



Western Norway
University of
Applied Sciences



KINDknow
Kindergarten Knowledge Centre
for Systemic Research on Diversity
and Sustainable Futures



KINDknow notes series 7, 2023

Water and waterscape: Collaborative exploration and meaning-making

National report to international OMEP pilot project 2022/2023
Wash From the Start - Local conditions for children's access to water in Norway

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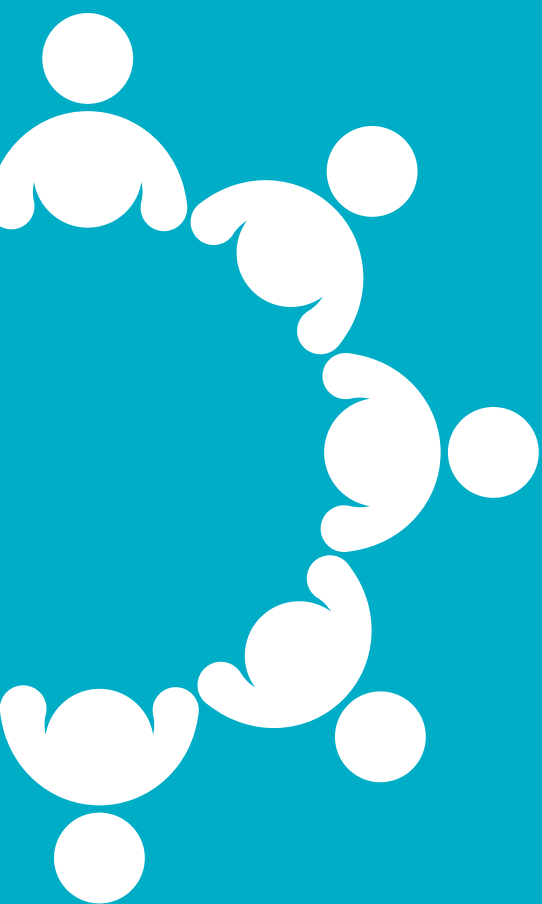


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Executive summary

Water as a global resource has been appreciated and praised for its beauty, for providing natural experiences, and for its wildlife, health, domestic, agricultural, fish-farming, tourism, and industrial uses. Access to improved water and sanitation are fundamental human rights and fundamentally important for children's health and development. Although over 1,400 million square kilometres of the earth are covered with water, only 0.001 per cent of this water is readily available for human consumption. Furthermore, there is huge geographical variation in access to consumable water across continents, regions, countries, and even within countries. Despite water being vital for nature and human life, it is often taken for granted and poorly valued. Ensuring global access to safe, clean drinking water and sanitation is a major challenge confronting humans today.

Current globalisation efforts create problems, such as rapid urbanisation, environmental degradation, climate change, and biodiversity loss. Children are exposed to high risks because they live longer and are more likely to experience the effects of climate change than others. This calls for early childhood education and care (ECEC) stakeholders to make a paradigm shift towards more sustainable ecological worldviews and frameworks that will allow children to co-create and shape alternative futures.

This study shed light on the pedagogy of water and waterscapes in Norwegian ECEC and revealed, through the perspectives of staff and researchers, children's experiences of their landscapes, sceneries, materials, and the weather.

This report outlines the background, context, methods, and findings of a pilot study completed between 2022 and 2023 in two Norwegian kindergartens, one in Lærdal and one in Tromsø, as part of Water – Wash from the Start – Children's Access to Water, which is an international project developed by KINDknow/HVL in collaboration with OMEP World.

The qualitative pilot study was based on an ethnographic participatory approach since the main goal was to explore in depth the visible indispensability and presence of water in daily practices at two sites in Norway. The analysis considered place (waterscapes, landscapes, and weather); time (seasons and processes); activity (actions, movements, and excursions); and pedagogy (aspects of teachers' and children's interactions in relation to exploratory, instructional, responsive, and other pedagogical styles).

The researchers found that children had close daily contact with water, used the local landscapes outside the kindergartens, and had occasional excursions involving water topics. Seasons and weather mattered because the decreasing temperature changed the water in the winter. They also gained factual knowledge about water through organised activities and dialogues between teachers and children. The children played with water almost daily during formal and informal activities, and they experienced and wondered about water-related activities all year round. The study highlighted the children's activities in everyday life in kindergartens and the important role teachers played in expanding children's knowledge and life experiences. They did this by making play-based sensory water experiences available to them and introducing various types of knowledge, such as regarding the physics of melting ice and the ecology of water. They also encouraged and passed on local myths. Thus, they cultivated children's awareness and appreciation of water and its protection.

Introducing the scope of research

Water - Wash from the start – Children’s access to water is a pilot project developed by KINDknow/HVL in collaboration with OMEP World and the pilot countries include Norway, Tanzania, New Zealand and Thailand. This report reports results from two Norwegian kindergartens, one in Lærdal and one in Tromsø, Norway.

Water is one of the most urgent and extreme cases of major resource scarcity and therefore the most serious ecological and human rights threat of our time (Barlow, 2008; UNESCO, 2017). Everything, plants, animals, insects, fish, and people need water to survive. Despite the obvious vital meaning of the non-human resource, most societal and pedagogical research has been nature-blind and especially water blind. According to the historian and geographer Terje Tvedt, most influential research traditions have been basically water-blind, as very few studies of social and historical development take as their starting point the knowledge that our planet is the Water Planet and that evolution, development trajectories, and social life are ‘written in water’, (Tvedt, 2021, p. 204).

The ecological epoch of the Anthropocene was first suggested as a concept by biologist Eugene Stoermer in the late 1980s, meaning the interval of geologic time, in which the collective activities of human beings (*Homo sapiens*) began to substantially alter the surface of Earth. This project aligns with early childhood researchers that urges for a transformative education paradigm that challenges or requests reframing of the currently dominating socio-constructivist frameworks currently underpinning Early Childhood Education & Care (ECEC). Unwinding to the old and reimagining a new paradigm is necessary to address humanity’s unsustainable, unjust and unhealthy living patterns (Elliot, et. Al, 2020, Ødegaard 2021, Grindheim, et. al, 2019).

This project aims to raise awareness of children’s intergenerational right to access to clean water and a sustainable environment in times of ecological crisis. Moreover, this project has value-driven aims to promote responsiveness in education, to cherish and protect water landscapes (waterscapes) and sources to broaden the understanding of water as a concept and vital resource for all life on earth including children, their families, and their environment, across contexts, nations, and cultures.

As sustainability is a shared responsibility across sectors and across countries, this pilot study will give us valua-

ble insight to go further on the most important issues of our time to support the realisation of the United Nation (UN)’s Agenda 2030. This pilot study focuses on SDG 4 the UN emphasises that sustainability education should be given at all levels, and we know that less attention has been given to ECEC. Researcher in the field of climate change and geography, and philosophers, often point to the importance of nature literacy and that care for nature should start with the youngest children (Jickling, 2000, Goulson, 2021) The UN agenda also states that by 2030, the world should expand international cooperation and capacity building, support the global south in water and sanitation-related activities, and support local communities in improving water and sanitation management (UN, 2015). The project also addresses SDG 6 clean water and sanitation and the International Decade for Action on ‘Water for Sustainable Development’ 2018-2028. In response to the ambitious 2030 Agenda, we raise awareness to the importance of water, with the glance on how ECEC in two geographical sites in Norway live and work with water. The project can also be seen as related to SDG13 climate action: Take urgent action to combat climate change and its impacts. Climate change is a direct threat to a child’s ability to survive, grow and thrive. It is a paradox that while children are the least responsible for the changes in environment, due to the older generation exploitation of nature resources, ignorance and neglect, the burden of climate change is given to the future generations.



With these overall goals and visions for the project, we go local in four countries with examples from five localities. In this Norwegian report we go local in the municipalities of Lærdal in the long and deepwater fjord at the west coast of Norway; the Sognefjorden, and in the town of Tromsø located in the Arctic of Norway. The Arctic location was chosen to give perspectives from an Indigenous Sámi kindergarten unit. With these two locations we aim to understand how local waterscapes affect and provide conditions for children and how this intersects with education. We are interested in both the local experiences and the stories of kindergarten practices as well as under-

standing what the local conditions mean for education. In the next step, we will compare the five localities, in a broader sense, across localities, to contribute to a 'glocal' awareness. A 'glocal' awareness is a capacity that incorporates the mentalities, knowledge, and skills necessary for a person to navigate the challenges and opportunities of a globalised world in a way that promotes sustainability. A 'glocal' pedagogical style of ECEC is therefore characterised by a teacher approach of planning and acting with anchoring up practices locally and with a larger systemic and ecological perspective in mind (Trippstad & Huang, 2015; Ødegaard, 2015).



Figure 1. The two localities of pilot kindergartens in Norway; Lærdal and Tromsø.

Our perspectives include children's meaning-making and the kindergarten staff engaging in everyday practices as well as in planned activities for engaging children situated in a local waterscape. The children's meaning-making perspective derives from a children's rights perspective that gives special attention to the voices of children (Ødegaard, 2007b), while a waterscape perspective comes from a tradition in political ecology that recognises that nature and society are entwined to produce hybrid socio-natures (a concept to overcome the dichotomy between the socio-cultural and the nature), and this has an influence on the way researchers examine a range of different landscapes such as cities, rural landscapes, agricultural fjords, rivers and forests (Karpouzoglou & Vij, 2017). Local waterscapes 'matter' because of the felt experience of 'being in' and co-weaving the world with meaningful others (Ingold, 2010). The term waterscape has different meanings in different fields of research and is often traced back to architecture and planning. In this report, we focus specifically on the use of the term waterscape in ECEC while recognising that political ecology itself

represents a diverse body of knowledge that has blurred boundaries to education and children's intergenerational right to access to clean water. The project contributes to new generations of children to explore, experience, and understand their local waterscapes. In doing so, we anticipate and hope for that children will cherish and protect water landscapes and water resources. By inquiring pedagogical practices over time, they will broaden their understanding of water as a concept and as a practice that are interwoven with global practices.

With these aims, we have invited kindergartens to organise a collaborative exploration with children aged 4 to 8 years. Specifically, we ask children and professionals to explore the conditions for their water supplies that is important for them in the place where they live. Crucial for all, even when taken for granted, is water for an ecologically sustainable environment, for washing and for drinking, and for expressing what finding the sources, sensing the water that is available for them means for them. We invited children and teachers in the pilot kindergartens of Lærdal and Tromsø to engage in a collaborative exploration of conditions for children's access to water reserves for washing and drinking by asking them to engage in a collaborative exploration and to report stories of children's meaning-making, their cultural and conceptual understandings of:

- Where does the water in the place where I live come from?
- What is happening to the water in the place where I live?
- What does this mean for me, my community, and the planet?

