant/ess met

[13] LJN, personal interview, Aug. 2, 2010.
[14] The so called maximum storage capacity of the Suorva dam/reservoir is 5.9 · 109 m³ water. See Viklander 1997.
[15] In English the committee has been named "The Swedish Committee for Design Flood Determination" – but a direct translation from Swedish (Flödeskommittén) is simply "the Flow Committee" (Svensk Energi, Svenska Kraftnät and SveMin 2007).
[16] In regard to the unruliness of rivers, water bodies and human attempts to take control, as well as losing control there is a massive body of both academic and non-academic literature; See for instance Wittfogel 1957; White 1995; Öhman 2007; Hoag and Öhman 2008; Summitt, 2011; Stoor 2011. Niemi 2012; Hoag 2013.

– the confluence of the little/Unna and the big/Stuor Lule River/Julevädno, or the northern and the southern river. There they send out signals to release more or less force, as demanded from Stockholm through internet cables and phone lines.[17] The focus is on producing electricity out of Julevädno's force, and making sure that Julevädno, the once tamed giant/ess river, does not break its shackles as predicted by Erik Olsson Rim. The human bodies are in a continuous fight and exchange with both dam bodies and bodies of waters. It is a sort of dance; sometimes a smooth and easy dance, at other times it turns into a wild *polska*.[18] In the fall of 2011 Unna Julevädno just would not stop flowing. I was not even allowed to visit the control station for my participatory observations, as the operators were supposed to have full control over the water levels at all times. No distractions were allowed. Instead I went around to the dams and watched the water's fierce flow. Unna Julevädno was coming to life again, filling up the dead river beds for three weeks. [19]

[Fig.5. and 6. (Left) Unna Julevädno disappears through underground tubes at the Letsi dam crest in the ground at *normal* electricity production and re-appears (Right) at the never-ending flows during three weeks, fall 2011. Putting the humans to work to make sure Unna Julevädno is safely under control. Photos: May-Britt Öhman]

Disillusion of river control- of controlling water bodies

"Large dams" as a concept is a matter of volume, heights, lengths, and storage capacities of the dam**,** as defined by the dam constructing sector itself. The simplest definition, as provided by the International Commission for Large Dams, ICOLD, is that a large dam is one with a crest of at least 15 meters height.[20] What is of importance with large dams is that there are very many around the world, and if they fail, the rivers that they exist to control become very intimidating to human bodies. Dams and levees have one thing in common: they were constructed by human bodies to

[17] Vuollerim Vattenfall control station for hydropower, participatory observations by author at several occasions 2010-2012.
[18] Polska is a traditional dance among the Nordic countries, often man-woman partner dance, but with variations. See for instance the dance video "Polska från Nås, Gagnsföra" available at http://www.acla.se/kultisdans/dansvideo.htm (Latest access, May 5, 2014).
[19] Unna Julevädno – Participatory observations in September 2011.
[20] ICOLD/Flögl undated; Öhman 2007.

keep water bodies, rivers under control. Yet this perceived control is but an illusion. The feminist philosopher Nancy Tuana writes how she herself witnessed the consequences of the breaching of the levees of the Mississippi river, and from this experience came to realize that it should be a feminist endeavor to consider the materiality of water:

The events of August 29, 2005, have left a lasting impact on the citizens of the US. Seeing through the eye of a category four hurricane has resulted in multiple destabilizations. Levees have been breached, a historic city devastated, climate change rendered not simply believable, but palpable, and the face of suffering given a complexion that revealed to a shocked nation the plight of the poor and the racism that is woven into our economic structures. As I considered the news reports of the various impacts of Katrina and thought about the city of New Orleans, I knew that I was witnessing afresh the reasons I have for the last two decades been advocating that those concerned with doing science, including science studies responsibly embrace an interactionist ontology. The events unfolding in the wake of Katrina provided a trenchant illustration of the importance of embracing such an ontology and its concomitant epistemology. Witnessing Katrina renders apparent the urgency of embracing an ontology that rematerializes the social and takes seriously the agency of the natural. As the phenomena of Katrina's devastation has taught us all too well, the knowledge that is too often missing and is often desperately needed is at the intersection between things and people, between feats of engineering and social structures, between experiences and bodies (Tuana 2006,1).

Like hydropower dams, levees are human constructions intended to make rivers behave according to human needs and desires. Hurricane Katrina in the U.S., which caused the Mississippi river to go wild and destroy the carefully designed levees, made many people, including Tuana, well aware of the materiality of water. Water – rivers – do not always behave as they are instructed to by human designs. And as soon as they escape that control, our human bodies become painfully aware of our porous relationship. Reading Tuana's account and reaction to the breaching of the levees of New Orleans, it seems as if this would be something new to human society. Yet, engineers active within the water construction sector are aware that these breakdowns happen at least once per year on a global level.[21] Every year dam engineers come together at local, regional, national and international conferences and symposia to discuss how the waters should be maintained under control. In 1928

[21] MB, Personal communication with author at the SwedCold symposium April 17, 2012; DH, Personal communication author at the ICOLD meeting in Kyoto, June 3, 2012.

the International Commission for Large Dams (ICOLD) was established. Once per year, representatives from 90 hydropower nations of today meet somewhere in the world to exchange news and understandings of river and water bodies.[22] At the start, the major focus of ICOLD was to discuss technical solutions for the construction of large dams, as well as to promote further constructions, a sort of spreading the dams over the world forum (ICOLD undated – History/Mission). Today, the agenda is very much the same. The ICOLD annual meeting is an arena for exchange of knowledge of how to construct the best dams, to ensure that the dams stay in place, and to spread a sort of development by constructing dams.[23] At these annual meetings, the persons involved discuss materials, construction methods, as well as recent failures and how to promote future dam safety. In Sweden, every fall and spring, around a hundred representatives of the Swedish hydropower dam sector gather to listen and share news and developments at a symposium in Stockholm. Stories of incidents and failures are told and discussed.[24] They, as well as the people maintaining the Julevädno under control, know that bad things can happen at any time in their very own river.[25] When something happens, which it does quite often – one or two major dams suffer serious problems and failure per year on a global level – information is quickly sent around through the wires of the internet.[26] However, ICOLD still does not have a current statistical list of failures to present to the public or even to themselves. The last assembly of statistics was made in 1996, and today the only way to find out about dam failures around the world is by attending the conferences and by reading entries on *Wikipedia*.[27]

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[22] Participatory observations by the author at ICOLD meeting, Hanoi, May 23-26, 2010; See also ICOLD undated - History.

