

## **Human Bodies and the Forces of Nature: Technoscience Perspectives on Hydropower Dams, Safety, Human Security, Emotions and Embodied Knowledges**

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### **ABSTRACT**

Hydropower has commonly been promoted as an environmentally friendly and renewable energy resource. Despite this, the major negative social and ecological impacts on the environment and its local inhabitants have been well established for a long time, as well as the high risks for large-scale disasters caused by hydropower dam failures. Drawing on a qualitative study that focuses on the Lule River in Sweden, this article analyses the cultural politics of emotions with regard to dams, reservoirs, safety and human security.

Annually between one and two major dam failures occur around the world, with major consequences for human and non-human lives, the environment and the economy, and the issue has been addressed in policy making and within the work of power companies since the 1970's. However, more people die due to accidents on dams and reservoirs than due to dam failures. In Sweden, the number of hydropower regulation related deaths within the demographically small municipality of Jokkmokk, where a major part of Sweden's hydropower is being produced, is on average 0,02 per cent per year, or 1-2 persons, which would correspond to 180-360 deaths in the Swedish capital Stockholm. Yet, there are no calls for inquiries, investigations and measurements to ensure public safety around dams in Sweden. Linking these two aspects on hydropower dams and safety through the concept of human security we identify a void of understanding and valuing the importance of humans' – operators - lived experiences and invested emotions in the work to avoid dam failures, accidents on the reservoirs and loss of lives. We address the fact that the operators live and are related to the inhabitants of the regulated Lule River and what role this may play in enhanced human security.

We argue that technical reports and studies on dam safety are written in a way that invokes false emotions of control, safety and security for inhabitants as well as political decision makers. New technologies for camera surveillance and monitoring provide opportunities to assemble data on a dam and the water flowing through it (seepage), with the purpose to enhance safety. However, we suggest that these systems actually may produce false emotions of safety and security, reinforcing a paradigm of perceived control of nature's forces and thereby may contribute to decreased safety and human security.

Keywords: *embodiment, dam safety, human security, public safety around dams, remote control*

## 1. INTRODUCTION

*By the end of April, a mere five years earlier, Ola Viekas life had been left in tatters. Before that, he had been so incredibly happy. As an 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 on 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 their in-laws. The distance being around ten kilometres 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 the snow mobile into the hole as well. He panicked, yelling straight out. He saw how his wife and mother-in-law took a child each 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 beloved 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). [Translated from Swedish by Öhman]*

The above quote originates from the novel *Trespassing Borders/Limits* [in Swedish: “Överskrida Gränser”] by Lars Wilhelm Svonni, born in 1946, author and member of the Sámi parliament in Sweden. The quote from the 2005 novel describes a fatal accident on the by the Swedish state power company hydropower regulated Lule river, at the Suorva reservoir, and the background of the formation of a fictional Sámi terrorist group performing a revenge on the Swedish state for putting them and their family at constant risk. As the story progresses, the terrorist group blows up the Suorva Dam, holding the water of the Suorva reservoir, the largest artificial reservoir in the North of Europe. The result of this fictional terrorist attack is that all villages below the dam are destroyed. Boden, a city with around 30,000 inhabitants, is completely destroyed. Despite the efforts of the group to save human lives by alerting the power company well in advance by first blowing up a couple of smaller dams to indicate a sudden increase of water, some 10,000 people die as the person in charge of the hydropower control station mistakes the sudden rising water levels for an instrumentation error (Svonni, 2005).

In Svonni’s novel, the low intense and small-scale disaster – everyday fatal accidents that fail to create headlines in national media, or a state of emergency, as they are primarily experienced by small numbers of people, mainly people in the north, Sámi persons, Indigenous people, and local inhabitants – very concretely meets the high intense, large-scale disaster striking a large number of people. Apart from the unlikelihood of a Sámi terrorist group causing such disaster, both fictional events are fully realistic. In reality it is more likely that the Suorva dam fails due to mismanagement, material exhaustion, sink holes, extreme high water flows, age or the combination of these factors, as described in the dramatic novel on the same theme with the title *Fallwater* by Mikael Niemi (2012). In practice both the low intense and the high intense disasters are unintentional but yet caused by humans, pretending to control the forces of nature for the production of electricity.