We suggested these questions as starting points for each kindergarten that participated in the project. The first two questions were pedagogical in nature and meant to prompt activities. The researchers gathered field notes, photos, and narratives as data to enable them to map what was available for children and how they used the local waterscapes. The third question was meant to trigger meaning-making dialogues. This report, therefore, pragmatically describes children's meaning-making in their local waterscapes through teachers' or the field researchers' reports. Based on story writing, reports from the kindergarten staff, and dialogue amongst the researchers, this report enquires into children's narrative meaning-making and outlines the characteristics of and relations between the local waterscape and pedagogy.

Following a qualitative thematic narrative analysis, we identified four themes:

- **Place:** noticing the waterscape in terms of landscapes and weather inside or outside kindergarten.
- **Time:** noticing seasons and processes.
- **Activity:** noticing actions and movements in everyday events or planned excursions.
- **Pedagogy:** noticing aspects of teachers' and children's interactions and whether the pedagogical styles were exploratory, instructional, responsive, etc.

In the analysis, we were interested in identifying narratives that highlighted the teachers' pedagogical styles and the children's meaning-making.

By providing information regarding these four aspects, this report provides new insights into the education of young children in two Norwegian pilot kindergartens. Since this was a preliminary study, the staff members were only briefly introduced to the theme and context of the study and the research interests. The children had not received any previous formal instruction about the local waterscape or the mechanisms of water in relation to scientific concepts or ecological cycles. Both the staff and the children lived alongside a waterscape, so they shared everyday experiences of the water in the landscape, the local weather conditions, the water they drank, when washing their hands, and in their interactions with the local society and economy. We expected that living near a waterscape would influence the emotions, motives, and experiences of humans and shape their lives, thinking, mentalities, and practices.

This study may support educators and science centres in designing more age-appropriate curricula and pedagogical approaches to give children rich experiences and understandings of the ecological mechanisms of the water cycle in ECEC and beyond. Giving voices to the children's and teachers' experiences may also help politicians make decisions and remind them of the cultural and intergenerational issues of access to clean water.

Background

Water as a global resource has been appreciated and praised for its beauty, for providing natural experiences, and for its domestic, agricultural, fish farming, tourism, and industrial uses. Access to improved water and sanitation are fundamental human rights and crucially important for children's health and development. As an abundant global resource, water covers over 1,400 million square kilometres, although only 0.001 per cent of this water is readily available for human consumption. Furthermore, there is huge geographical variation in access to consumable water across continents, regions, countries, and even within countries. Despite water being vital for nature and human life, it is often taken for granted and poorly valued. Ensuring global access to safe, clean drinking water and sanitation is a major challenge confronting humans today.

Current globalisation efforts create problems, such as rapid urbanisation, environmental degradation, climate change, and biodiversity loss. Children are exposed to high risks because they live longer and are more likely to experience the effects of climate change than others. This calls for ECEC stakeholders to make a paradigm shift towards more sustainable ecological worldviews and frameworks that will allow children to co-create and shape alternative futures.

Recruiting kindergartens for the pilot study

By inviting the kindergartens to tell us about what water meant in terms of local practices regarding the waterscape, we moved closer to answering questions about what water meant across geographical sites.

In February 2022, Inger Oddrun Sverkmo, the climate coordinator for the Grøne Lærdal [Green Laerdal] project, contacted Elin Eriksen Ødegaard, at KINDknow Knowledge Centre, to propose working with a kindergarten in Lærdal on a sustainability research project. The project was funded by the Norwegian Directorate of the Environment, and we considered it to be a good match, offering valuable synergies, so we agreed to involve them in the pilot study.

The pilot kindergarten was recruited in October 2022 on the initiative of Veronica Bergan to provide insight into an indigenous Sámi kindergarten context and to explore how Arctic waterscapes are perceived by Sámi children and teachers in ECEC.

Waterscapes in Norway

Norway is an elongated country in the north of Europe, with many fjords and waterfalls offering abundant access to clean water. The landscape and weather conditions are diverse, but the coastal areas usually have relatively mild, wet winters and changeable, humid weather in summer, while the inland regions have cold winters with a great deal of snow and relatively hot, dry summers (around 20°).

The Norwegian government regulates the water supply and drinking water to protect human health and ensure sufficient clean drinking water with no prominent smell, taste, or colour. Norwegian kindergartens must follow these regulations and have sufficient hygiene, including access to washing facilities, for both children and staff, especially when serving meals or food. Tap water is usually of drinking quality, and all washrooms have toilets.

The waterscape in Lærdal

Lærdalsøyri Barnehage is situated in the small municipality of Lærdal and has 2,117 inhabitants. This village is situated on the inner side of Sognefjorden (the deepest and longest fjord in Norway) and is also close to a protected UNESCO World Heritage site. The village has old, protected buildings, some of which date back to the mid-eighteenth century and include the national heritage site of Borgund Stave Church.



Figure 2. Map of Lærdal Municipality (a) and landscape map of Lærdal Municipality (b).

Central to the village is the Lærdal River (Læredalselvi), which is called 'the queen of rivers' due to its rich history of exclusive wild salmon fishing. The King of Norway is a dedicated wild salmon fisherman who calls this river his 'second queen'.

The landscape is varied, with high wild mountain areas, including the Jostelsbreen Glacier, and lower agricultural areas for growing and processing fruit, berries, and vegetables.

The Lærdal River valley is long, running from the massive mountain area of Hemsedal and Filefjell in the east to the Sognefjorden in the west. This municipality has a green vision for all sectors and hosts a Knowledge Centre for Wild Salmon financed by the Norwegian Directorate of the Environment.

The kindergarten staff members photographed some of the places where they took the children (see Figs. 3–6).



Figure 3. This is Stødna fossen during the winter, 2023, when the waterfall was frozen.



Figure 4. This is Stødna fossen in the spring, during the snowmelt season.

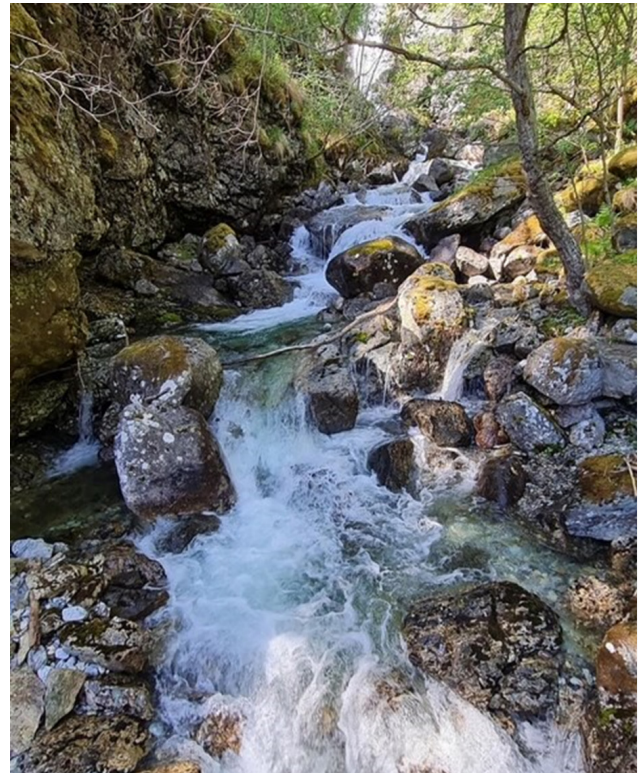


Figure 5. This is a stream from mountain, soon approaching Stødna fossen.



Figure 6. This is Lærdalselvi on it tour through the valley and Lærdalsøyri.



Figure 7. The island/town of Tromsø in the summer (a) and winter (b).



The waterscape in Tromsø

Tromsø is both an island and a town/municipality in the Arctic region of Norway with approximately 77.000 inhabitants. The surrounding landscape of Tromsø are nature rich areas with mountains which are covered with snow most of the year except for a few summer/autumn months (fig. 7). On the island of Tromsø there are a few small lakes and streams in the woods, and one of these lakes (Langvannet) is close to the pilot kindergarten (fig. 8).

A small stream runs downwards from Langvannet (fig. 9), and this stream and the lake freezes during the winter (see later). In addition, there is a water basin (pressure pool) that provides water supply for all households, including the kindergarten, which is located in a walking distance from the pilot kindergarten (fig. 10). The water basin can also be seen as a small round building in figure 8 at the far end of the lake above the woods.

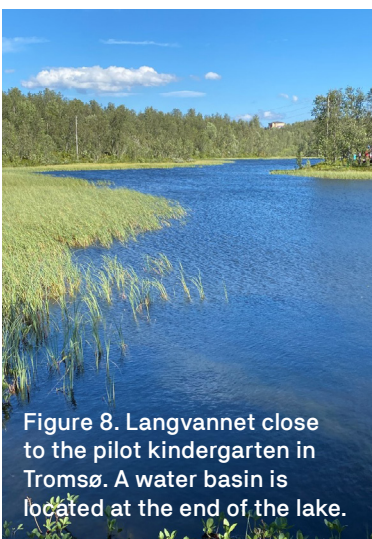


Figure 8. Langvannet close to the pilot kindergarten in Tromsø. A water basin is located at the end of the lake.



Figure 9. The small stream from Langvannet in summertime.



Figure 10. The water basin of water supply to all households nearby which is located in a walking distance from the kindergarten.

Children's waterscapes - Knowledge and concepts

Children engage, sense, explore and make meaning of the world from the start. They are entangled in the material and local landscapes in which they live (Ingold, 2010; Ødegaard & Marandon, 2019). They are also embedded in the values, culture and knowledge that are made available for them through their families, kindergartens and through being engaged in media and societal institutions like museums and science centres (Sadownik et al., 2022; Ødegaard, 2007a, 2012, 2022). More understated and subtle are the societal, political, ecological, and economic waterscape conditions for children's lives. From experience, children develop ideas about how the local world works, and experience emotions triggered by events and sensations. From developmental psychology we have learnt that emotions have a substantial influence on the cognitive processes in humans, including how they perceive, pay attention to, learn, memorise, reason and solve problems. Emotions motivates action and behaviour (Tyng, 2017). When we attend to children's waterscapes, children's emotions give direction to the motives to engage in exploring water and waterscapes.

Studies have shown that the conceptual understandings children hold prior to formal instruction serve as a framework through which children interpret, integrate, and construct new knowledge (Malleus et al., 2017; Saçkes et al., 2010). A better understanding of children's ideas about weather worlds, local waterscapes and ecological science and the style of teacher's pedagogies, may lead to the design of a more sustainable curriculum and pedagogical strategies. Planned activities as well as an everyday responsive pedagogical style, that are informed by children's initial ideas may support the development of a more elaborated and deeper curriculum for the shaping of local and global knowledge and cultural values for sustainability.