[23] Participatory observations by the author at the ICOLD meeting Hanoi May 23-26, 2010 and at the ICOLD congress, Kyoto, June 2012.

[24] Participatory observation by the author at the SwedCOLD symposiums: Nov. 6, 2008; Apr. 2 and Oct. 20, 2009, Apr. 13 and Oct. 19, 2010; Oct. 2011; Apr. 17, 2012.

[25] Participatory observations at Swedcold symposiums. Participatory observations at Vattenfall Vuollerim control station 2010-2012.

[26] YH, Personal communication with author, at ICOLD meeting Hanoi, May 25, 2010. A major dam is much bigger than a large dam. For the status of a large dam, the height of 15 meter of the dam crest is required. For the status of a major dam, the height of 150 meters is required. Sweden has no major dam, the highest dam being only 125 meters.(Trängslet) (ICOLD undated. damsafety).

[27] Participatory observations by the author at ICOLD meeting, Dam Safety technical committee, June 4th, 2012, Kyoto; Wikipedia Undated.

Furthermore, large (and some small) dams are represented within a massive body of scientific literature in the natural sciences, engineering sciences as well as social sciences, where a significant focus is dedicated to incidents, failures, collapses, overtoppings, overdammings: i.e., failures, mistakes, accidents, and human error (Idenfors 2012). What is hidden in the use of language is the normality of unruly rivers, water bodies that do not wish to follow the rules made by human bodies: dam bodies growing old and tired – dying. They are indeed vulnerable bodies.

Also, there are an immense number of persons who are currently involved, and who have earlier been involved in constructing, maintaining and living next to dams and other manmade water constructions, and have their own close encounters with such failures of the dams. In total, around the globe, ICOLD's "World Register of Large Dams" contains 37 641 large dams (ICOLD undated – register of dams). The five nation states topping the list in the World Register are the United States with 9 265; China with 5 191; India with 5 101; Japan with 3 076 and Canada with 1 114 large dams. The dams smaller than this size are unaccounted for. In Sweden, there are about 200 large dams, but in total Sweden has over 10 000 dams (Riksrevisionen 2007). So, on a worldwide scale, the total number of dams, for hydropower, for water distribution, for mining waste, is gigantic. Within Sweden, only three major rivers are untouched by dams.

The scientific and media languages and imageries around the dams and their failures, in dealing with these unruly rivers, mask reality. Many persons, like myself for instance, hardly even notice that they live next to a regulated river, whereas most people who live next to a nuclear power plant seem to be well aware of this. On a worldwide scale as well on a Swedish scale the nuclear power plants are completely outnumbered by dams and large dams.

The dams become visible, by necessity, to the human bodies of non-civil engineers and operators only in times of distress. Only when the dam bodies are short of waters, or when they threaten to fail, or when they have failed us. When the waters once quietly contained in the dam bodies invade us, when the relationship of human bodies and these bodies of waters come into conflict, the porous relationship becomes disturbing and distressing. That is when the dams and the water bodies are finally visible for some time, maybe six months to a year or two, soon again to be forgotten. Our

living memory is sometimes very short. Disasters are overcome and then shelved, horror stories of the past (Le Blanc 2012).

The remaining question is still: why were these violent water bodies not discussed before they invaded human bodies? Or, in those cases they were discussed, why were these river bodies portrayed as having been tamed, as non-violent? Why does it take a national disaster to invoke the vulnerability of dams, the potential aggressive violence of water? Why is the memory so short? What does it take to make human bodies understand the unruliness of water bodies, to understand that rivers cannot be tamed? What memory was Erik Olsson Rim referring to when he warned against the powers of the Julevädno?

Human Bodies, Dam Bodies and Water Bodies - a Long Time Relationship of Vulnerability

The invasion of water bodies into human bodies in New Orleans, U.S., in 2006 was followed by similar events in Brisbane, Australia, in 2011 and also in Japan, after the earthquake in March 2011. These events are but very recently created memories inscribed onto and into the consciousness of human bodies by water bodies. Human bodies have lived with vulnerable dam bodies for millennia. The oldest of the large dams known to us today dates back to 3000 years before Christ (Schnitter 1994). The oldest still operational dam referred to and mentioned by the International Commission of Large Dams is the Roman-constructed Proserpina dam, where the dam wall measures at its tallest 21.6 meters in height (Arenillas and Castillo 2003). The dam was constructed on the river Las Pardillas, in present day Spain, in the region of Badojoz, and its purpose was to feed water to the Roman city of Augusta Emerita. The Proserpina has managed to stay alive for two millennia, whereas other dams constructed by Romans seem to have collapsed at earlier stages. Of the dam Alcanterilla, which was constructed in a similar design as the Proserpina, only the ruins remain. It was probably breeched very early, not long after its construction (Arenas and Castillo 2003). In other parts of the world, there are also very old dams that are still part of modern life. Japan, for instance, has a long and continuous history of human dam constructions, and there are several more than thousand year old still existing dams. One of the notable is the Kaerumataike on the Yodo River, near the one-time capital city of Nara, dating back to the second century after Christ, measuring 17 meters high (Jansen 1980). Of other dam bodies, physical remains – ruins – are left for human

bodies to visit today. Sometimes though, these dam bodies are discovered only through historical written records. For instance, as Jansen (1980) writes, the Sabaen civilization (the people of Sheba) was concentrated around Marib which was the center for an important network of water supply. The thriving civilization was made possible by the construction of dams impounding the runoff from the hills, providing soil conservation and irrigation. The largest of these dams, the Marib dam, also called Sudd Al-Arim, is commonly ranked as the largest of the ancient dams in southern Arabia (Jansen 1980). The exact location, construction time and lifetime of the dam varies in different accounts, an approximation stating that it was constructed sometime between 1700 and 700 before Christ. There are also different accounts as to the size and material of the dam. One account states that it was 37 meters high, 152 meters wide and 3.2 kilometers long, and made of rock. Another account tells of a much smaller embankment, composed of earth (Jansen 1980). The material might not seem to matter to human bodies not trained in understanding the dam bodies, but for any human body trained to interact with these dams, the materials make a great difference.[28]