However, so far, in Sweden as well as internationally, focus has largely been placed on so-called big disasters, i.e. the dam failures – which are commonly discussed under the concept of “dam safety” – whereas the smaller scale fatal accidents – commonly referred to as “public safety around dams and regulated water ways” – are much less prioritized. Work regarding “dam safety” started on an international level in the 1970’s, after a disaster in the US. Today there is a massive body of literature based on experiences in regard to dam failures, causes and consequences, regulations and work to prevent further failures (cf Jansen 1980, Bradlow et al 2002, Bamane and Valunjkar 2014, Cloete et al. 2016). At the same time, however, there are far more people who die in public safety accidents than due to dam failures (Pritchard/Bennett 2014). In Sweden, there is currently little focus and much less investments in dealing with the issue of Public safety around dams. The work that was initiated by the state owned power company Vattenfall in 2007 and the sector organization Svensk Energi in 2008, places the major part of responsibility on individuals to

avoid putting themselves in danger, i.e. to stay away from the water courses, whereas the responsibility of the dam owner is limited to warn the public to stay away from dangerous areas (Norstedt 2013; Vattenfall 2007; Svensk Energi 2008; Idenfors *et al.* 2012; Palo 2013). The watercourses and regulated rivers and lakes being used as routes and spaces for daily livelihood of local inhabitants, including for reindeer herding as an economic and cultural practice of the indigenous Sámi within the actual Sámi territory is not recognized in this view.

In Sweden, since the start of the construction of large-scale hydroelectric dams, only one person has died as a consequence of a dam failure (Sverige 2012, 75). Meanwhile, according to the local rescue services in the Jokkmokk municipality, one single area in Sweden with five thousand inhabitants, one to two persons die on the regulated river every year in fatal accidents like the one described in the quote (Lundström 2010; Nilsson 2013). As a comparison, if the same percentage of people died due to hydropower regulations in the capital municipality Stockholm, with 900 000 inhabitants (Stockholm Stad 2015), that number would amount to between 180 to 360 persons every year. It goes without saying that it would be considered a major hazard that would need to be addressed in policies and actions. In an overview report regarding drowning accidents over the last ten years, 2006-2015, the Swedish Life Saving Society (Svenska Livräddningssällskapet 2015), an NGO with focus on safety and security with regards to water, states that the northernmost counties have the highest number of deaths by drowning, in relation to the number of inhabitants. The cause for this is in the folder claimed to be the cold water in the north as a major factor. Still no alerts are made, no big headlines have ever been seen in media, and no policy changes seem to be in view. People, who do not live in these risky areas, know very little about the conditions under which their everyday portion of electricity is produced.

How can this situation be explained? First of all an important explanation is that the rules and jurisdiction for Swedish hydropower was set both before Sweden had become a democracy, as well as during the time when Sámi territories were under strict colonial tutelage where the indigenous Sámi were not allowed to speak for themselves (Össbo and Lantto 2011, Öhman 2007). As a comparison, US licenses for hydropower plants are limited to between 30 to 50 years. Thereby public safety issues may be addressed in view of a renewal of the license, which strengthens the incentive to reduce the number of accidents. Canada has a similar situation (BB, FERC 1992, CDA 2011). In Sweden, around 90 % of the existing hydropower plants are run by permissions granted under the 1918 Water Act, an act created to take the heat out of lively debates on water courses, before democracy was installed in Sweden and which is undeveloped with regards to both social and environmental protection (Jakobsson 2002, Öhman 2007, Össbo and Lantto 2011). In 2012 a state inquiry committee with the mandate to review the Environmental Code relating to the legislation of water activity was set up. In 2014 the inquiry presented a legislative proposal that all permits issued under ancient law was to undergo a new trial, which is currently under debate within the Swedish government and to be decided by the Swedish parliament (Alskog 2016, Sverige 2014).

Secondly, Swedish hydropower electricity is produced and sold under the device of being clean and environmentally friendly. Media searches and literature studies focusing on the period from the early 1990's up to 2015 done within the research projects shows that despite numerous debates on the issue of the severely negative environmental impacts of hydropower, the fatal consequences of hydropower production for local inhabitants are seldom or next to never discussed in media, although they have been pointed out by Sámi journalists and in articles in Sámi media from at least the 1950's (Utsi 1958, Spiik 1961).

There is yet another aspect to attend to, which brings the dam failures and public safety issues closely together. This is the aspect of the human bodies in the design of dams and reservoirs, in the daily management of them, within a technological paradigm and discourse, where human emotions, affections and lived experience are disregarded.

