

INHABITING THE INTERLACINGS

A cartography of glocalization for Umeå

Accustomed to think of cities as domestic interiors to inhabit and considering therefore their exteriors as what those cities are not, we find ourselves questioned by the interlacing and redistributions of everyday life. It seems that inhabiting everyday life is an affective, perceptive and political challenge that defies the old habits and boundaries of traditional cities and citizenship. We need to assemble new cartographies to navigate these interlacing.

The arctic region is facing a big transformation. Climate change is hitting hard the arctic region.

Umeå, a city in the North of Sweden and once a former isolated outpost, is becoming an urban an economic hotspot. The city and the region will be affected by the multiplication of fluxes across localities and the strong interactions between natural and antropic ecosystems. We call the interlacing of these fluxes and interactions hybrid communities, assemblages of humans and not humans.

These non humans have a high degree of expression and we find them very well suited to describe these new scenarios. We think it's possible to talk with them because they are good spokespersons of these hybrid communities.

This is an experiment to give voice to these hybrid communities through their spokespersons.

We chose 3 things you can find in Umeå: a lichen, a painted truck part and a light bulb. Lichen tell us about the connection of the city with climate change. They can detect and react to changes in weather conditions occurring in other places.

A painted part of a Volvo truck will try to give voice to the material fluxes embedded in the pigments of white paint.

The lightbulb will disassemble the electric light in a myriad of stories about energy sources.

LICHEN

Transfer of life between planets

The reentry module of the Foton-M2 spacecraft, which has been in low-Earth orbit for the last 16 days made a successful landing the 16 June 2005. The experiment which took place during the Foton mission was called 'Lichens' and was one of the exobiology experiments that was located in the ESA Biopan facility. Opened to exposure the samples inside to open space, i.e. exposed to vacuum, wide fluctuations of temperature, the complete spectrum of solar UV light and bombarded with cosmic radiation. Analysis post flight showed a full rate of survival and an unchanged ability for photosynthesis. This endurance relies on a key factor: lichens are a microecosystem formed by two organisms: a fungus and an algae.

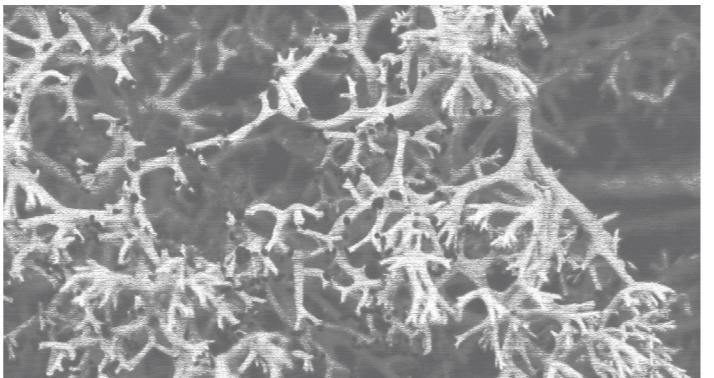
This experiment opens up many possibilities for future research into the possibility of transfer of life between planets, a theory called panspermia.

Wikipedia definition

Lichens are composite organisms consisting of a symbiotic relationship between a fungus (the mycobiont) and a photosynthetic partner (the photobiont or phycobiont), usually either a green alga (commonly Trebouxia) or cyanobacterium (commonly Nostoc). Lichens occur in some of the most extreme environments on Earth. However, they are also abundant as epiphytes on leaves and branches in rain forests and temperate woodland, on bare rock, walls and gravestones.

Symbiosis

One of the reasons of space flight survival is symbiosis. Symbiosis (from Ancient Greek σύν "together" and βίωτις "living") is close and often long-term interaction between two or more different biological species. In 1877, Bennett used the word symbiosis (which previously had been used to depict people living together in community) to describe the mutualistic relationship in lichens.