ECEC research shows that children's perceptions of the water cycle were influenced by their cultural beliefs and pseudo-scientific knowledge about the phenomenon (Saçkes et al., 2010). Research also shows that kindergarten children's understandings of the water cycle are influenced not only by their cultural beliefs and pseudo-scientific knowledge but also geographical location where they live. Children from mountainous areas tend to understand rain fall and snow concepts significantly better than children who live in deserts (Malleus et al., 2017).

While earlier studies indicated that first at around the age of nine, children could start to transition to more fully understanding the water cycle and related concepts, more recent studies have reported that kindergarten children can understand and explain the water cycle phenomenon, if they are taught water cycle concepts early (Cai et al., 2020; Panagiotaki et al., 2009).

Drawing on works influenced by relational understandings of the more than-human world (Djohari et al., 2018; Ingold, 2005) and the cultural historical approach to a pedagogy of kindergartens that celebrate collaborative exploration at the heart of early childhood education (Hedegaard & Ødegaard, 2020), we illustrate how the qualities of waterscapes are continually 'woven' into the material, embodied and cultural practices of young children.

Waterscapes are places to be and dwell in. Children experience their landscapes, the sceneries, the materials, and the weather. The local practices, cultures, landscapes and economies are shaped through the spatio-temporal ecologies of waters: the rhythms, tempos and durations that are traced through assemblages, bodies and the affective life of human and non-human in materialised, lived and ongoing processes (Djohari et al., 2018, p. 2). Tidal scapes, seasonal changes in weather and animal cycles give rhythm to local kindergarten practices.

The tradition of giving attention to the rhythm of life, season and nature in education goes back to the philosophical origin of early childhood (Froebel, 1895). The pedagogy of early childhood in relation to natural phenomena is characterised by collaborative exploration between teacher and children (Eikset & Ødegaard, 2020; Ødegaard, 2021).

Collaborative exploration practices can be verbal or silent, driven by the body and performative actions. *Collaborative exploration simultaneously takes children's imagination and play seriously while paving the ground for following up on children's curiosity and endurance in investigating and searching for scientific truths about the world in which they live* (Ødegaard, 2021, p. 14). A pedagogy of collaborative exploration acknowledges uncertainty and drives meaning-making and the continual activity, walking alongside children to search for answers or better solutions.

However, to understand how waterscapes ‘matter’ to young people and how staff in kindergartens respond to children’s sensational and explorative approach, we need to go closer to the everyday life practices in kindergarten. We will turn to the stories and notes from the staff in kindergarten.

Generating data

The pilot study had qualitative approach, inspired by ethnographic and participatory approach which was appropriate as we wanted to explore in depth how the necessity and presence of water was visible in the daily practice in two local sites in Norway. Beforehand all the participants got the invitation from the pilot study in four countries. (See appendix 1.) In both sites in Norway, Lærdal and Tromsø, we met up with the kindergartens to tailor the project to the local kindergarten. Informed consent from the parents of the children and the staff were collected (See appendix 2). We agreed to avoid personal identifying markers on photos, narratives and fieldnotes. The staff decided what to share with the researchers as data. At both sites the field notes and personal communications was collected for reflexivity purposes. The field notes and personal communication were included to deepen the understanding of children’s conceptualization of water and landscapes.

In Lærdal three researchers visited the village and the kindergarten in early august 2022 and later one researcher re-visited the kindergarten during the Storm Hans in august 2023 for going alongside with the children and the staff when visiting the river and for a reflective summing up sessions with the head of the kindergarten and two teachers. The researchers and the climate coordinator in Lærdal planned for the start of the project; co-creative workshop with the kindergarten to decide on what kind of data could be created by the staff. The staff wrote fieldnotes, took photos and wrote narratives of events and moments of collaborative exploration over a year (Ødegaard, 2021).

In Tromsø the children and staff were ethnographically observed in their natural settings, and the children’s drawings and the staff’s photos about water and landscape were collected for analyses.

Waterscapestories from the kindergartens



Figure 11. The children gazing at Stødna fossen over the autumn (a) and winter (b).

The kindergarten practitioners reported that by giving extra attention to water and children interacting with water over autumn 2022, spring 2023 and august 2023 (Lærdal) or October to December 2022 (Tromsø), they noticed that children responded with a great interest of water.

Water is like a magnet for them. It is difficult for children to let go of playing with water. It is interesting to see how unaffected most of them are by being wet. Most children end up getting wet from playing in and with water, even with boots and raincoats. But they hardly notice it because they are so into the water itself. Playing with water seems meditative for them. They pour and empty buckets of water, which they can keep on for hours. They dig rivers and ponds and make mud cakes and mud water. They roll, splash, wade, and throw (Excerpts from staff's field notes, Lærdal).

Their first notice on a general level from the outdoor playground, was that water as a tactile and mediative source for play, sensation, and exploration. In such water play, as noticed by the staff, children engaged with their senses.

By playing with water many of their senses, such as touch, , and sight were engaged. All of that splashing, pouring, and puddle jumping had the purpose of joy as well as that of experiencing and learning about themselves, how the water felt towards the skin, the variety of the sound, and the sight of water when engaging with it.

Following the kindergarten's stories of experience with water over the year opens the meaning of water to them and their reports, stories, and photos makes it clear to us as readers and researchers as the following stories show.

Watercape stories by the local Waterfall – Stødna fossen, Lærdal

Over the autumn and winter, they followed the waterfall extra closely, small groups approached the waterfall to have a closer look at it (fig. 11). Below are spontaneous comments, observations, and small practical stories from the children regarding the waterfall. They followed the waterfall as it shifted from being flow of falling water, to becoming a frozen waterfall. The staff wrote:

Along our northern valley, we have a beautiful waterfall, which is characteristic of lower Lærdal, where we live. Stødna fossen is the name, in the vernacular; "the tie", as it looks like a tie that coils from the mouth of the mountain and down into the valley. We can see this waterfall well from our kindergarten, and it is often the topic of conversation, as it changes a lot throughout the year and seasons. When it is extra-large, we can also hear it. (Descriptions of the waterscape in the Lærdal valley.

On one of our hiking days to Stødna fossen we were walking along the riverbank with the whole group of children. We first crossed the road and up the path that leads to the riverbank, when we got up and we got a good view of the river, one of the girls, 4 years old uttered: "Oh, look at the river!" the teacher responded: "Yes, look at the river" the girl: "It's big, huge" the teacher responded: Yes, it is really huge, do you know why is the river so big now?" The girls answered: "Because there is a lot of water" and the teacher followed up: "Yes, but why is there a lot of water in the river?" The girl had an answer: "Because it's raining! There will be water everywhere." (Excerpts from staff's notes, Lærdal).

Analysis: This story describes the route from the kindergarten to the location by the riverbank where they can have a good view over the river flow and the conversation brings up utterances triggered by the sight of the huge flowing river. The teacher's response to the child is one that is refereeing to knowledge of the processes of connections to the weather cycle, when the child's first answer is naïve; the river has a lot of water, the teacher follows up and end the story at the point when the child gives an answer related to the weather.

Waterscape stories from a lager pond/lake, Langvannet, Tromsø

The Sámi pedagogical leader (PL) and her assistant took nine children to Langvannet in late October. The temperature was below freezing so the lake and small stream nearby were partly frozen. Here are excerpts from the PLs notes.

"Do you think there is ice on the water?"; I asked. The children's attention was directed to the stream. The stream was open, but a thin layer of ice had formed on the water. The stream itself had not turned to ice, and we experienced it with all our senses (vision, sound, touch it with our hands). I asked: "But, why is that so?" The children did not know. I replied: "The water in

motion does not turn to ice, but the water lying still on Langvannet does freeze."

The conversation was then about the birds that used to be here (at Langvannet) and that they had migrated to the south for the winter. We talked about the icicles hanging on some blades of grass at the entrance to the water. The children were very attentive to the frozen water all the way while walking. They talked the entire trip about ice crystals that sparkled like. I talked about the Sámi mythological figure 'Buolašaddja' (the cold old man) that had been blowing cold air so that it became ice crystals. They seized the realness of things in the moment from what the children saw and sensed. "The snow crystals are not diamonds, but snow crystals", I said. There were wonderful formations of ice crystals which the children studied carefully. A child had snow crystals on his mittens, around which there was a nice conversation about the beauty of snow crystals. (PL's notes, Tromsø).

Analysis: This story is about exploring and sensing the nature of water below freezing temperature in nature. The PL/teacher is aware of nature and directs the children's attention to the frozen water in the stream and the ice crystals on the ground. She asked open-ended questions of why the water is frozen. However, she did not provide the scientific arguments at first, but introduced the Sámi mythological figure 'Buolašaddja' (the cold old man) to explain the role of cold temperature to form ice crystals. The mythical dimension was actively used in the Sámi kindergarten context (see further).



Figure 12. Ice crystals on the trip to Langvannet.

Mythical stories – fairy tales, imagination or enlivening of nature.

In both pilot kindergartens we find examples where the children connect waterscapes to mythical folklore of either Norwegian or Sámi culture.

The story of the troll in the waterfall, Lærdal

One morning early in autumn a 4-year-old girl starts the day by telling us about the waterfall Stødna-fossen, when she enters the kindergarten: “Today the Stødna-fossen was really big! I even heard him.” A boy of Three years sat memorizing and studying the waterfall at the same time: “There’s the waterfall up there”. Teacher: “yes, there is the waterfall, does it look any better today than the last time you looked at it?” Boy (wasn’t too concerned with that particular question): “In that waterfall there lives a troll”. The teacher: “Does a troll live there? Is it possible to live in a waterfall then? Won’t he get very wet then?” Boy: “The troll lives in the waterfall, the troll maybe lives behind the waterfall and then he just pours out the water”. (Excerpt from staff’s field notes)

This excerpt is written as a collaborative narrative. The story shows an example on how children think and resonate through imagination. There is a Norwegian folk fairytale, much used in kindergartens and families, about three billy goats that are setting out on a journey to find grass to eat, in order to come there, they need to cross a bridge over a river and a waterfall, below the bridge, there is a troll. This can also be reinforcement, stories told to the children, by family members, as part of local folk culture.

The story of ‘čahceravga’ (a water troll) in the lake, Tromsø

About a week after the trip to Langvannet, the PL, the field researcher and the children recalled the trip by looking at pictures with a projector on the wall.