While human dam construction has been going on as long as there has been human societies, and dams have been intimately linked to both the rise and decline of human civilizations – more so to cultures dependent on irrigation for food production – modern historians, political scientists, ecologists and others, often refer to a "big dam era" which started in the 20th century. What is new to this big dam era is that these dams are at work and continue to be built, to a large extent for the production of electricity, but also for what is considered to be "flood control" – reassuring that human bodies will not be in conflict with the water bodies. The old tradition of irrigation is continued, making sure that those human bodies can feed from the water bodies – just as they have throughout the history of human construction of dam bodies. Also what is new, are the new nation states constructed throughout the 19th and 20th centuries, and along with them their view of the land and waterscapes as belonging to the nation state. A common feature of decision makers is to describe the land and waterscapes as empty of human bodies, often the indigenous populations, and the animal bodies with which these human bodies interact (Berger 1977; 1985; Dyck 1985; Lins Ribeiro 1994; Aronsson 2002; Öhman 2007). The political reasons for the construction of large

[28] Participatory observation by the author at SwedCold symposiums 2008-2012; and at ICOLD annual meeting Hanoi May 23-26, 2010, and ICOLD congress Kyoto, 2012.

dams are commonly articulated as the argument of a benefit for the nation state, for progress, for modernity (Öhman 2007).

In nation states where water has been considered by the dominant political power to be too scarce, dams have been constructed for irrigation solely, or in combination with the production of electricity. In countries such as Sweden, where the dominant view has been that there is an abundance of free flowing waters, the dams have often been constructed solely for the production of electricity (Jakobsson 1996; Öhman 2007).

A common denominator, throughout this long-term relationship, is the sickness and death of dams. Obviously, dams or levees do not stand forever. They get sick, they die and when they do, the water bodies contained in the dam bodies tend to literally invade human bodies. The dams are an intimate part of our societies; they are amongst the oldest of human constructions. Human bodies ought to be familiar with the stories and lives of dam bodies and water bodies. Yet, when these things happen, it is referred to in terms of "disaster." The word "disaster" – or "failure" – in itself, frames the understanding of the possibility of total human control of waters – of rivers – and the understanding of dams as forever there. "Disaster" is the concept conveying that something went terribly wrong. Sometimes, although not always, it is even referred to as a "natural disaster," indicating that the disaster was caused by nature itself, and not by human failed attempts to take over control.

But if we instead consider a dam as a living organism, the imagery of our bodily interactions changes. Erik Olsson Rim's imagery of the dam bodies – and river bodies – seems to have been set; he did not believe that they would withstand the forces of these bodies. And his belief is far from ungrounded.

Dam Bodies as Vulnerable Unprotected Bodies Depending on Friendly Human Bodies

[Fig.7. A small part of the Suorva reservoir (also referred to as Akkajaure), at the top of the Lule River/Julevädno. The largest artificial hydropower reservoir in the north of Europe and in Sweden, storing at its most about 6 cubic kilometers of waters and is 60 kilometers long.[29] Before regulation the river formed seven small source lakes here. The Sámi residents lived by these lakes during the summer, and they still live here. Photo: May-Britt Öhman, July 2006]

His heart beat increased as the radio broad cast continued:
Since the Porjus dam collapsed at 5.30 this morning the power plants at Harsprånget, Ligga, Messaure, Porsi and Laxede have been torn away by the massive waters. The flood wave is expected to reach Boden and Luleå within 30 minutes. The police have reported that the situation in the two cities is chaotic. The roads are blocked by cars and trailers. Persons owning snowmobiles are fleeing north and south. Police and rescue service people are stuck inside the two cities. As the first flood wave reaches Boden, thousands of persons will be dragged along with the waters. This is the largest disaster that has hit Sweden in modern times. The police urgently request those who cannot save themselves in any other way to go to the nearest high building. The hope is that these buildings will be able to stand up to the forces from the massive waters. The weather in the area has changed for the better, and the police have reported that they will go up to Suorva as soon as it is possible. North of the Lule river is without electricity, and all five high-tension lines have been destroyed. The provision of electricity to the mines, the railroad and the industries north of the river has ceased. The situation of the northern parts of Sweden is dramatic. Swedish Energy has reported that the rest of the country will be affected as well, as the Lule River corresponds to an important part of electricity provisioning for Sweden. The Emergency Rescue Services calls on inhabitants outside of the risk area to take care of the people who have fled form the valley of the Lule river (Svonni 2005, 75).[30]

The quotation above comes from the novel *Trespassing Limits*. The Swedish title *Överskrida gränser* has multiple meanings and can be interpreted in many ways. The word *överskrida* may also be translated as *transcending* or *exceeding*, and *limits* can be exchanged with *borders* or *frontiers* in accordance with the Swedish *gränser*. The novel is written by Lars Wilhelm Svonni, a Sámi, author and activist as well as member of the Sámi parliament in Sweden. The quotation describes the consequences of a failure of the Suorva dam. In the novel the cause of the dam body failing is an act of human bodies performing self-defense, through reclaiming the river. It is a group of Sámi reindeer herders, having

[29] Lake Vänern, with a volume of 9.4 km3 and regulation amplitude of 1.7 meters, is often considered as the largest artificial reservoir in Sweden, although Vänern is also a natural lake (Jakobsson 2010).
[30] Translated from Swedish by M-B Öhman.