So far very little work has been made in Sweden when it comes to understanding the human bodies, commonly named the "human factor" in discussions about dam failures (Cf Norstedt *et al.* 2008). So far there is far too little work done to understand the complex aspects of human interactions with water, climate, dams and nature's forces (cf Baecher 2016). Our studies indicate that both dam operators and local inhabitants invest emotionally and practically in upholding safety to avoid dam failures. We have found that this work is built on the human relationships with the river, dams,

reservoirs as well as the human social relationships. Living in the area seems to be of major importance for the understanding.

We depart from the concept of *human security* which focuses on the protection of people and individuals. As proposed by Hoogensen and Stuvøy (2006) we integrate insights from gender perspectives and thereby recognize security relationships and the multitude of actors working for the enhancement of security through a variety of different actions. Based on the findings within three trans- and supradisciplinary research projects in this article we argue that the human bodies and emotions, in their social, historical and cultural contexts of dams, safety and human security need to be analysed to a wider extent than that what is currently the case today within the civil engineering sector in general, and in the dams and hydropower sector in particular. Security concerns the maintenance and protection of that which we as humans most value, both material and immaterial, and the actors and their work to promote security is much more complex than what is today acknowledged. We argue that in regard to the political decision making sphere – legislation and control of dams by national and local authorities – there is a need for bringing in the human bodies, or more specifically the *embodiment of lived experience* (Merleau-Ponty 1998) as well as studying the cultural politics of emotions (Ahmed 2004) to enhance the understanding of the complex issues at stake in regard to dams, safety and the relation to human security.

## **2. THEORY, METHODOLOGY AND EMPIRICAL BASIS**

The empirical study is qualitative and based on interviews, participatory observations and literature studies. The studies have been carried out as part of three research projects, the focus period stretching from June 2008 until December 2015. Interviews and conversations with actors within the hydropower sector; power companies as well as authorities with responsibility for rescue services and supervision of *dam safety*, as well as with persons in local communities along the Lule River in Sápmi-Sweden. Participatory observations have been made on site in combination with a reading of technical reports and documents dealing with dams and safety issues, including reports of incidents and failures, and reports of deaths on the reservoirs. Sensitive empirical data from observations and interviews have been anonymised. Furthermore we build on our own combined personal embodied experiences, three decades as students, scholars, lecturers and professionals within the science and technology sector, as well as the history of technology with a specific focus on water resources, dams and hydropower constructions. The article approaches hydropower, dams, safety and human security building with *feminist technoscience* perspectives reflecting on possible ways of understanding these issues and contributing to a change. Feminist technoscience as a research field goes beyond gender relations and sex, women and men. The focus is on epistemological and ontological issues, on human bodies and their relations with each other and with non-humans. Technologies and constructed artifacts are commonly considered as being materialised knowledge and understanding. The design of technologies, science and artifacts is seen as processes of knowledge production, where emotions and subjective embodied understandings of the world is at the fore (Latour and Woolgar 1979; Haraway 1988; Harding, 1987; Lykke and Braidotti 1996; Barad 1999; Suchman 2002, Rydhagen 2002, Elovaara 2004).

## **3. EMOTIONS AND EMBODIED EXPERIENCES OF HYDROPOWER**

The reference to Svonni's novel serves two main purposes. First of all, within our research, we have encountered several stories similar to the one described in the novel quote (Lundström 2010; FF; GG). By referring to Svonni's novel, the horrendous events are well pictured, while avoiding exposing the tragedies that have actually happened. It is an ethical approach we opt for. Furthermore, Svonni also provides an opportunity to show the emotions of rage and the desire to be heard. The Sámi terrorist group in the novel we read as a fictional revenge on the Swedish state and what is perceived as an aggressive colonization of Sámi territory through hydropower exploitations. It is a call for action, to make a change, to remember and also to stop the deaths on the hydropower reservoirs. While the frustration and rage against the colonial and racist hydropower exploitations illustrated in the novel is for real it is unlikely that such a terrorist incident would ever be orchestrated

by Sámi persons. Instead, actual experiences indicate the opposite - the presence of Sámi and other local inhabitants living around the dams and reservoirs is an important contribution to an enhanced human security (Öhman *et al.* 2010). This was the case of the Suorva dam incident – which was a near failure – in October 1983 after 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 and reported to the power company Vattenfall (Nutti 2010).

The second purpose of referring to the novel is to point towards the emotional investment in these techno-scientific systems. Sara Ahmed (2004) discusses the major impacts of emotions on politics: ... *emotions work to differentiate between others precisely by identifying those that can be loved, those that can be grieved, that is, by constituting some others as the legitimate objects of emotion. This differentiation is crucial in politics as it works to secure a distinction between legitimate and illegitimate lives* (Ahmed 2007, 193). What are the culture politics of emotions in regard to dams, reservoirs, safety and human security?