Living warning systems for future climate changes

For Kristin Palmqvist, Professor of Plant Ecological Physiology at the Umeå University, "Lichens are sensitive to air pollution and changes in the climate. That makes them an important puzzle piece in researchers' studies of climate changes. We know that lichens are disappearing from many places today, but not really why. Lichens are good at taking up and storing nitrogen. We know that an increased nitrogen load is significant to their disappearance from large parts of Europe, but because no one noticed anything until it was too late, we do not know what it was that happened. Sweden and Norrland are very well suited for studies of lichens since there are 2,000 different lichens in the country. There are a total of 20,000 species in the world. The lichens are important because they come first to areas without vegetation. They pave the way for new vegetation. They are also of significance to biological diversity. Because they are suited to nutrient-poor environments, they are very sensitive to changes. If the lichens disappear, spiders and mites also vanish, which in turn means that birds have no food".

Coevolution with the city

In 1926 the swedish scientist, R.Sernander, conducted one of the first studies in this field. He pointed out a "lichen desert" in Stockholm – a center of the city and industrialized areas with high level of air pollution – where lichens were almost completely absent. But for Kristin Palmqvist, Umeå presents a particular situation: "It would be interesting to look at an urban environment from the lichen perspective of where they actually occur in a city like Umeå – they are quite abundant in some areas depending on the age of the substrate they have chosen to occur on and the quality of the air. But churchyards with old stones and old trees are good places for them. But also trees in parks and peoples' gardens. Some species are actually more abundant in these urban areas than in the younger spruce and pine forests around Umeå".

The forest and the forestry

The northern boreal part of Sweden is a land of few people but large forests. The dominating tree species include Scot pine (*Pinus sylvestris*) and Norway spruce (*Picea abies*). The forest history of this part of Sweden is rather dramatic and the use of the forest resources has been a very important component in Sweden's transformation from agricultural nation in the 19th century to an industrialized country in the 20th century. The focus on timber production during almost a century has had a high ecological price. Today we have many red-listed species of animal and plants. The present movement is towards environmentally safe forestry but there are doubts as to whether it is too late to save some species and ecologically valuable forest. A very small portion of the swedish forest is currently protected and set aside from forest exploitation.

Arctic climate change

A dramatical climate change will probably occur in the arctic region; rising temperatures, loss of sea ice, and melting of the Greenland ice sheet. In Sweden, large changes in temperature and changes in patterns of precipitation will lead to a substantial change in the natural conditions for agriculture and forestry, reindeer herding and winter tourism, as well as for natural terrestrial ecosystems. The distribution of species will generally be shifted northwards.

The generally warmer climate, a longer vegetation season and an increased carbon dioxide level in the atmosphere will result in greater growth. New tree species and

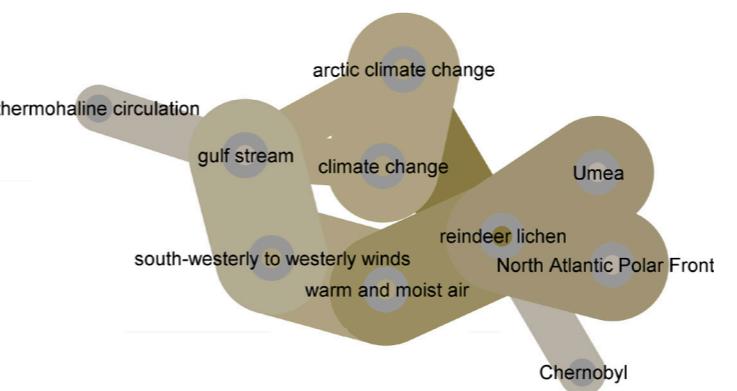
different types may lead to even higher production.

Given a prominent position of macrolichens in the Arctic, it is important to develop a predictive framework of lichen responses to global changes.

Planetary streams as house corridors

The sweden weather, a piece in the arctic climate, is enhanced by two major factors. The effects of the Gulf Stream, which brings pre-warmed winds over the land providing a temperate climate and the Thermohaline circulation, a large-scale ocean circulation that is driven by global density gradients created by surface heat and freshwater fluxes. Both connect the local air and temperature with distant and hotter places, providing Sweden a huge amount of energy and making the country's weather more livable.