lost family members on the treacherous ices of the Suorva dam caused by human bodies regulating the water bodies for the production of electricity and money profit sent southwards to other human bodies. One of them is a former operator, having taken part in the continuous efforts of constraining the river in shackles and fetters. Now he participates in the Julevädno's release. Whereas the scenario is not unlikely, in any regulated river where the operators are often local peoples whose lives are intertwined with the river, so far similar events seem to not be considered as an actual risk by the Swedish state power company or anyone else within the sector. Vattenfall, along with the other power companies in Sweden, has been criticized for not having taken precautions against the risk of acts of terrorism and sabotage by employees (Höeg et al 2007). As I research all documents available online, I find no reference to this specific criticism, and the 2007 document itself is no longer available online.[31] In the summary of the peer review of the Suorva dam and four other dams, the criticism is made less potent: "*There is a need to evaluate the risk and carry out measures related to antagonistic threats against dams (dam security) and public safety*." (Bartsch et al 2007, 16). However, the issue has not disappeared. In June 2012, the Swedish state inquiry on dams and dam safety in Sweden was published (SOU 2012:46). A whole chapter deals with issues of terrorism and sabotage. The inquiry calls for safety measures, scanning of the human bodies involved, and strengthening of the protection through legislation, by turning the riskiest dams into "protected objects" (SOU 2012:46, 395) with particularly limited access for un-authorized persons. But the inquiry also points at the difficulties with protecting the dam bodies against malevolent human bodies. It costs money and it is difficult. As I interpret the inquiry when reading between the lines, it is perhaps not even possible to achieve the necessary safety against terror and sabotage via legislation and training. Something more is required.

My discussions with operators and dam engineers both in Sweden and at ICOLD meetings point to the difficulty of protecting the dam bodies from human terrorist attacks.[32] In the US, after the attack on the World Trade Center in September 2001, the road that used to go over the Hoover Dam crest

[31] Multiple online database searches by the author, January-June, 2012. The document by Höeg et al, 2007, was available online in 2008.

[32] Dam engineers and operators, personal conversations by the author at ICOLD and SwedCold meetings and at Vattenfall Vuollerim control station, 2010-2012.

Please reference as May-Britt Öhman LAST MANUSCRIPT 2015, "Embodied Vulnerability in Large Scale Technical Systems – Vulnerable Dam Bodies, Water Bodies and Human Bodies", Bodies, Boundaries and Vulnerabilities - Interrogating Social, Cultural and Political Aspects of Embodiment, Käll, Lisa Folkmarson (ed.)Springer. LINK to final and published version (available through libraries) http://link.springer.com/chapter/10.1007%2F978-3-319-22494-7_4

was replaced by a new road, constructed and inaugurated in 2010.[33] It takes time and much money to protect ourselves against unfriendly human bodies interacting with dam bodies. My interpretation from discussions, interviews and going through documents is that people within the power producing sector, as well as the decision makers in power, at least in Sweden, prefer to avoid to even think about the possibility of someone committing such an act of sabotage (Öhman and Thunqvist 2012). It seems as if it is too painful to imagine another human body doing this to a dam body, releasing the enormous powers of the water bodies. I ask, but what if someone goes crazy, angry, mad, and does something to a big dam? So far the answers I get, from the very same discussions, interviews and lack of discussion in documents, is that it is a non-issue. Well, actually, not really. Staff at the hydropower plants go through security checks before they are employed, I am told. But once they are employed, nothing can be done. Because it is impossible to deal with, it is a non-issue. Or maybe it is because operators are by definition considered to be in control of their own human bodies. They are not allowed to go crazy, mad, or become upset.

As I travel up and down the Julevädno, visiting the different dams, something I have been doing for the last decade, I notice how vulnerable these dam bodies are. They stand there unprotected. Signs tell me to keep away. Cameras are pointing in my way. I go in. I stand there, waving to the cameras. Waiting. Listening. Nothing happens. No one comes to force me away. No helicopters in the air. I ponder, what would it take a human body to commit a hostile act to these dam bodies, to be so unfriendly to the dam and to the human bodies that depend on the dam for and with their lives? Maybe the idea is that people are supposed to love these dam bodies and water bodies, to protect them with their own bodies?

[Fig 7. Trespassing at a high-risk dam on the Lule River/Julevädno, downstream of the confluence of the Great and the Little Lule Rivers. The sign says, "Access denied for unauthorized". Photo: M-B Öhman, August 2011.]

[33] Personal visit by the author to the Hoover dam, Nov 8 and 9, 2010.

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[Fig.8. The Hoover dam, between on the Colorado River, and the new road constructed to protect the dam against terrorist attacks. Photo: M-B Öhman, November 2010.]

I return to Svonni's novel to reflect. What does it take for a human body to get so mad, upset, as to attack the dam body, to release the water bodies? Svonni answers:

Ola Viekas life had been crushed into tatters by the end of April five years earlier. By then he had been so incredibly happy. As the only child he had taken over the reindeer herding from his father. He had fallen in love with the only daughter of Nilas Latte more than ten years ago. They had gotten married the year after, and had a child the next. Their second child was only two months old when the terrible accident happened that spring day. Nilas had his summer residence east of the outflow of the Vuojat River. Ola had finished moving the reindeer to the mountains. They had decided to go by snow mobile from Ritsem to the cabin of the in-laws. The distance being around ten kilometers over the great Suorva reservoir, Nilas had been driving ahead with fuel wood and provisions. Ola had a sledge behind his snowmobile, with the mother in-law, his young wife and their two small children. Suddenly the ice broke under the sledge pulling also the snow mobile into the hole. He panicked, yelling straight out. He saw how his wife and mother in-law each took a child and fought their way to the edge of the hole. They threw the children up onto the ice, but when he crawled towards them he too fell into the freezing cold water. He tried to find the children in the snow slush without succeeding. Using his two knives he finally managed to make his way up on to solid ice. Turning around he no longer could see his two small children, his loved wife nor his mother in-law. People who had witnessed the accident came to his help, taking him to the warmth of the nearest cabin in Ritsem (Svonni 2005, 47).[34]