They stopped at a foggy picture of Langvannet and there was a thin membrane of ice on the water. PL then talked about that one could not go on the ice without testing its safety. One could test the safety of the ice by hitting a stick hard on the ice and watch if the ice could hold the punch. I asked what more they could tell me about the picture. One of the children replied that ‘čahceravga’ lives in the lake.

All the children knew that there lived a mythical creature called ‘čahceravga’ (a lake/river troll) in the lake. He can be a little scary, so one must not go alone to the water. Because he may be there lurking. I asked the children what they knew about ‘čahceravga’. One of the children replied that he has sharp teeth and can eat you. Another child said: “There will be a splash when he gets out of the water”. Yet, another said: “There are also fish in the water”. The children had seen ‘čahceravga’ in a book in kindergarten. One child pointed out: “When he comes up [of the water], the ice is crushed”. One of the children then began to fantasize about another figure – “the snow thief”. It was obviously common to create imaginary stories when one was out in nature in Sami culture. There was also fog in the picture, and it may have created more mystery in the picture which inspired the children’s imagination in the moment. (researcher’s field note, Tromsø).

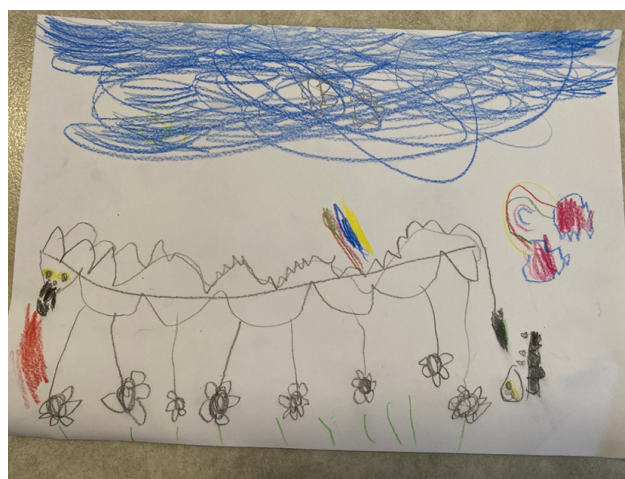


Figure 13. A drawing of ‘čahceravga’ by a girl of 4 years old. The blue is the water where he lives.



Figure 14. A drawing of ‘čahceravga’ by a boy of 4 years old. The black in the centre is his big pointy teeth.

Analysis: This excerpt shows that the children associate the lake with the water troll ‘čahceravga’ who “lurks there”. Stories of ‘čahceravga’ as a mythical figure aims to raise the children to not go or play by the water because it can be dangerous. This is a common mythical story in Sami culture along with many others (e.g., Stallu, Ulda, Gufihtar) which embodies the unseen part of nature. It has the aim of keeping the children out of danger in nature and of course acknowledge the spiritual part of nature. The children have heard about ‘čahceravga’ in a book and used their imagination to describe his features of sharp teeth and making a sound when getting out of the water. Two of the children also drew a picture of ‘čahceravga’ afterwards (fig. 13 and 14) showing his big teeth. The story confirms that mythical figures are still used in Sámi enculturation, and that the children have respect for these animated and unseen spirits of nature.

Educational Stories

Water as melted ice, Lærdal

One rainy day, we took a walk. Everyone was wearing raincoats; we passed a big puddle. The teacher commented on the puddle: This was a big mud pond. All the children stepped into the pond and the teacher asked the children: Where does the water in the pond come from? A quick response came from a boy, four years: From the waterfall. I extended this explanation: It comes from the clouds; it has rained from the clouds. Then the boy explains to me: But there is water coming from the waterfall too (Excerpts from staff report).

Analysis: This dialogue exchange shows how the teacher and child negotiate scientific knowledge on the question on where the water comes from; While the child presents the explanation of water coming from the waterfall, the teacher presents another idea; the water comes from the clouds. The boy explains his idea even further by presenting the argument that there is water in the waterfall too.

Furthermore, the kindergarten report that during winter-time, water is usually explored in its frozen form.

A bit later in the autumn, as we were outside in the playground a girl of 4 years came up to one of the teachers with a lump of ice in her hands. It had been freezing cold for some time now. The girls started to lick on the lump of ice, and she said: look at this lump of ice. The teacher answered: Yes, look at it, feel how cold it is. The girl responded: It makes my tongue cold; it feels good to lick it. The teacher turned to a new question: What happens when you lick it then? It gets wet, and then I can chew it

and eat it, the girl answered. Then the teacher continued: Yes, then it melts and turns into water in your mouth. The girl followed up: There’s the waterfall, there’s lots and lots of lots of ice on it, but I see some water also. The teacher confirmed her observation: Yes, lots of ice and a little water, it’s not completely frozen. (Excerpts from staff reports).

Analysis: In this excerpt we can see that the child explores the ice with a sensational approach; licking it and the teacher responded by confirming it; Yes, look at it, feel how cold it is. The girl put words into her sensational experience, and this is again confirmed and extended by the teacher. The teacher adds a scientific approach to what happens when she put ice in the mouth; it will melt and turn into water. In their landscape view they can see the waterfall. It might be the closeness to it, to have the waterfall in the local scenery and the experience of being close to the waterfall, that triggers her association with the waterfall.

The kindergarten reports that they also brought up the theme of water becoming ice in the circle time. They had experienced the frozen ground outside and the layers of ice covering the puddles. The teacher initiated the conversation about what happens to the water when it’s freezing outside. This is a conversation engaged the children in the group and the teacher writes down the conversation afterwards:

When I asked the question of what happened to the water when it was freezing outside, one of the children responded quickly: “it’s frozen into ice.” And another child followed: “It will snow when I crush the ice”. I followed up: “What can we make with water when it freezes? Several children had ideas to what we could make from ice: “ice house”. “Ice music”. “Playing with icecicles”. “Ice drum”. “Ice light”. I took the conversation further: “Do you think the clouds are filled with water that turns into snow? Or Snow that turns to water?” One child responded, “There is snow in the clouds that turns into water”. I then filled one bottle completely full of water, and one half full; «What can happen to the water now?”. One of the children answered, «I think it will snow” and another child answered, “I think it will turn into ice”. A third child responded: “I think the one with the most water in it turns into snow and the one with the least water in it turns into ice.” A fourth child had another explanation: “I think it will turn to stone”. I then added a new question: “Why do you think some will become snow and some will become ice?” The child responded: “Because the snow is cold and

made by rain". The children put one stone each into the bottle with less water in it and I asked: "What happened now?" The children studied the bottles and the level of water; "The water got higher." Another child added to the explanation; "There was more water because the water was heavier with stones in it." (Excerpts from staff's field notes).

Analysis: In this excerpt they report on a teacher led conversation during circle time. The angle the teacher leads the conversation is first natural science; what happens to water when the temperature drops. However, when the second child answers; "It will snow when I crush the ice", this is not followed up. What the child might refer to is that the material of ice, turns white, when being crushed and the visual resemblance to snow is obvious. However, the scientific concept conversation turns into a conversation of ice as a material for use. The teacher asks the children what one can make from ice and the children have many ideas, that might come from their previous experiences of outdoor play and activities. We can see from the children's answers that they bring aesthetic activities to the conversation, e.g., ice music and ice drums. The conversation turns back again to a scientific approach, when the teacher asks them about their beliefs on what clouds are in wintertime, whether they consist of water that turns into snow or snow that turns into

water. The teachers then had an activity with two bottles. The exchanges between the teachers and the children are, characterised by guesses of what will happen. This reported event might indicate that whether children actually learn weather concepts or whether they learn in a synthetic way and even misconceptions is an open interpretation (Malleus et al., 2017). The circle time seem to bring up naïve physics.

The next day the conversation came up again, when a child looked out the window and pointed: "Look, almost all the snow and ice is gone outside now." The teacher responded: "Yes, everything has melted". The child followed up: "But why has it melted when it's still winter outside?" Then the teacher explained: "Because it's not below zero outside. It doesn't always have to be below zero, even if it's wintertime". (Excerpts from staff reports)

Water stories with ice, Tromsø

The pedagogical leader (PL) and the field researcher (FR) gathered the children around a table and picked up a pair of milk containers from the outdoors that had been filled with water and frozen to ice containing natural elements (see fig.15 a-d.). The children made these a few days in advance, and they were put out in the cold for a few days to freeze solid.

Figure 15. Frozen out-doors decorations. A milk container filled with water and natural elements (a). Different examples of ice cubes for decoration (b-d).



The children touched the cubes of ice and said they were cold, wet and slippery- and very nice! They had collected natural elements from the surrounding area [spruce bar and cones] that were frozen into the water cubes as decoration outdoors. They were supposed to be used for the “dark -time ceremony” on the university campus close by.

The FR asked the children what ice is made of. A child replied: “Frozen ice is made of ice!” - “It’s cold”. The children spun the cube around the table because it was so slippery and slightly round at the edges. FR asked: “What if the ice melts, what does it consist of?”. The children answered in unison: “water!”. FR asked what water is called in the Sámi language. The children answered “čáhci”. They understood that FR could not Sámi so well. The children touched the ice and got wet on their hands and touched their own face. They realized that the ice melted against what was warm (their skin). FR asked: “Where did you retrieve the water to fill the milk containers?”. One of the children pointed to the tap/crane in the kindergarden.

They knew a rule about ‘čáhci’ (water) that had the purpose of teaching the children the Sámi word for water (which is difficult to pronounce). The rule was as follows:

I čáh čáh čáh. I čáh čáh čáh.
Á ci ci ci. Á ci ci ci.
Čáh čáh, ci ci. Čáh čáh, ci ci.
Čáhci, čáhci, čáhci, čáhci.
Čáhci, čáhci.

Another time when the children looked at pictures from the outdoor trip to the water basin (figure 10 previously), this conversation also explored where water comes from.

The FR asked the children why the water was frozen? Most of the children had not thought much about it, but through the conversation it was found that it was because it was cold outside. FR asked: “Where does the water come from?” A child replied: “the rain”. FR confirmed: “Yes from the rain”. We looked at several pictures that showed a stream with icicles. FR asked: “What do we see in the picture?” Everyone knew it was “icicles”. The water had frozen in the cold, it had become solid. PL said it was very beautiful when the water had frozen to ice and made ice crystals. It was like diamonds.

We wondered about water which was in the form of ice when it was cold outside, and it was moving and wet when it melted and was heated. FR asked the children: “where we can find water?” One of the children replied: “the sea”,

another said “the swimming pool” (svømmehallen). FR confirmed: “Yes, it was lots of water [in the sea and the swimming pool]”.