Most technical reports, state inquiries or rescue plans may at a first glance seem to be stripped of the existence of both emotions and human bodies, for instance reports in Sweden such as the ones from Länsstyrelsen Norrbotten 2014, Riksrevisionen 2007, Sverige 2012. But, when one is instead looking out for the lived experience, emotions in these texts, the emotions displayed in such reports and plans can be summed up as working as a type of appeasement. The way the reports are written exclude the human individuals' experiences of disaster, pain, death, and instead work as reassuring, that nothing bad has ever happened and nothing bad will ever happen. Capricious – but still totally normal – acts by nature, with extreme temperature shifts, freeze-ups, rainfalls, snowfalls, winds, flows, small tornados in combination with the demands of production of electricity from far away, in places where the understanding of the local conditions are not the same, seem to be unaccounted for. The feeling of control is instead what is conveyed through these reports. This style of writing can be interpreted in a way that may be best expressed through a sentence such as “you [the reader] are safe, we have things under control, nothing bad will happen to you”, but it is a false promise of control.

#### 4. DETACHMENT → EMBODIMENT

Within engineering sciences, i.e. within training and education of engineers, as well as with regards to the design and construction of large technical systems in general, and with regards to large-scale hydropower, important aspects of the human body is to a large extent disregarded. While the design and construction of technical systems are indeed directed at making sure that human lives are not put at danger, important aspects of the human body of the designer and the operator are to a large extent neglected. This approach comes to life for instance in the representations of hydropower on power companies websites, as well as in the actual technical designs of remote control and surveillance systems. At the forefront is the technology; the technological artefacts – the dam constructions, the power plants, the turbines, the surveillance cameras and measurement techniques (Cf. Öhman 2016a). The humans involved are all too seldom in focus. To fully understand the background of this detachment from the human body it suffices to take a look at the scientific development since the 18<sup>th</sup> century. The detachment from the human body is indeed not a new invention; it is built on a tradition of philosophy of science – *rationalism* – developed since the 18<sup>th</sup> century in Europe, strongly influenced by Descartes mind-body dualism. A rationalistic approach is the belief that the human mind works independently of the human body, or that there is a truth out there, that can be captured by the human intellect. While it seems as this body-mind dualism has prevailed to a large extent within engineering sciences, it was actually challenged already in 1748 by Julien Offray de la Mettrie in his work *L'homme Machine – Man a Machine*:

*The human body is a machine which winds up its own springs: it is the living image of perpetual motion. [---] Without proper food, the soul languishes, raves, and dies with faintness. It is like a taper, which revives in the moment it is going to be extinguished. Give but good nourishment to the body, pour into its tubes vigorous juices and strong liquors; then the soul, generous as these, arms itself with courage; and a soldier, whom water would have made run away, becoming undaunted, meets death with alacrity amidst the rattle of drums.* (La Mettrie, 1750, p.11)

The rejection of the mind-body dualism has been revived in the 20<sup>th</sup> century, and brought

to life within the concept of *embodiment*. *Embodiment* is the process in which our body experiences the surrounding world and this experience becomes a subjective knowledge. For instance Merleau-Ponty formulates it as it is through the body that we have access to the world, actions and perceptions are intertwined. Thereby the process of embodiment is formed by habits and learning (Merleau-Ponty 1998). We integrate our own lived experiences, through our own bodies, to our knowledge and thereafter into our actions. Engineering and scientific practices are indeed dependent on the embodiment of experiences (Harding 1987, Haraway 1988; Barad 1999,).

## 5. SAFETY VERSUS DEATH AND DESTRUCTION

Language is closely linked to our bodies, it is through language that we appropriate knowledge and understanding and it is through language that we communicate our understanding (cf. Fanon, 1952). Thereby looking closer at the language and concepts, used by actors within the large-scale hydropower sector provides an idea what it is all about. For instance the use of the terminology of “dam *safety*” – brings about an idea of feeling safe and secure. The concept of dam *safety* focuses on engineers and operators making the rivers safe, and thereby the idea that the rivers and bodies of waters – nature – can be controlled by human beings. A next step in this logic is that when the waters are no longer controlled, this is a failure, or accident. Dams that break down, inundation, flooding, and other forms of disasters are not normal, they are abnormal. The paradox here is that failures are indeed normality. On a global level, there are 1-2 major dam failures per year, and several smaller dams overtop, break or end up needing water to be released to avoid dam failure – and thereby inundation occurs (BB; ICOLD undated; Öhman 2016a). Furthermore, engineers designing dams and dam management techniques are often fully aware of the disasters that may occur if their design is erroneous. Operators managing the dams are in many cases also as conscious about the importance of their work (BB).