Svonni tells the story of Sámi reindeer herders, losing their lives in the regulated waters of the river. Now, Sámi are Sámi, the indigenous people of the Scandinavian north and often not considered to be modern enough to be in control of or have any relationship of importance with dam bodies. A prominent personality within the Canadian dam power sector tells me that Sámi should not even have snowmobiles, as they should use their traditional transport methods – skiing – being indigenous and all.[35] A representative for the Swedish state power company Vattenfall, tells me that locals do not have any business fooling around on the dams. The dams are regulated, and to be used

[34] Translated from Swedish by M-B Öhman.
[35] TB, Personal communication with author at the ICOLD congress, Kyoto, June 5, 2012.

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for hydropower production and that is it.[36] The website of Vattenfall indicates the same idea. The Vattenfall web brochure, "A journey along one of Sweden's magnificent rivers," provides an image of a 'soft' and environmentally-sustainable nature of the hydropower system, where no humans are involved:

> Waterpower is a sensible way of using a natural eco-cycle. Water vapour, which forms when the sun warms the lakes and oceans, rises to the higher, colder layers of air, where it condenses and forms clouds. When the clouds move in over the land, they release their burden in the form of rain or snow. That rain and snow is what keeps our rivers flowing. On its journey to the coast, we take advantage of the water's potential energy. Still within the eco-cycle, the water returns to the lakes and the sea, and the process begins again. Hydropower comes from a renewable source and makes use of Nature on Nature's terms (Vattenfall Undated, 4).

Nowhere on the company's website or other promotional material are the troubles and dangers that resident Sámi face mentioned. Yet, as Svonni's novel tells, and as the story of the first leakage on the Suorva reservoir was witnessed – when the first report came from Mr. John Tomma – Sámi persons are intimately related to the Julevädno, both living on it, and working with controlling it from the inside and from the outside. The dam bodies depend for their lives on the friendliness of the Sámi and the other local human bodies living and moving around here. And this goes not only for the Julevädno, but also for any regulated river. The dam bodies depend with their lives on the human bodies that control them, as much as the very same human bodies depend with their lives on the dam bodies staying in place and behaving well. The sharp division in between is nothing but an illusion.

Hearing what these prominent persons say about Sámi people, about locals living and dying here, witnessing how the forced colonization goes on and on – and re-reading the prediction by Erik Olsson Rim, I start seeing it as a curse. A necessary curse. I fantasize about releasing the powers of the water bodies of the Julevädno and about reclaiming my fettered river, to show them all how

[36] LH, Personal conversation, Stockholm, Aug. 24, 2010.

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strong we are – together. I read Svonni's novel as our fictional revenge. But I still want to keep the Julevädno, my river, calm because all my personal memories, my relations, my family depend on the Julevädno's calm and good behavior.

Water Bodies and Dam Bodies – a Relationship of Watery Invasions

Whereas the issue of the possibility of human bodies committing atrocities against the dam bodies is not discussed within ICOLD – neither ICOLD's website, nor in the congress proceedings of 2012, it is the intrusion of water bodies into the dams that is the constant focus of worries. A dam body is all but a stable body. Dam bodies are porous by design, and constructed with the designers' knowledge that water will intrude into them. Whether it is an embankment dam or a concrete dam, the water will find its way. The water continuously enters to the very core of the dam crest; it takes particles of the earth or the dam's rock fill embankment along with it, on its course downstream. It will create the dreaded "sinkholes" which ultimately threaten the entire existence of the dam body, if not carefully supervised and dealt with by friendly human bodies. To the concrete dam, the waters enter in terms of condensation, and engage with the steel skeleton of the dam body. Eventually those concrete dam bodies, which appear as stable and strong to our human eyes, will give in. In cold climates, like at the Julevädno, the continuous change between warmth and extreme cold collaborates with the intrusive waters to weaken the dam body, and eat it away, piece-by-piece. Stated in engineering language it goes like this: "Cyclic freezing and thawing influences the structure of soil; studies of fine-grained soils exposed to freezing reported changes in volume and structure, as well as significant increases in permeability" (Jantzer 2006,1).

When the dam body of Suorva had its first sinkhole in 1983, as discussed in the Bronner et al., paper to ICOLD in 1988, the very first alert to the State Power Company Vattenfall was made by the Sámi man John Tomma, who had his summer residence below the dam wall. When I did my interviews along the river, Mr. Tomma had passed on, but a friend of his tells the story:

It would have gone to hell if John Tomma hadn't had the urge to go to his toilet. He had his residence below Suorva, and he had his toilet a bit away from the house and then the water showed up between the house and the toilet and so

it began. He discovered what had happened and called, and some men came. It was about to sail away all of it. It was a big fuss. Later they gave him a reward of 2000 crowns.[37]

A research colleague who this fall of 1983 had just begun her first year of school in Luleå – my hometown which would become totally destroyed if the Suorva dam fails - remembered the big deal about it, how scared she was.[38] The engineering account of the event presented was completely stripped of this tumultuous event and the fears and emotions involved. The invasiveness of waters through the dam body and possibly into human bodies is not part of the story told, at least not acknowledged. But the ensuing studies of the Suorva Dam and other earth embankment dams in Sweden, as well as the work, time and money spent among engineers to study the intrusive waters, bear witness to the complex relationships between the bodies involved, telling another story (Nilsson and Norstedt 2004).