The projector showed a picture where the children were sledging on the snow (the frozen water). One of the children said that one can slip (ake) on the snow and that you can slide on skates in the ice hall. So, the snow had properties that made it smooth and that you can slip/slide on it.

A water story by the breakfast table, Lærdal

One morning by the breakfast table, one of the children studied the water bottle. The overnight stay in the car, had resulted in turning the water into ice. The child turns the bottle upside down and shakes, but the ice lump will not let go. The child asked the teacher to fill the bottle with more water and when the teacher came back with the bottle filled with water, the bottle contained the ice lump and some water on top. The child then cried out with satisfaction: Ha, ha, now I have both ice and water (excerpts from staff notes).

Analysis: In this everyday story the child discovers the phenomenon of water and ice. A bottle left in car on a winter night, engages the child who want to drink the water when eating breakfast. The child discovered that one cannot drink frozen ice. The child is satisfied when the teacher adds some water to the bottle.

Water stories from the bathroom by the sink

Washing hands in Lærdal

One day when, it was almost lunchtime, and a group of children of five-year-olds, went to the bathroom to wash their hands before eating. There are small double sinks there, so two and two can wash their hands at the same time. The water was pouring out of the tap, and it was fascinating to watch how the water kept finding its way down the drain. So, I asked: Where does the water travel when leaving the sink? And then a girl of four years old explained; It travels down into a pool under the floor. I asked her about what could happen if we took away the floor. She answered: Then I can take a bath. Then one of the children wondered: “Why does the water turn white and foamy?” “It might be the soap”, was my answer and the boy replied, “yes, or maybe because it is clean water?” I continued to bring up the question of where the water goes when it pours down the drain.

One child had an answer to this question: “On the ground”, and another child said, “In the pipe, below the sink”, and yet another child said, “In the wall”.

Analysis: These short exchanges of questions and answers, while washing hands in the bathroom, can make us understand the children’s understanding of the water system, while standing in the bathroom, and washing hands it seems that children take a direct and from their perspective a logical and concrete response; on the children’s initiative question comes up about the white colour of the water and the foaming of the soap and as a response on the teachers question on where the water travels when leaving the sink, the children, the children answer from their knowledge as far they can imagine; In the wall, in a pipe, on the ground, under the floor (excerpts from staff notes).

Washing hands in Tromsø

This is a conversation about water from the tap.

FR then asked, “What else do you use tap water for?”. PL then looked at the children and asked if FR could figure out what the children had eaten for breakfast that day? FR studied the faces of the children carefully and saw that several of them had some white spots of something that had dried around their mouths. FR: “Oh you have eaten yogurt!”. The children replied in unison: “Yes!”. PL then said they had to go and wash their mouths to remove the remnants of yogurt (fig. 16).



Figure 16. The sink in the bathroom was levelled so that the children could wash their hands by themselves (a). The children used wet paper towels to clean the yoghurt mark off their face (b).

To reach the sink, the smallest children had to use a small stool (krakk) (Fig. 17). They used a wet paper towel to wash their faces. PL filled in that sometimes they just took water on their hands and washed around their mouths, something that the PL taught them how to do. The children did most of the washing by themselves. PL was a little frustrated that the children could not use their own cloths and towels in the kindergarten. It contradicted the PL’s Sámi values to use disposable paper towels to wash and dry the hands. But this was obliged by regulations from the Norwegian Food Safety Authority on hygiene.



Figure 17. The smallest children used a small stool to reach the sink to wash their hands.

PL said that when they all were outdoors, they did not wash their hands that much. The children learned that they could wipe their fingers in the grass, wash themselves in the creek or in the wintertime they could eat their food with the mittens on. Usually outdoors, the children did not need to wash off dried food debris from their mouths until they were back from the trip in the kindergarten. Indoors in the kindergarten, the children washed their hands before eating, but not outdoors.

Outdoor waterplay stories

Stories of playing with water, sand and mud, Lærdal

There was a lot of activities outside on the playground when it rained, and the children loved to make mud. They mixed sand with water and stirred (fig. 18). They searched for the soil with the best qualities for mixing in the water, this makes the best, finest and softest mud. The children decorated the buckets filled with this fine mud with grass, flowers and other little treasures they could find, and pretended they were making soup, porridge, cakes, ice cream or coffee.

One day two girls (5) are sitting by the mud pond, each scooping water into a bucket with a shovel. They then move to the sandpit. There they store water in the water bucket. A girl of five years olds said: "Look now!! There will be more water when I put sand in the bucket." The teacher engages in the conversation: "yes, look there. Why do you think it will be like that?". The girl answered, "Does the sand turn to water? «The teacher explained: "No, but when you have sand in it, it takes up space in the bucket, and makes less room for the water. And since the sand is the heavier, it's on the bottom of the bucket so we can't see it. Then it can look as if there is more water, but actually it is because there is sand in it which causes the water to rise." The girl poured the water out, so only the sand was left. We found a new bucket and poured the water into it. "See how high the water is without the sand, before I emptied the water into the bucket with sand and see how high the water is afterwards".

Figure 18. Playing with sand, mud and water.



Analysis: This story, from the playground sandpit area on a rainy autumn day, with access to a lot of water, encourages the play exploration with sand and water. The child discovered a relation between the water and sand; the water level rises, when pouring sand into the water, and invites the teacher into the conversation on the discovery. The teacher first responded but asking the child a new question of why this happened. When the child responded with a naïve understanding; the sand turns into water, the teacher explains the Archimedes law of physics to the child. This seems to encourage the child to explore more and tries again and is excited by her discovery that the level of water rises when sand is poured into the bucket. We can categorise this story as collaborative exploration as it engaged both the child and the teacher, and the experience and understanding were expanded due to the collaboration.



Figure 19. The photos document a play exploration when the children experiment with pouring water into buckets for constructing a river in the sandpit.

Stories of playing outdoors with ice and snow, Tromsø

It was a lovely day in the dark period of the Arctic winter at 11am. It was clear, a little cloudy and the temperature was about -2 degrees Celsius. The kindergarten's outdoor area is shown in fig.20 and consists of a range of play equipment and a lavvo (traditional Sámi tent/dwelling). The children were well dressed in winter suits, headwear, mittens, scarfs and winter shoes.



Figure 20. The outdoor area within the kindergarten fence of the Sámi kindergarten unit.

A 4-year-old girl wanted to hang with the FR. I asked: "What do you like to do outdoors in kindergarten?" She then took me to the fence at the lower point of the kindergarten's outdoor area where there was quite a lot of stones and withered leaves on the ground, and the terrain was relatively rough as it went down a slope (fig. 21a). We discovered that the stones on the ground were stuck/fastened in the ground. I asked if she knew why they were stuck. She did not answer but found a small stick which she used to strike the stones with (see fig. 21b). She could then loosen the stones with the stick. We walked around the area and dislodged many rocks that were frozen solid.



The stones came loose after a bit of pounding. I asked her again why the stones were stuck, and we concluded that they had frozen solid when the water turned to ice. When the water froze, it became like a glue between the ground and the rocks. We talked a bit about this, that water became like glue and attached things to the ground and other places.

The girl also found a toy bowl with ice inside. Again, she used her stick to loosen the ice from the bowl. She had to hit the bowl for a long time before the ice inside loosened (fig. 22). There were also some rocks frozen inside the ice.



Figure 22. The bowl of ice with stones in it and the stick to hit loose the ice.

Figure 21. The frozen ground of rocks and leaves (a). The rock was loosened from the frozen ground by hitting it with a small stick (b).



Another girl of around 3 years old also came by and she thought it was fun to walk a little up a slope and then fall on her stomach and slide down. This behaviour was obviously fun, because she did this several times (fig. 23a). Another child came and showed me snow crystals on a small spoon (fig. 23b). They were so beautiful and had such an interesting shape.

Figure 23. A 3 year old girl played on a slippery slope made out of the frost on the ground (a) and another child showed me snow crystals in a spoon (b).



A 3-year-old girl was eagerly busy shoveling snow from a bucket with a toy shovel (fig. 24). The children played with various elements that they found lying around in the outdoor space - both with and without ice crystals (fig. 25).

Figure 24. Shoveling snow in a bucket.



Figure 25. Children playing outdoors with the frozen elements.

Analysis: The children has already played a lot with the elements of snow and ice, and they seemed to know how it could be used for sloping and to shuffle it into buckets, shuffles and spoons. The girl who explored the glue-like feature of frozen water, also seemed to know what to do to loosen the stones and ice with a stick. The FR did not need to show any of the children the opportunities for play and problem-solving. They seemed to be trained to handle the frozen elements and explore and play on their own . Many of the children played and shuffled things by themselves, and they seemed to enjoy it.

Stories of the watercycle

Visiting the local waterworks in Lærdal

In Lærdal, they recently have constructed new waterworks that supplies all households in the lower part of Lærdal with water. In the new waterworks, they pump up groundwater and clean it before it reaches households. Previously, they had water supplies from a place by the river, which took in water from the river. This was a very unpredictable solution, especially in winter when the water in the river will freeze, and in summer when the river flow is poorer. The kindergarten arranged an excursion to the water works and they were welcomed with a tour of the water works.