Death and destruction are thus a constant part of the experiences when it comes to large-scale



**[Figure 1. Inside one of the hydropower stations on the Lule River.  
[Photo: M-B Öhman, 2011]**

hydropower reservoirs and power plants. At any construction of a hydropower plant and reservoir, people have died at accidents. At many construction sites there are memorial stones or boards over the ones who have died during the construction of this or that power plant or reservoir (DD). Furthermore, as in most large scale industrial ventures, the everyday operation of the hydropower plant and reservoirs, death and destruction is a part of the picture as both incidents and actual fatal accidents occur on an everyday basis. Operators or machinists working inside of the power plants work below the surface of water. If a system fails, or someone makes a mistake, their lives are at risk. They are also at risk for other types of accidents. For instance, if a fire breaks out, the escape route through long tunnels or climbing long vertical ladders are on average both very long and dangerous (DD). Such accidents and incidents happen around the world all the time and reports from them are today immediately circulated around within the hydropower sector companies (BB).

Moreover, as the initial quote of the paper makes visible, the daily operation of the dams

may cause death for the people living around the dams. Depending on the climate where the reservoir is placed, the dangers are different. In the cold northern hemisphere, the ice covered rivers and lakes function as roads for the inhabitants during the winters. However, because of the regulations, the ice becomes both fragile and treacherous. In summer the large bodies of water becomes dangerous to cross in small boats as the wind can speed up suddenly. In the fall the mountain weather is very hard to predict with sudden storms occurring (GG, Öhman 2010).

In short, death and destruction, as part of the lived – embodied – experience of the hydropower engineers and operators form a constant part of the picture. The problem is how this is dealt with, and by whom it is dealt with. A question to discuss is what this embodied experience does to the engineers, operators and machinists involved in hydropower and reservoirs? How does it produce knowledge and relate to actions taken to prevent failures? How are the emotions related to incidents and accidents dealt with on different levels – individual, organizational and political levels? Interviews and discussions within our study all indicate that to a large extent this lived experience and emotions are neglected, on a formal level although dealt with through verbal knowledge sharing between the operators.

Incidents and accidents that happen are left to the individuals to be dealt with on their own. For instance, at one accidental submerging of a hydropower plant where several operators were at risk of dying, the aftermath seems to have been dealt with mainly by the operators on their own (EE). When asking questions about whether there is access to psychological support for dealing with such traumas, the informants answered that this help is available, but one has to ask for it, and that this is something that no one seems to be inclined to do: "I think there is someone we can talk to, I don't know who it is. But one takes care of one's own feelings by talking to colleagues" (EE). With regards to people dying or being injured on the reservoirs, this is left completely outside of the concept of "dam safety", and thereby not dealt with at all within the power company. Still the operators will have to live the rest of their lives with the trauma of possibly causing someone's death. To analyse how this comes about, the *hegemonic notion of control* is of interest.

## 6. EMOTIONS AND THE HEGEMONIC NOTION OF CONTROL

Using the concept "safety" brings in a false understanding that it is possible to control the forces of nature, to make oneself and others safe. This idea of control is part of a hegemonic notion of control over nature and detachment from certain emotions. It is about control over nature's forces, as well as the control over oneself, over one's own feelings. Based on our professional experiences, participatory observations, interviews and studies of technical reports from dam failures and incidents, we suggest that within the current engineering training in general, as well as within the specific instructions to dam operators, the actual human bodies are considered at the same time to be both uninteresting and easily replaceable.

With modern remote control technologies, control over the river can more or less be performed from anywhere, and sometimes it is argued that it is better done from far away (FF; HH). We see that what comes to the fore in reading technical reports and instructions, as well as when taking closer look at the remote control settings of the rivers we have studied, human bodies are frequently considered to be very easy to replace with machines and "new technology" – i.e. the installment of remote control devices as well as remote supervision through cameras and other means of surveillance (Cf Norstedt *et al* 2008).