On a global scale however, Suorva was far from the first case. Only seven years earlier, an earth embankment dam in the USA, the Teton Dam in Idaho, had suffered the same watery intrusion, leading to its collapse and death, resulting in the death of 11 human bodies and 20 000 cattle bodies (Hatch 2010). The Teton dam collapse seemed to have been a prominent dam body collapse within the engineering sector. At the ICOLD dam safety technical committee, in 2012, one participant claimed that the Teton Dam collapse changed everything in regard to dam safety criteria around the world.[39]

[Fig.9. Water pouring out of the reservoir of the Teton Dam, Idaho, following its collapse on June 5, 1976. Photo: Bureau of Reclamation. Source: ID-L-0011, WaterArchives.org]

[Fig. 10. Rushing to the rescue – at the Teton dam failure, Rexburg, 1976. Photo: Roundy. Source: ID-L-0024, WaterArchives.org]

[37] LJN, Personal interview with author, Aug. 2, 2010, Porjus.
[38] KL,Personal communication with author, April 3, 2014. I too lived in Luleå this fall, it was my first year of secondary school, but in my own memory there is no trace of these events.
[39] Participatory observation by the author at ICOLD meeting, Dam Safety technical committee, June 4, 2012, Kyoto.

The engineers are busy discussing methods to discover "seepage" – the waters making their way through the dam body, invading it. Engineers at ICOLD and SwedCold (the Swedish Commission of Large Dams) gather people from the hydropower dam sector and power companies within Sweden who labor to understand, to explain, to measure and to make sure we protect the dam bodies from the watery invasions that eat the earth away, or rust the steel skeletons. At the ICOLD meeting in Kyoto 2012, representatives of an engineering consultant company talked about instruments to be installed into the very body of the dam itself. Fiber optics is a new method to be built into the dam body. They argued that this is the new technology that will improve safety (Sjödahl 2012).[40] Knowing the technical artifacts from my daily life, I hesitate. It sounds very good. Like me, other participants at the ICOLD meeting, engineers themselves, are doubtful about the replacement of human bodies. We are not convinced that fibre optics can replace humans. The lifetime of a fiber optic cable may never correspond to the expected lifetime of a dam body. A dam is expected to last at least for a century while the fiber optic cable might last up to 50 to 70 years. The guarantee from the supplier, however, is a matter of legal contracts.[41] Still another engineer speaks of the importance of motivating the operators, the human bodies working at the dam, to take good care of the dam and the instruments (Fleitz 2012).[42] Ultimately, the dam body depends on friendly human bodies, doing their utmost to keep it safe from the water bodily pressures.

Our modern dams are of the Big Dam Era, only a few decades old. The oldest ones date back to the early 20th century. The engineers discuss what to do with the old dams. They talk in terms of *rehabilitation*, *reinforcements* but sometimes they even propose a dam to be *de-commissioned* – taken out of commission.[43] Killed. In comparison with dams such as the 2000-year-old Proserpina, our modern dams are newborns. Arenillas and Castillo (2003) suggest that it was the human bodily efforts – the

[40] Participatory observation by the author at ICOLD congress, June 8, 2012, Kyoto: Pontu Sjödahl (2012) presented the paper "Experience from two embankment dams equipped with on-line seepage monitoring system based on distributed temperature sensing using optical fibres", and afterwards a discussion took place.
[41] Participatory observation by the author: Sam Johansson at discussion ensuing Sjödahl, 2012 presentation at ICOLD congress.
[42] Participatory observation by the author: Jürgen Fleitz (2012) presented the paper "A proposal to optimize maintenance of dam monitoring systems seepage. Terroba's Dam", presentation and ensuing discussion at the ICOLD congress, June 8th, 2012, Kyoto, Japan, after Sjödahl.
[43] Participatory observation by the author at the, ICOLD congress, Kyoto June 6-8, 2012.

engineers' design – in combination with the kind water bodies that made the dam body withstand all these years. Their answer to why the Proserpina dam has outlived the Alcanterilla for almost two thousand years is that the inflow to the Proserpina main reservoir was possible to moderate during extreme flows. The Alcanterilla was subdued to more extreme flows, receiving more waters which could not be taken care of as no extra weirs were constructed within the design. The human bodies and the water bodies collaborated for the Proserpina, but were not caring enough for the Alcanterilla.

Returning again to the Julevädno, and Erik Olsson Rim's prediction – or curse – "Just you wait until the spring flood comes", I reconsider his words. I think he was right indeed. Just they – we and those coming after us – wait until the spring flood comes. We will never know which spring flood will do the work of unfettering the Julevädno. But one day sooner or later it will come. The spring flood indeed arrives every year, eating the dam bodies away, forcing engineers and hydrologists to work to create scenarios of their "design floods;" i.e., the greatest floods that can be expected to come within a specific interval. Such scenarios of *design floods* are created to understand how big a river can occur once in one hundred years, once in one thousand years and even for once in ten thousand years (Bergström, Hellström, Lindström and Wern 2008). A century has passed; the dam bodies fettering the Julevädno might have survived, so far, the one hundred year flood. But it is due to sheer luck, and ever-ongoing meticulous work to keep Julevädno calm and the river behaving well, being nice to us. Now the engineers hydrologists and experts are waiting for the 1000 year flood, as climate change is expected to increase the flows (Bergström et al 2008) – more snow, more strong winds, all combining their forces to make Erik Olsson Rim's prediction or curse come true.

Pleading with the Julevädno to remain kind and gentle

Human bodies, water bodies, dam bodies are all intimately related and interdependent. This article challenges the modern ideal of science and technology as the human body being in control, by putting water bodies at the forefront and discussing the relations with dam bodies. In this article I explored human perceptions of rivers and waters, the human self-experience informed by water/human bodily interactions – including my own perceptions and understandings. I argue that there is a modern ideal of human beings, human bodies being in control, which is nothing but an