We were given a briefing and someone responsible for the waterworks informed us of the water cycle before we started the tour. One of the boys of five years old came with a straightforward utterance; "I already know this". Despite the knowledge of the one child, it was difficult for the children to follow the guided tour; probably because the language that was conveyed was too advanced for most 3-6-year-olds. Anyway, what really engaged the children on the tour was when he opened the hatch to a tank, a pool of water, and the children got to see the water that was pumped up and was to be used as drinking water. One of the boys realized the connections between the water in the pool and the water coming from the sink; "Oh this is the water from the pool!" When we returned to the kindergarten, the children showed renewed interest in the drinking water from the sink and new conversations about the water to drink, came up. (Excerpts from staff notes)

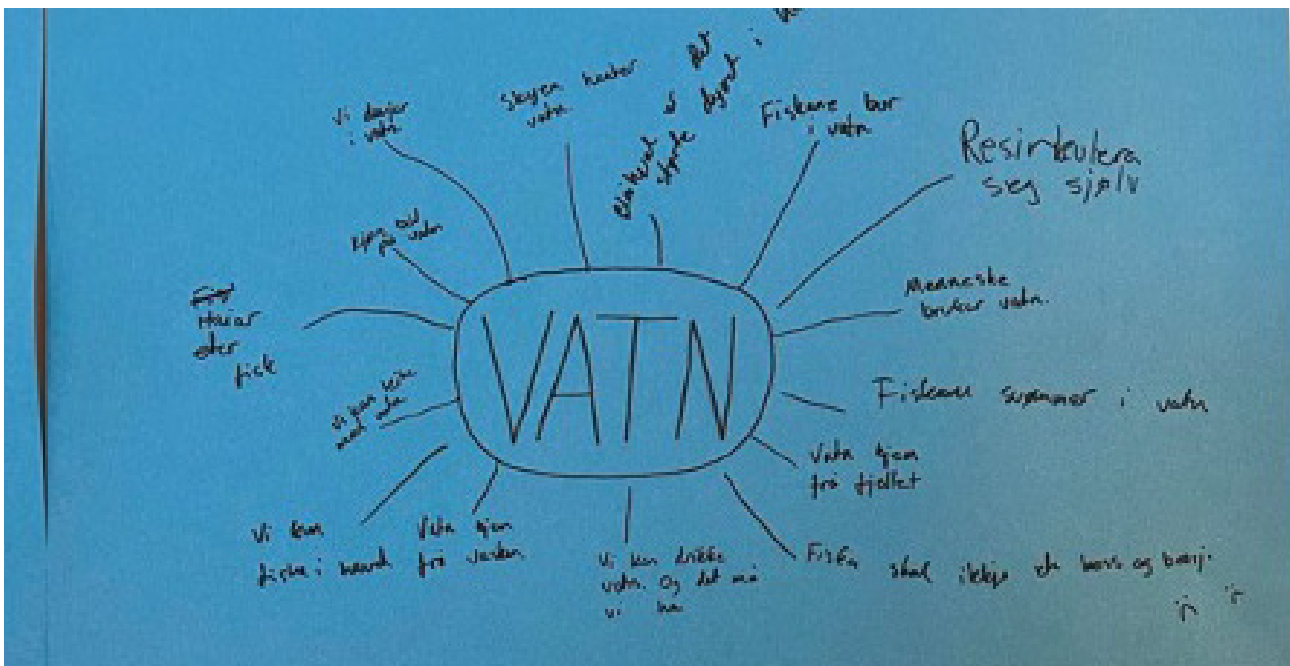


Figure 26. A trip to the local waterworks in Lærdal.

Analysis: The photos document the event when the kindergarten visited the waterworks and were told about water cycles. The children showed great interest when they could look down in the water pool and explained that this water pool is pumped up before being sent to the local households and the water that comes out the water taps.

Before and after this visit, the teachers invited the children to association sessions about water and to art works connected to their everyday experiences with weather landscapes and water cycles as illustrated on the photos below.

Figure 27. The first poster shows a mind map of children's association to water. The second poster illustrates the water cycle.





The children's responses to the question on what they think of when they hear the word water, were:

- The sky catches water
- Blue whales are the largest animal in the sea
- The fishes swim in the sea
- Water comes from the mountains
- We can go fishing in the sea
- We can play with water
- Sharks eats fish
- We can go by boat on the sea
- We can shower with water



Figure 28. Window paintings of water in the Lærdal kindergarten.



Figure 29. Life under water – window paintings

Visiting the Norwegian Wild Salmon Center in Lærdal

The Norwegian Wild Salmon Centre is located along the Lærdalselvi river (fig.30). The center provides insight into the life cycle of the Atlantic salmon. The kindergarten visited the center in the spring of 2023 and the children had a guided tour around the center and watched wild salmon from Lærdalselvi - the Laerdal River. As Lærdalselvi is one of the most renowned and exclusive salmon rivers in Europe, the knowledge, and the history of the fishing of wild salmon, is part of national and local culture and local pride and identity. The Norwegian King, King Harald, used to fish here from childhood and had recently visited the lærdal village again on the occasion of the renovation of the center. The guided tour with an engaged staff member of the center, Åge Flakk, was inspiring to the children. They were informed of the life of the wild salmon and stories of the culture. These stories might also be a collective memory of many of the families. This excursion boosted the formation of a local identity connected to the waterscape of Lærdal.



Figure 30. The Wild Salmon sculpture at the Norwegian Wild Salmon Center.

Figure 33. The children are playing at the beach with buckets.



Everyday events of playing with water.

The next photos document some of the other play activities with water in the Lærdal kindergarten (figs. 31-33).



Figure 31. Playing with water bobbles.

One day we initiated an activity for children to explore and play with bubbles (fig. 31). We put blue colour and soap in a big container and used straws into blow air in the water. They fooled around, enjoying the activity. Child 5: "Why are there bubbles?" The teacher: "We blow air into the water so that air comes under the soap and bubbles come up. The children went on and on with this activity.



Figure 32. The children are playing at the beach with buckets.

One day, we brought our buckets and shuffles to the seashore to sense and play with salt sea, sand and stones (fig. 32).

One day, we filled the bathroom with water in a home-made container as a pool and let the children sense and play with the water (fig. 33).

Summing up – a focus group conversation with the staff

The conversation with the staff at the end of the pilot project had two main questions; what were the success criteria for the project, and what were the learning points for further developing the water project?

The project reminded the staff of how water is essential and ever omnipotent in life. Some of the staff were very much engaged in the topic and the project, while others did not pay much attention to the water with the children. Their experience was that the engagement was personal, and the project's success relied on the staff that were committed to the project. It seemed like the open and fearless staff members were the ones that were committed. They planned for activities, took photos and wrote narratives. The topic and conversations about water came easily for the engaged staff; probably because there were so many interesting conversations with the children about water. One said, "but I did not bring my notebook all the time, I should have, but I didn't, so I 'lost' some of the narratives".

The most important learning point from the perspectives of the staff was the uncertainty the open process brought about. The project had open and easy-going frames, like the topic of water and water landscapes, clear aims and questions, nevertheless the staff wished for a clearer instruction on what to do.

From the perspective of the researchers, the pilot project needed to be open, in order to be sensible to the local culture, daily routines in the kindergartens and the surrounding waterscapes. For such an explorative pilot study we were interested in their engagement in water related activities with the children, in how it played out from their perspective. Since we collaborate with four countries the open-ended design was intended, to respect local differences. Nevertheless, we will need to manoeuvre wishes from the staff of an even clearer instruction for the further implementation of the project.

Conclusion and the way forward

Returning to our inquiry about children's meaning-making with water and what kind of events, topics and narratives that occurred during the year with the pilot project. We have analysed the data thematically following a qualitative thematic narrative analysis and ended up with the following four themes: place, time, activity and pedagogy. In the following we will reflect upon our main conclusions.

Place: We saw that both kindergartens gave rich time and space for noticing, sensing, experiencing, exploring and experimenting with water and especially with the waterscape as landscapes and weather-landscapes. Throughout the year their spend time both inside and outside of kindergarten as well as doing excursions.

Time: Both kindergartens were noticing the changing seasons and processes, especially processes of physics, like melting and freezing of water.

Activity: Both kindergartens paid attention to varied forms of water activities. In Tromsø they were situated by the sea and used the natural landscape as an everyday activity and went on excursions to nearby areas. In Lærdal they arranged several excursions, to Stødnafossen, the Lærdalselvi, to the water work as well as to the Norwegian Wild Salmon Center.

Pedagogy: The pilot study showed that the children had various experiences with water during a year in kindergarten. Both in the fjordlandscape of Lærdal and the coastal area of Tromsø, the children were exposed to the local weather landscapes and seasonal changes as part of their everyday experience. The kindergarten staff followed the seasonal and temperature changes and had a variety of activities available for children, both indoors and outdoors. The waterscapes and the weather events offered conditions for the children's play explorations. The staff reports consisted of events and narratives from conversations they had with children, when engaged in a water related activity. The staff also introduced the children to the waterscapes and water technology, e.g., when visiting the waterwork. Both kindergartens worked with a responsive teacher's style; They expanded and deepened the children's meaning-making and expressions through indoor activities, like concept formation on the concept of water and arts expressions like drawings and window paintings.

In Tromsø most of the field work was conducted during the winter seasons and the staff and children worked a lot with exploring physical laws like melting and freezing, sensing the effect of freezing temperatures outdoors including ice-crystals, mythical beings connected to waterscapes and other issues connected to water.

Both kindergartens reported stories of conversation with the children that were based on both the staffs and the children's initiatives. The style of the pedagogy seemed to be that of facilitating for children's play and exploration with water, and that of expanding the children's understanding of physics and how water is cycled in nature.

In Lærdal, the staff actively reported short narratives. The exchanges between the teachers and the children had on many occasions the potential to be further extended, but the narratives reported was rather short. The teachers asked open-ended questions, but anyway directed towards children's beliefs about the scientific knowledge of water. The children showed naïve understandings of water and water conditions and the potential for an extended and deepened conversation about waterscapes, water cycles, and water properties and characteristics. But by taking an overall look at the richness of the activities afforded to the children, one can expect that children could use their senses and that expressions and experience also came through participating in experiments, storytelling, excursion and artwork. What happened with children's meaning-making both in Lærdal and in Tromsø could be called emergent water and waterscape literacy as they were exposed to the local landscapes of water and the properties of water in e.g., changing temperature conditions. The staff facilitated and staged a rich sensational and emergent conceptual understanding of the properties of water.

What was not explored in the material in this pilot study was the global conditions for water and work with the water cycle and its impact on the ecological circle beyond their local community.

The impact of the study is manifold: Firstly, a 'glocal' model of the teacher can be a thinking tool in the process of increasing awareness of global shared concerns and at the same time understanding the impact of local traditions. The concept allows the teacher to expand the children's experiences of the local waterscapes and with an anchoring of the local sensation and knowledge, the water cycles importance for ecological cycles can be understood more easily.

Secondly, the finding that the children have naïve understandings of water as a nature phenomenon, physics and waterscapes, is not a surprise. However, research shows that children can expand their understanding under conditions of varied experiences, a responsive education and an education that build upon the collaborative exploration (Myrstad, et. al. 2017, Pirbhai-Illich, et al. 2017; Ødegaard, 2021). Therefore, this study has impact on a further development of quality education. Emergent water and ocean literacy could be a concept to consider for future work (Mckinley, et al. 2023; Ødegaard & Birkeland, manuscript)

Thirdly the study has impact on the local institutions where communication to local citizen is one of their tasks. We know that local institution communication is most often tailored for communication with citizen in school age and beyond. The knowledge of children's development, how they create meaning and how they move, play and explore, are knowledge expertise of early years, belonging to kindergarten teachers and early childhood educational researchers. This study can therefore foreground interdisciplinary collaboration on communication to, for and with children.

At last, but not at least, this study foregrounds the comparative study with three other countries located very far from each other, on how water is sensed, experiences, how children from other local settings relates to waterscapes and how the pedagogical styles are expressed.