One important reality of this remote control technology is that power production is increased and decreased according to the demand of electricity which impacts directly on the water levels. As the Lule River is used both for power production for the power company Vattenfall as well as for stabilizing the Swedish national grid, water levels of the reservoirs may rapidly increase and decrease, as requested from Stockholm where the national grid balance is kept and the main control room for power production within the power company is located. On smaller reservoirs the levels may change within a few hours, on the larger it is a matter of several hours, but the difference is of importance for the local inhabitants' safety. The control of the reservoirs, the release of the water, is made from one specific control station which is located by the Lule River, but still far from – up to 240 kilometres at the most – the dams and reservoirs. The water regulation creates dangers for the local inhabitants, including reindeer herders. In winter time the regulations, in combination with temperature, cause dangerous holes in the ice, or causes existing holes to open up more and cause fatal accidents as described in the Svonni novel quote (FF, GG, Öhman 2008-2015). At other locations, where there are dry beds due to regulation, water may be released onto persons who are in the dry beds for any reasons. As there is no warning signals before water is released in the Lule River, such incidents occur. At one occasion water was released as a reindeer herder was passing with his reindeer (Öhman 2008-2015). Similar accidents with fatal outcomes have happened on amongst other the Ume River (ICOLD/Norstedt 2012).



**[Figure 2. Reindeer migration on the Lule river, Stora Lulevatten, Stuor Julevu. Photo: Fia Kaddik]**

We have also found that the interpretation of the information collected through these technological devices seems to be a complex issue which may not be given enough consideration. For instance, in 2012 cameras were installed at the control station for the Lule River to supervise the dams. The cameras were installed to be used to see if break-ins or damage are made to the since long unmanned dams and power plants (HH, Öhman 2008- 2015, 2012). However, at the control station, the operators found another usage to be of higher priority, namely as a back-up control of water levels, in case of a report from a station that the water level is not what it is supposed to be. Furthermore, the camera at one specific dam at one occasion showed in real time teenage boys climbing on a dam wall, putting themselves at high risk. This could be seen by the operator, who had no possibility to do anything but to watch them, and then decide if he should call out an emergency. It was a stressful moment for the operator, who saw this dangerous situation, but whose work was not to supervise the dams for such situations. (Öhman 2008-2015, 2012).

We have thus found a void of discussion and analysis with regards to who is supposed to interpret the information channelled, and what the responses to the information provided is supposed to be at any given moment. Furthermore, our findings suggest that at the same time, the human being, the

operator, is supposed to always be functioning, and not being touched by emotions or affections in a way that may cause errors. He or she is not supposed to be thinking about facing death, or possibly causing death and destruction to themselves and others by failing in the daily operations of the plant and reservoir. Or at least, that these emotions are not considered important to the everyday control of the river, it is not dealt with

the control station other than in informal discussions between the operators (FF; Öhman 2008-2015; Öhman *et al.* 2010).

Yet, during nights and weekends the operators are commonly alone, and there is no one else to discuss with at moments of stress. There is no specific guidance from the power company dealing with these issues of life and death and the emotions of the operators, despite the fact that they are in charge of a major force, the water that may kill other humans if the dams and power plants are mismanaged. One other important aspect which calls for further attention is that the emotional work and relationships by the operators on their own may be the reason for there not having been any major dam failure disaster yet, and that accidents and deaths and the reservoirs are not even more frequent than what is currently the case. Our studies indicate that the operators, who in this study live by the regulated river themselves and thus have friends and family in the river valley, do their best to ensure the safety and wellbeing for other humans (FF; Öhman 2008- 2015). We suggest that it is important to take this physical closeness to the river, to take this lived and shared experience taken into account. It is possible that the number of deaths on the reservoirs could be higher if the operators were not part of this local context themselves. It is also possible that the number of incidents leading to failure would have been higher, and that the fact that no major dam failure has happened yet, despite numerous severe incidents (amongst other the Suorva 1983 leakage for instance), can be attributed to the operators relationships with the river valley and all its inhabitants.

## 7. COUNTING BODIES – WHOSE BODY COUNTS?

Yet another aspect of importance is the counting of human bodies, along with the determination of which human bodies actually count as being important. This relates back to the discussion of emotions, and how the distinction is made between what lives are legitimate to care about (Ahmed 2004). For instance, the prospect of human lives lost in case of a major accident can be discussed in relation to the actual number of human lives lost around large dams on an every year basis. Who are these bodies, what emotions are they carriers of, and which bodies do count, whose emotions count as important and serve as a basis for change in policies, to perform actions in order to enhance human security? A closer look on hydropower in Sweden, in Sámi territory, may provide a better understanding. Are local inhabitants in the north, and Sámi, human bodies counted as important? Is it about the number, only 1-2 per year, dying? Would policies look different if the same percentage of accidents happened in Stockholm?