illusion. It is a trick of language production within modern science and technology production. Assuming a position, within which indigenous and local understandings are placed at the same status level as modern science and technology produced within the arena of universities and power companies, and thereby analyzing the fragmented and scattered knowledge production of a wide array of disciplines within science and engineering – I argue that there is actually a common understanding that at the end of the day, that the human body is not at all in control. Instead, it seems as the ultimate objective of science and technology language in terms of assuming human control as possible, is put in place to keep us all calm in the face of the forces of nature. The way rivers bodies, dam bodies, water bodies are described in engineering reports is all about soothing us, making us feel good. It can also be a read as an ongoing plea and prayer to the river – to the water bodies – to stay calm and nice, to behave well, to do as the human bodies tell Julevädno. And, to keep it to a dance, albeit sometimes a bit wild, but never worse than a fierce polska. All in all, it reminds much of the words spoken by Erik Olsson Rim, saying that fettering Julevädno is ungodly. Putting the water bodies into shackles is to challenge god, nature and natures forces. Changing the language regarding how it is described will not help. The Julevädno is already constantly getting back at the human bodies fettering the river's body. And all that the human bodies can do is to continue to perform their prayers through scientific writing, measurements and constructions, reinforcing the dams, operating the gates and power plants. The dance continues. The Julevädno was never really tamed; the Julevädno is merely being gentle for the time being. I hold my breath, and plead with the Julevädno to remain nice for some decades more. I plead with the dam walls to remain safe. I urge the operators and decision makers to behave well – to continue their meticulous work of keeping us safe. I write to the Swedish government stating: "No! You may not put more pressure on the Julevädno, or the river will get back at us all."[44]

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[44] As new mining projects are now allowed just next to the Julevädno dams, putting more pressure on the dams in Julevädno, I actually write to the Swedish government, to regional authorities, the power company, urging them to be careful. But this is another story.

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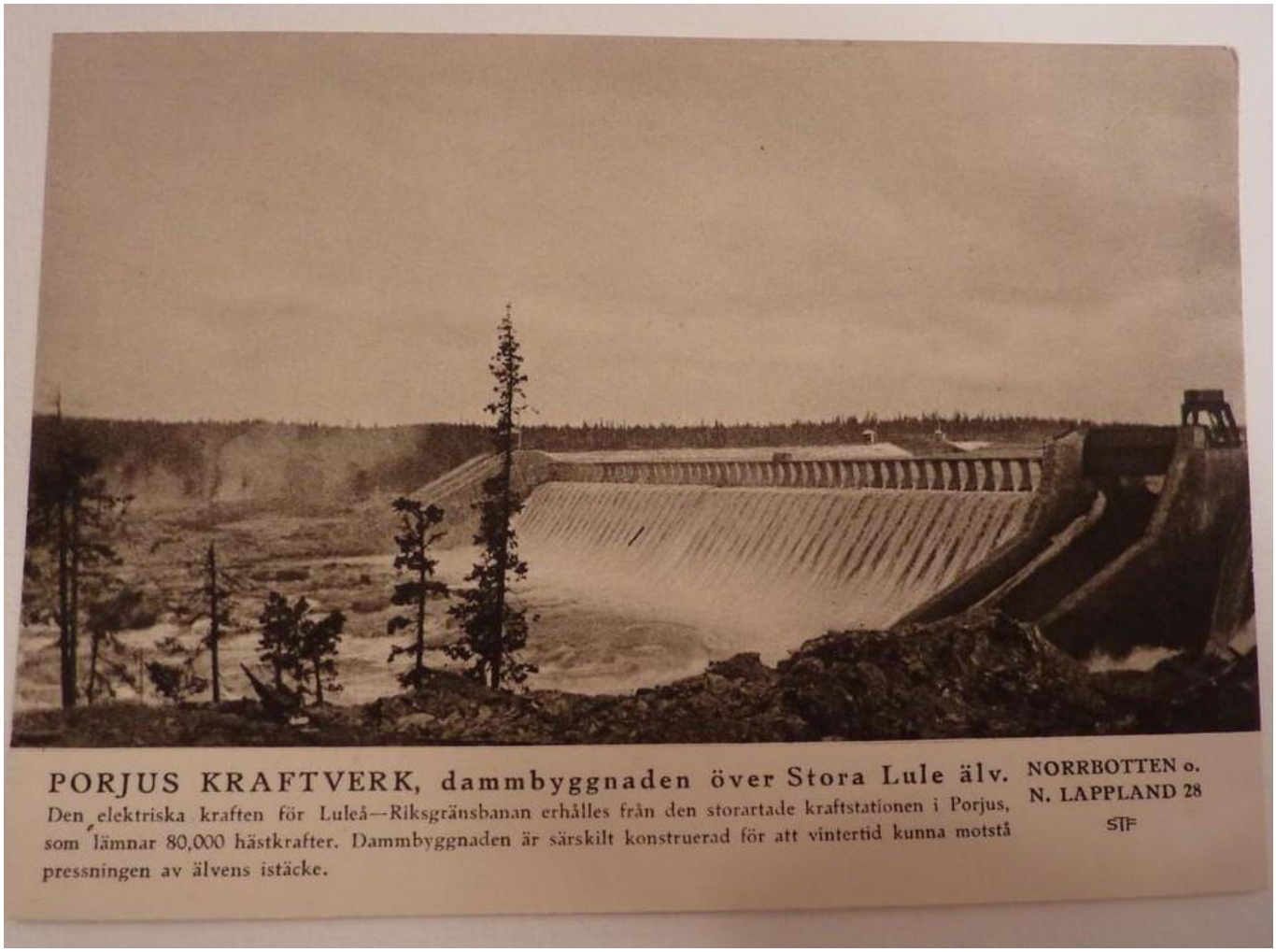
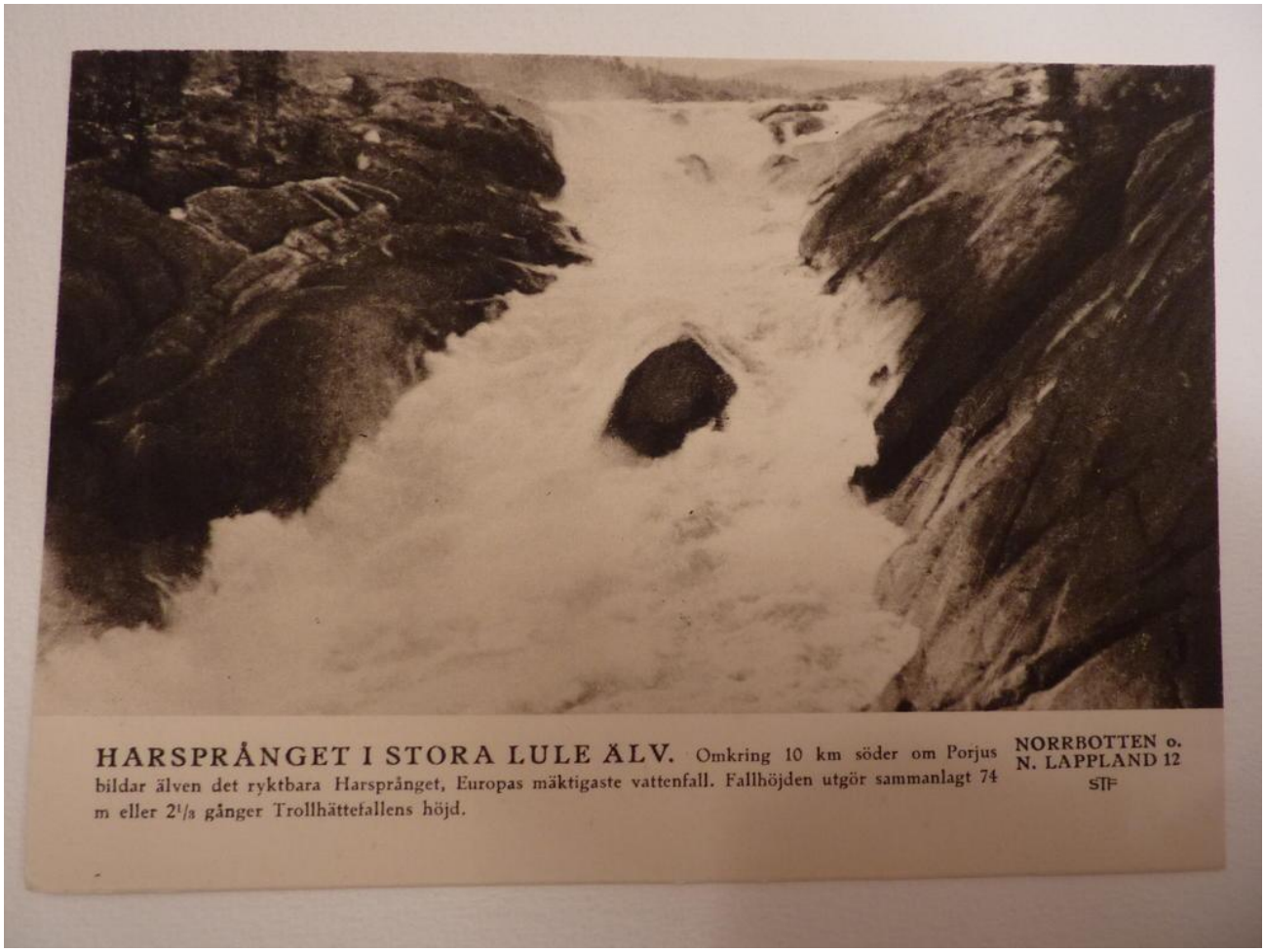
Images