Way forward

This “Wash from the start” pilot for OMEP lays the groundwork for a larger ‘glocal’ project exploring the theme of waterscapes in ECEC. The pilot study has informed, explored, and developed experiences that need to be discussed and rethought with respect to its impact and pedagogical potential for bringing the awareness of access and knowledge about water to the youngest children. The way forward for a larger international study must be negotiated in the international team.

Children’s waterscapes vary across the globe. In this report we explored an analytic design of waterscapes from a Norwegian context. The waterscape is, according to Karpouzoglou & Vij (2017), a perspective that has captured the attention of diverse scholars interested in the interaction of water and society. This includes the way water travels in time and space and how our understandings and experience with water is shaped by culture and geography. In this report we pay particular attention to the study of how early childhood education affords children’s experience and knowledge of water in a close up on two sites in Norway. Scholars following the tradition of waterscapes have placed strong emphasis on understanding the role of power and the contested nature of water in diverse geographies with aims of contributions within political ecology.

We believe that this perspective also could be helpful for a larger study involving more countries and more sites in a larger variety of geographies and cultures. By creating ethnographic data including stories, myths and narratives from children and teachers as well as geographical and societal data we can compare children’s access to water as an issue of children’s rights in addition to describe local cultures and pedagogical practices.

A wider study could also use the perspective of water or waterscape literacy or bring our project in dialogue with ocean literacy. The perspective of new conceptualizations of Ocean literacies would be open for ocean knowledge as inclusive of multiple knowledge types, including local and Indigenous knowledge, as well as knowledge of how to engage in ocean issues (McKinley, et al. 2023). This perspective is relevant for educational purposes.

Acknowledgement:

The project could not have been carried through without the children, families and staff in the contributing kindergartens in Tromsø and Lærdal. We extend a huge thank-you for welcoming the researchers and for participating with valuable documentation for the project. We also give a thanks to the Climate coordinator Inger Oddrun Sverkmo, who facilitated the collaboration in Lærdal. We also would like to thank KINDknow research center (NFR – project number 275575), Western Norway University of Applied sciences and UiT- The Arctic university who financed the fieldwork.

It is rewarding to have the opportunity to collaborate internationally; thank you for your engagement and collaboration; Jayne E. White, Nemes Danstan and Udomluck Kulapichitr. We will also thank Arjen Wals, Unseco Professor for Sustainability for rewarding dialogues. We would also like to express appreciation to Lisbeth T. Larsen at the Mediacenter for the layout for printing. At last, we would give a thank to OMEP for the collaboration.

Ethical declarations

Data contained in this article were approved by the ombudsman for ethics at Western Norway University, first on 12.05.2021, Number 530501, and again after extension, on 21.12.2022, Number 655592. The research study title for ethical approval was Exploration and cultural formation.

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Appendix 1 - Consent declaration

Consent declaration for families on the behalf of their children:

Informasjon og samtykkeskjema

*Er du interessert i å delta i et verdensomspennende OMEP-prosjekt WASH FROM THE START?
«Vask fra starten: Lokale forhold for barns tilgang til vann»?*

Dette er en forespørsel om deltakelse i et verdensomspennende OMEP-prosjekt hvor hovedformålet er å samle informasjon om små barns meningsskaping, voksnes og barn felles utforskning, deres tanker, kommentarer og kreative uttrykk. Tanken bak prosjektet er å introdusere og invitere barn og barnehageansatte til å utforske de lokale forholdene for vann, for å forstå mer om betydningen av vann, de lokale vilkårene for vask og drikking og å uttrykke hva det å finne kildene, sanse vannet som er tilgjengelig for dem betyr for dem og lokalmiljøet. Vi er interessert i å finne ut mer og hvilken utforskning som kan finne sted, hvilket innhold som kan utvikles, i et barnehagebasert prosjekt om vann og vannressurser.

Hvem er ansvarlig for forskningsprosjektet? OMEP World er ansvarlig for prosjektet. BARNkunne – senter for barnehageforskning ved Høgskolen på Vestlandet leder og koordinerer prosjektet. Senteret spesialiserte seg på å utvikle pedagogisk kunnskap for og med barnehager. Mål om mer bærekraftige praksiser er overordnede mål for forskningen. På nasjonalt nivå er våre partnere:

- I. Jayne White fra University of Canterbury, New Zealand,
- II. Udomluck Kulapichitr fra Navamindradhiraj University, Thailand
- III. Nemes Danistan fra University of Dar es Salaam, Tanzania.

Hvorfor blir du bedt om å delta?

Data vil bli samlet inn ved hjelp av barnetegninger som vil bli utført i barnehagens lokaler eller andre relevante naturlige pedagogiske miljøer der personalet finner det tjenlig. Barn vil bli observert i sine naturlige omgivelser, og deres tegninger og bilder (ikke foto av barna, bare av landskapene) om vann og landskap. Feltnotater og personlige kommunikasjoner vil bli samlet inn og analysert.

Hva innebærer deltakelse for deg?

Å la barn delta på aktiviteter organisert av barnehagen og dele sine fortellinger, tegninger og bilder og/eller videoer eller annen relevant informasjon som vil bli tatt av prosjektlederen. Men videoer og bilder vil ikke inkludere barnas ansikter, men vil heller sette søkelys på deres aktiviteter relatert til deres forståelse og bruk av vann. Bakgrunnsinformasjon (ikke personopplysninger) om etnisitet og minoriteter vil bli samlet inn for å kunne informere om hvilke barn som har vært involvert fordi vi tilstreber at ulike grupper av barn og kulturer over hele verden skal være representert).

Det er frivillig å delta

Det er frivillig å delta i prosjektet. Hvis du velger å delta, kan du når som helst trekke tilbake samtykket ditt uten å oppgi grunn. Det vil ikke få negative konsekvenser for deg hvis du velger å ikke delta eller senere bestemmer deg for å trekke deg.

Ditt personvern – hvordan vi vil lagre og bruke dine personopplysninger

Barnetegninger kan være personidentifiserbare, spesielt når vi lokaliserer og interessert i lokale praksiser. Vi vil kun bruke barnets personopplysninger (barnetegningene) til formålet som er spesifisert i dette informasjonsbrevet. All informasjon om barnet ditt blir anonymisert. Navn skal ikke skrives på barnetegninger som deles til forskning. Vi vil behandle de innsamlede personopplysningene konfidensielt og i samsvar med databeskyttelseslovgivningen i vårt land. Vi vil behandle barnets personopplysninger basert på ditt samtykke. Kun HVL-forskere og spesifikke medlemmer av OMEPs nasjonale komité som skal samle inn data relatert til barnet (i samme land) vil ha tilgang til innsamlede data (barnetegninger og feltnotater av utforskende samtaler mellom voksne og barn og barn – barn).

Hva vil skje med dine personopplysninger på slutten av forskningsprosjektet?

Prosjektet er planlagt avsluttet 30. september 2025. Dine personlige opplysninger vil bli slettet innen da.

Dine rettigheter

Så lenge du kan identifiseres i de innsamlede dataene, har du rett til:

- få tilgang til personopplysningene som behandles om barnet ditt,
- be om at barnets personopplysninger slettes
- be om at uriktige personopplysninger om ditt barn blir rettet/rettet
- motta en kopi av barnets personopplysninger (for eksempel barnetegninger) (dataportabilitet), og - sende en klage til personvernombudet eller Datatilsynet angående behandlingen av dine personopplysninger

Hva gir oss rett til å behandle dine personopplysninger?

Vi vil behandle barnets personopplysninger basert på ditt samtykke. NSD – Norsk senter for forskningsdata AS har på bakgrunn av avtale med Høgskulen på Vestlandet vurdert at behandlingen av personopplysninger i dette prosjektet er i samsvar med personvernlovgivningen.

Hvor kan jeg finne ut mer?

Har du spørsmål om prosjektet, eller ønsker å utøve dine rettigheter, ta kontakt med:

- Barnehagekunnskapssenter for systemisk forskning på mangfold og bærekraftig fremtid ved Høgskolen på Vestlandet, via prosjektleder:
Laurent Gabriel Ndijuye, epost: lgnd@hvl.no eller telefon: +4740591681.
- Vårt personvernombud:
Trine Anikken Larsen på e-post (trine.anikken.larsen@hvl.no) eller på telefon: +47 55 58 76 82
- NSD – Norsk senter for forskningsdata AS,
på epost: (personverntjenester@nsd.no) eller på telefon: +47 53 21 15 00.

Med vennlig hilsen

BARNkunne- Senter for barnehageforskning, Høgskulen på Vestlandet.

Du kan lese mer om Forskningscenteret her:

BARNkunne – Senter for barnehageforskning - Høgskulen på Vestlandet (hvl.no)

English version:

Information and consent form

*Are you interested in taking part in worldwide OMEP project
“Wash from the start: Local conditions for children’s access to water”*

This is an inquiry about participation in a worldwide OMEP project where the main purpose is to collect information about young children’s meaning-making, their thoughts, comments, and creative expressions. The idea behind the project is to introduce and invite children and professionals to explore the conditions for their water supplies for washing and for drinking and to express what finding the sources, sensing the water that is available for them, means for them.

Who is responsible for the research project?

OMEP World is responsible for the project. KINDknow - Kindergarten Knowledge Centre for Systemic Research on Diversity and Sustainable Futures of Western Norway University of Applied Sciences is leading and coordinating the project. At the national level, our partners are:

- i. Jayne White from University of Canterbury, New Zealand,
- ii. Udomluck Kulapichitr from Navamindradhiraj University, Thailand
- iii. Nemes Danistan from the University of Dar es Salaam, Tanzania

Why are you being asked to participate?

Data will be collected using children’s drawings which will be conducted at school premises or any other relevant natural learning environments where teachers will happen to be facilitating early childhood lessons. Children will be ethnographically observed in their natural settings, and their drawings and photos (without children) about water and landscape, field notes and personal communications will be collected and analysed.

What does participation involve for you?

To allow children to attend activities organized by the kindergarten and share their narratives, drawings, and photos and/or videos or any other relevant information which will be taken by project enumerator. However, videos and photos will not include children’s faces, rather will focus on their activities related to their understanding and use of water. And information about ethnic backgrounds – children of ethnic minorities will be collected.

Participation is voluntary

Participation in the project is voluntary. If you chose to participate, you can withdraw your consent at any time without giving a reason. There will be no negative consequences for you if you chose not to participate or later decide to withdraw.

Your personal privacy – how we will store and use your personal data

We will only use your child's personal data for the purpose(s) specified in this information letter. All information about your child will then be made anonymous. We will process the collected personal data confidentially and in accordance with data protection legislation of our country. We will process your child's personal data based on your consent. Only HVL researchers and specific members of the OMEP national executive committee that will collect data related to the child (in the same country) will have access to collected data.