Today there is no legal definition of the concept of “dam safety” within Swedish jurisdiction (Sverige 2012, 73). The proposal by the national authority, Svenska Kraftnät, in charge of counseling power companies, and other authorities promoting the work with this issue defines it as: “prevention of dam failure, erroneous operation of the power plants and other events that may result in uncontrolled and fast flow of dammed waters, as well as the “preparedness for dam failure” (SVK 2010). The national inquiry of 2012 on dam safety suggests the same definition (Sverige 2012, 73). While the accident in the initial quote from Svonni’s novel is indeed related to the running of a dam – the ice becoming fragile and treacherous because of changing water levels – with the purpose to produce electricity, the issue of “public safety around dams” are still not part of Swedish jurisdiction. Furthermore it is completely left out of the picture in the dominant discourse within Swedish production of electricity. Accidents that happen on the reservoir are not categorized specifically as dam safety problems. It was left outside of the mandate of the Swedish national inquiry on dam safety in 2012 (Sverige 2012, 59). In guidelines for public safety around dams created by the State power company Vattenfall (2007), and by the association for companies in the hydropower sector, Svensk Energi (2008), as well as in conversations with representatives of power companies (BB) the major responsibility for staying safe is placed on the individuals themselves, to keep away from dangerous sites. This view turns an accident as the one in the Svonni quote into as drowning accidents, thus

excluded from the statistics of deaths caused by hydropower regulations and the ones being injured or killed are depicted as not supposed to be there in the first place, or else it is their own fault that they are killed or injured.

There is so far no statistics available in Sweden that indicates whether a drowning is related to a regulated river or not. It is thereby very difficult to find out to if the death was in some way caused by hydropower regulation, or not (Idenfors 2013; Nilsson 2013). Our understanding is that these deaths and the grief which ultimately is caused by the production of electricity are generally not really considered a problem that needs to be dealt with. Yet, the reason for the ice to break under the sledge in Svonni's novel, is as most local people, most of them Sámi, around the Suorva dam are painfully aware of, the continuous regulation of the water levels, for the production of electricity – electricity that will for the most part be used far away, providing great economic benefits for other people living in another part of the country, far away from the dangers (GG). This calls for an analysis of the colonial Swedish state, and its relationships with the Sámi, and the colonised or conquered territory of Sápmi (cf Öhman 2007; Össbo and Lantto 2011). Sweden relies heavily on hydropower for the production electricity within the country. The number of dams (the majority being hydropower dams) in Sweden amounts to around 10,000. Out of these 78 are of the highest so called “consequence class 1A” – within the Swedish classification system – meaning that a dam failure would with high probability lead to the loss of human lives, at least 20 lives, and severe damage on societal infrastructure, loss of environmental values and economic values (SVK 2010, Sverige 2012). Out of these 78 class 1A dams, 51 are located within Sápmi, the land of the indigenous Sámi, and also reindeer grazing and migration lands.

As the large scale hydropower exploitation set off in Sweden in the 20<sup>th</sup> century, Sámi reindeer herding communities were severely affected as was Sámi who were not reindeer herders. For both groups, the fishery was severely disturbed and the everyday life close to the waterscapes became more dangerous and unpredictable because of the water regulations. Reindeer herding communities lost grazing land, as well as land and waterways for the annual migration of the mountain reindeer. Interviews with the affected communities point at several injustices that have taken place (FF; Öhman 2008-2015), despite Sweden boasting an international reputation as one of the top representatives in terms of democracy and human rights. To this day, land rights are being debated and for instance the Swedish government has avoided ratifying the ILO convention 169 that gives indigenous people extensive land rights.

As the hydropower exploitation is extensive within Sápmi – there are numerous Sámi, reindeer herders as well as Sámi and others who are not reindeer herders but who live in the area – many Sámi and other local inhabitants are affected on a daily basis. In interviews, carried out between 2004 and 2015, testimony is provided about how dangerous the life has become for the local inhabitants around the dams, with fatal accidents occurring every now and then that can be directly linked to the regulation of waters, as well as incidents that has not cost human lives, but this only because of sheer luck (GG; Öhman 2006; 2008-2015). For instance one fatal accident occurred in May 2008, when two Sámi men – 50 and 37 years old – on a snow mobile went into a hole in the ice created by the waters coming out from a hydropower station just outside of their own residence by the Suorva dam (Öhman 2008-2015, 2008).