[Fig.1. Standing at my stretch of the silenced regulated Unna Julevädno/Little Lule River. At the far end the Letsi dam can be discerned. Photo: M-B Öhman, July 2012]



[Fig.2. An early postcard by the Swedish Tourist Association, with a photo of the Porjus/Bårjås dam, finalized in 1915. The text reads: *Porjus power plant, the dam crest over the Great Lule River. The electric power for the Luleå-Riksgränsens railway line is received from the magnificent power station in Porjus which provides 82 000 horsepower. The dam construction is particularly built to in be able to with stand the pressure of the river's ice cover in winter.* Translation from Swedish by M-B Öhman]



[Fig. 3. At Harsprånget, Lule River/Julevädno, waterfall 10 km south of Porjus/Bårjås. Constructed in the 1950s, it is the hydropower plant with the largest installed capacity in Sweden, 977 MW (Vattenfall 2010). In this postcard photo produced by the Swedish Tourist Association, STF, the waters were still untouched. The text reads: "Harsprånget on the Great Lule River. About 10 kilometers south of Porjus the river forms the renowned Harsprånget, the mightiest waterfall in Europe. The drop is 74 meters, or 2 1/3 times the drop of the Trollhätte falls". Photo: Ludvig Wästfelt (1883-1957) Translation from Swedish by M-B Öhman.

Fig.4. Sinkhole at Messaure, Stuor Julevädno, in 1963. Photo: Vattenfall

[Fig.5. and 6. Unna Julevädno disappears through underground tubes at the Letsi dam crest in the ground at *normal* electricity production and re-appears at the never-ending flows during three weeks, fall 2011. Putting the humans to work to make sure Unna Julevädno is safely under control. Photos: May-Britt Öhman]

[Fig.7. A small part of the Suorva reservoir (also referred to as Akkajaure), at the top of the Lule River/Julevädno. The largest artificial hydropower reservoir in the north of Europe and in Sweden, storing at its most about 6 cubic kilometers of waters and is 60 kilometers long.[29] Before regulation the river formed seven small source lakes here. The Sámi residents lived by these lakes during the summer, and they still live here. Photo: May-Britt Öhman, July 2006]

[Fig.8. The Hoover dam, between on the Colorado River, and the new road constructed to protect the dam against terrorist attacks. Photo: M-B Öhman, November 2010.]

[Fig.9. Water pouring out of the reservoir of the Teton Dam, Idaho, following its collapse on June 5, 1976. Photo: Bureau of Reclamation. Source: ID-L-0011, WaterArchives.org]

[Fig. 10. Rushing to the rescue – at the Teton dam failure, Rexburg, 1976. Photo: Roundy. Source: ID-L-0024, WaterArchives.org]