What will happen to your personal data at the end of the research project?

The project is scheduled to end 30 September 2025. Your personal information will be deleted by then

Your rights

So long as you can be identified in the collected data, you have the right to:

- access the personal data that is being processed about your child,
- request that your child's personal data is deleted
- request that incorrect personal data about your child is corrected/rectified
- receive a copy of your child's personal data (data portability), and
- send a complaint to the Data Protection Officer or The Norwegian Data Protection Authority regarding the processing of your personal data

What gives us the right to process your personal data?

We will process your child's personal data based on your consent.

Based on an agreement with [insert name of institution responsible for the project], NSD – The Norwegian Centre for Research Data AS has assessed that the processing of personal data in this project is in accordance with data protection legislation.

Where can I find out more?

If you have questions about the project, or want to exercise your rights, contact:

- Kindergarten Knowledge Centre for Systemic Research on Diversity and Sustainable Futures of Western Norway University of Applied Sciences, via project leader:
Laurent Gabriel Ndijuye, email: lgnd@hvl.no or telephone: +4740591681.
- Our Data Protection Officer:
Trine Anikken Larsen by email (trine.anikken.larsen@hvl.no) or by telephone: +47 55 58 76 82
- NSD – The Norwegian Centre for Research Data AS, by email: (personverntjenester@nsd.no) or by telephone: +47 53 21 15 00.

Yours sincerely,
The project team

KINDknow – Kindergarten Knowledge Center

Samtykkeskjema

Jeg har mottatt og forstått informasjon om prosjektet
«Vask fra starten: Lokale forhold for barns tilgang til vann»
og har fått mulighet til å stille spørsmål. Jeg gir samtykke til mitt barn:

- delta i aktivitetene barnehagen arrangerer
- dele materialet han/hun har produsert i forhold til prosjektet

Jeg gir samtykke til at mitt barns personopplysninger knyttet til barnet mitt
kan behandles frem til sluttdatoen for prosjektet 30. september 2025.

(Signert av deltakerens foresatte, dato)

Navn på barnet det er gitt samtykke til

English version:

Consent form

I have received and understood information about the project Wash from the start: Local conditions for children's
access to water and have been given the opportunity to ask questions. I give consent for my child / children:

- to participate in the activities organized by the kindergarten
- to share the materials s/he produced in relation to the project

I give consent for my child's / children's personal data related to my child
to be processed until the end date of the project 30th September 2025

(Signed by the guardian of the participant, date)

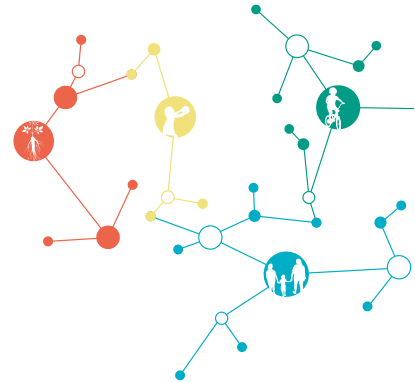
Name of the child for whom consent is granted

Appendix 2 - The Invitation Letter



Western Norway
University of
Applied Sciences

KINDknow - Kindergarten Knowledge
and Research Centre



Wash from the start- Local conditions for children's access to water

By KINDknow/HVL and OMEP World

Water as a global resource has been used for various tasks ranging from domestic to industrial uses (Butler, 2017). Access to improved water and sanitation are fundamental human rights and basic to children's health and development (UNESCO, 2020). As an abundant global resources, it covers over 1400 million square kilometres even though only 0.001 percent of water is readily available for human consumptions (Bates et al., 2008; Butler, 2017). Further, there is a huge geographical variation in access to consumable water across continents, regions, countries and even within countries (Butler, 2017). While water is non-substitutable for human life, yet it is more than often taken for granted and poorly valued. Ensuring global access to safe and clean water for drinking and sanitation is one of the challenges facing mankind today (UNESCO, 2020).

With the current globalization efforts comes with such challenges as rapid urbanizations, environmental degradation, climate change and loss of biodiversity. In particular, children are exposed to the highest risks among other for they are the most affected group because they live longer and are relatively susceptible to climatic changes. This calls for ECEC stakeholders to make paradigmic shift to a more sustainable and ecological world views and frameworks in which children co-create and shape alternative futures. This project aims to raise awareness to cherish and protect water landscapes and water sources, broaden understanding of water as a concept and vital resource for children and their families across contexts, nations, and cultures. The project is connected to the existing Word OMEP's Wash from the start project. With this new initiative we invite OMEP members all over the world to organise a collaborative exploration with children aged 4 to 8 years. Specifically, introduce and invite children and professionals to explore the conditions for their water supplies for washing and for drinking and to express what finding the sources, sensing the water that is available for them, and what it means for them.

Methods and materials

This project will include (N) countries from six continents: Europe, Asia, Australia, North America, South America, and Africa. Specific OMEP national teams will be invited to participate in the project. a) From each participating country, the OMEP national executive committee will appoint one person to oversee the activities of the project in their respective country; b) For countries with minority and disadvantaged groups, we encourage their participation

whenever socio-contextual circumstances allow, c) Explore how water is conceptualized and presented in the existing documents related to early childhood education; Select (N) kindergartens (early years settings) which will be involved in the project based on pre-set criteria.

The OMEP national executive committee accepting the invitation means:

1. In each participating country there will be a person termed as 'National Project Coordinator' who so far should be national president of OMEP or the person the national president delegate.
2. The National Project Coordinator shall, with support from the national OMEP Committee, plan how to spread information about the project to OMEP members and invite participants.
3. The National Project Coordinator need to check and apply for ethical approval for children's involvement and participation in the project. We attach information letter and consent form for parents and children which the coordinator needs to collect and keep in a safe place until January 2025 and then destroy them.
4. As this is a coordinated OMEP World Project, participants must work within the same framework. They must be given instructions and they shall use the project Guide. It is very important that the project follow the procedure. Thus, we can compare and bring forward the creative and critical thinking and expressions, quotes, and drawings of water for washing and drinking, from children from all over the world.

Data collection instruments

Data will be collected using children's drawings which will be conducted at school premises or any other relevant natural learning environments where teachers will happen to be facilitating early childhood lessons. Children will be ethnographically observed in their natural settings, and their drawings and photos (without children) about water and landscape will be collected for analyses. Further, whenever possible field notes and personal communications will be collected for reflexivity purposes. The field notes and personal communication will broaden and deepen understanding of children's conceptualization of water and landscapes. The national research panel overseeing this project will collect, analyse, and store various documents related to water in preschool education and settings.

Ethical issues

OMEP upholds high ethical standards and is committed to the wellbeing of children and their families. Given the international nature of the project and variations in countries' laws and regulations guiding research practices; in each country, the OMEP executive committee should take a leading role in observing ethical research practices including applying and obtaining ethical clearance.

Data storage, analysis, and dissemination plan

The OMEP national executive team responsible with this project will oversee storage of collected data. The collected data will be shared with the KINDknow team and the OMEP national executive committees may keep copies of the data. Collected data from all countries will be stored in the data bank to be created at the KINDknow and open to researchers for analyses upon requests. The overall qualitative and quantitative analyses will be carried out at the KINDknow and disseminated in the form of OMEP conference papers, IJEC journal articles, policy briefs, and posters.

Research and project procedures

- Pedagogical procedure:
 - Inform parents and get consent from them to take written notes from conversations and share drawings with the world project team,
 - Make an inquiry-based project with the children in each kindergarten, framework should contain more or less of these components: artistic/natural science/ social-political Science/humanistic/health Sustainability approach/equity approach,
 - Take notes from conversations with children, note children's curiosity, teachers' questions, and observe how the exploration is developing,

- **Data generation and analysis procedure:**

- Write a description about the kindergarten and the water source you found,
- Take three descriptive photos of the landscape with the water source(s) at least one nearby and one long distance (without persons),
- Draw the landscape where you found the water resources, this could be done by children individually or as a group project, perspective of children’s own choice, both surrealistic, attempted, imaginative and real live representations will be welcomed,
- Collect all the drawings – this will involve collection of variety of perspectives as mentioned above,
- Collect relevant, meaningful, or expressive quotes from conversations and dialogues. This will include quotes from both children’s and teachers’ utterances,
- Include short description of procedures and preliminary background data such as numbers of girls, boys, age, and any other relevant information,
- Language accepted: English (preferably), Chinese, Swahili, Scandinavian languages, French or Spanish,
- Use the Summary Report Structure, starting with a short summary (See Attachment),
- Send Summary Report to world project leaders Aihua Hu and Laurent, not later than March 30, 2023.

Process and end evaluation

For emerged issues which may require follow-up and clarifications, process and end evaluation will be conducted with teachers or any other relevant data source using interviews and/or surveys. The national OMEP executive committee in consultation with central research team will decide on which issues and how to conduct the process and end evaluation.

PROJECT TIMELINE:

TIME	TASKS
Aug.– Nov. 2021	Decision made by EXCO
May 15 – Oct. 2022	Confirmation by OMEP National Committees that they will join the Project. (Please use attached Form) and conducting a pilot study.
May 16 – Oct. 2022	Projects are carried out (flexible about the time to start depending on ethical application)
Oct 2022 - Mar. 2023	Analysing the material, writing a Summary of the results, following a certain structure, see attachment
Nov. 2022	Deadline for sending the project summary to OMEP World Project team
Dec. 2022 – Mar. 2023	National or local conferences on Education for Sustainable Development (ESD) and other ECEC conferences and events to presenting their local projects and for dissemination about the project and highlighting ESD in their countries
Dec. 2022-May. 2023	Time available for the World project team to <ul style="list-style-type: none"> a. write an article proposed to IJEC sponsored by KINDknow the national coordinators will be acknowledged as co-authors a. make a film from the project (the film production will be sponsored by KINDknow research center and Western Norway University of Applied Sciences. a. write a Policy Brief about the importance of equal access to clean water for children’s health, wellbeing and for the Planet Earth in collaboration with all the participating OMEP member counties following the values of OMEP world and distributed by OMEP world after being accepted. a. Possible spin off articles and publications after the deadline which could include authorship of the national coordinators. Each national committee owns their data and could reuse the data for bachelor, masters, and PhD theses.
Sep. 2023	Presentation of the Film of the World Project at the OMEP World Assembly and OMEP World Congress

Note to the initial timeline: Due to issues in the aftermath of the Covid-19 pandemic, and to adaptation to the wishes and premises of the participating kindergartens, the time line was delayed with at least one year in the Norwegian part of the pilot.



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University of
Applied Sciences

KINDknow notes series 7, 2023
ISBN: 978-82-8461-043-6

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