**[Figure 3. The hole in the ice caused by water from the hydropower station at Ritsem, Suorva reservoir, Lule River, close to where two men lost their lives in May 2008. Photo: M-B Öhman, May, 2009]**

While the hole in the ice is there the whole time during winter time, the extent of it is hard to judge for anyone. As more water is released, the size of the hole may change rapidly. Furthermore the unpredictable changes of temperature in May, which is due to the climate this time of the year in this region, form an important factor in the changes of ice stability, something that is hard for the local inhabitants to predict and handle. In any case, the crossing over the ice is not something they can avoid, this is their home and working area. When they move between neighbours and friends, the ice has to be crossed. The state power company provides support for a supervised ice road, but only up to May 1<sup>st</sup>, or when the ice is strong enough. After that, the local inhabitants – residents – are left on their own to assess the risks. Also, for reindeer herding, this is the time of the year when reindeer herders have to move over the ice with their herds. This causes constant stress and anxiety, along with the grief over the lost family members and friends in earlier accidents (GG, Öhman 2006, 2008-2015).

Another important feature is the cold temperatures in this region. A person who falls into the water of an ice-covered reservoir does not necessarily have to drown to die. Once in the water, depending on the physical condition of the person and the surrounding temperature, it takes approximately between 5-15 minutes before the person is numb from cold and it becomes impossible to move or do anything to help oneself. And, even if the person manages to get out of the water within that time limit, it suffices to get wet, without getting adequate help, being taken into the warmth; the person is likely to die because of the cold. Therefore, an important feature is the possibility or difficulty of getting assistance in time. Assisting someone who has fallen into the water on such a big reservoir as Suorva is difficult, and the best and fastest help provided by helicopter assistance. However, when someone falls into the cold waters of the Suorva reservoir, the nearest rescue helicopter (ambulance helicopter) is located in Gällivare – 155 kilometers flying distance (Lundström 2010; GG).

## 8. DISCUSSION

*Through emotions, the past persists on the surface of bodies. Emotions show us how histories stay alive, even when they are not consciously remembered; how histories of colonialism, slavery, and violence shape lives and worlds in the present. The time of emotion is not always about the past, and how it sticks. Emotions also open up futures, in the ways they involve different orientations to others.* (Ahmed 2004, 202)

Within the dominant hydropower discourse in Sweden there is a strong focus on the technology, the artifacts, to find technologies to prevent and manage accidents and incidents, while the human bodies, the people who work on ensuring that dams are safe, are willfully being neglected. Furthermore, in Sweden the issue of public safety around dams is constantly cut out, and in practice neglected in terms of investment of time and means. The safety of humans, the human security is not in focus. In this paper, we bring forward the concept of human security, as a point of departure, while discussing

the politics of emotion in regard to hydropower. In this way we can focus on what hydropower and dams do to human and their feelings of security, as well as the actual fatal accidents. Recent developments in regard to licenses for hydropower in Sweden may open up for a change, and in view of this possibility for change we argue for a broader take on the issues, to go beyond the common way of describing and dealing with safety and security in regard to dams.

We argue that the human bodies, the lived – embodied – experience, emotions and affections, with regards to human security as a whole collectively constitutes an understanding of what makes dams safe and less safe, as well as with regards to the public safety around dams. We suggest that these aspects need to be connected and addressed with major investment in terms of time and funds, and that this is a responsibility to assume by the Swedish state, power companies and authorities at all levels. We thus argue for a broadening of the discourse of dam safety, to deal with the emotions of the human bodies involved with the design and management of the dams, living by and below the dams and reservoirs, within their societal and historical contexts, and to analyse the colonial context under which hydropower exploitation was made, in view of reducing the risks of fatal accidents and both large-scale and small-scale disasters. One particular such lived – embodied – experience which should be further analysed is the everyday experience of death and destruction; the experiences of death caused by hydropower, facing death, being at risk of dying, being the operator of a dam that causes fatal accidents for local inhabitants, as well as possibly being the cause of the death of other people including the destruction of societal and environmental values on a grand level. We argue that both fiction as well as first person narratives may serve this purpose and that the training of engineers, operators and all others in this sector should open up to broader understandings of these perspectives. The relationships between the Swedish state, power production and the indigenous Sámi need to be discussed, taking into account the aforementioned colonial context. The objective then is, as in any scientific investigation of techniques related to the management of large dams, to widen the perspectives on dam safety/public safety, ultimately to prevent accidents and that when such accidents do happen, manage them in ways that reduce the negative consequences for those struck by the disaster.

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