What characterizes a place in its most intimate and subtle identity, it's local weather, is constituted by the permanent fluxes that comes from faraway. Therefore our house. our city are extended to where these winds originated.



Monitoring risks at the large house: Chernobyl

On April 26, 1986, at 1:23 a.m., a chain reaction occurred in the Chernobyl reactor (1500 km from Umeå), creating explosions that blew off the reactor's heavy steel and concrete lid. From Chernobyl in the former URSS, radiation spread across Europe in perhaps the most catastrophic industrial event in the planet's history. The event released 6000-8000 kg. of radioactive material.

The plume passed over the Baltic countries and then Scandinavia on 28th April, and was then blown eastwards and then south, carrying the contaminants towards central Europe and the Balkans.

Atoms of it wound up in the lichen that reindeer graze on. And that year, after the slaughter, almost 80 percent of the Swedish reindeer meat was too contaminated for sale.

Sámi reindeer herders had to change their practices, slaughtering earlier in the year before the animals had a chance to eat the moss.

PAINT

Winter white

The Volvo Trucks paint shop in Umeå has more than 850 colors to choose between, but not all of them are used that frequently. "There are 50 colors that are registered under White shades, whereof 10 of these are also available with clearcoat as an option" says Hans Venngren, Volvo Trucks' global process manager for surface treatment. The top-ten list is crowned by Winter White.

Shields and coatings

Although there is evidence that since 2000 BC calcite, some phases of calcium sulfate and kaolinite were the first white pigments used, the 12th century treatise of Theophilus (pseudonym of a goldsmith and Benedictine monk) describes creating paints from a variety of pigments; specially white from lead carbonate, ground bone ash, calcium carbonate, lime, gypsum or chalk.

An interesting source for Viking Age paints comes from shields. The wooden shields from Ballatare, on the Isle of Man, have a leather facing that was painted, instead of the paint being applied to the wood, and it seems to have been painted with black and red patterns on a white background, using a gesso paint (organic matrix, such as egg yolk), while the Cronk Moar shield has traces of white paint.

Pigments

In the 20th century, titanium dioxide with anatase or rutile structures, and acicular zinc oxide were introduced as the new synthetic pigments for white. Titanium dioxide, also known as titanium oxide or titania, is the naturally occurring oxide of titanium, chemical formula TiO₂. When used as a pigment, it is called titanium white. It is the most widely used white pigment in the coatings industry because of its brightness and very high refractive index.

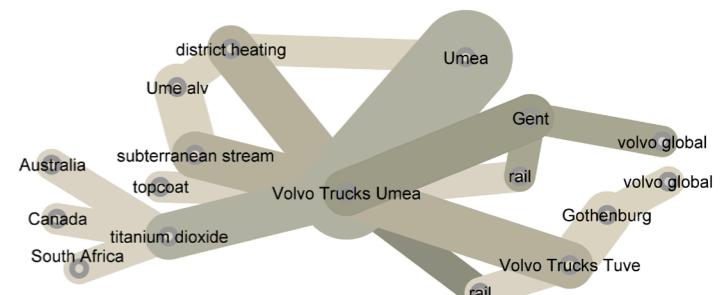
Where do the colors come from?

The Falun red is a color named after the site where its pigments were distilled, the copper mines situated in Falun, a mine that operated since X century and closed in 1992. On the contrary, we tend to think of white as a standard global color that comes from nowhere, an abstract thing, almost a concept for non color. This is accurate since the major paint and coating company end users for pigment grade titanium dioxide (the pigment used in white color) depend on the qualities of limonite, a component of TiO₂ present in the sands of African beaches or Australian deserts. Australia is the largest producer of titanous raw materials, followed by South Africa, Norway, and Canada.

A spreading landscape

Artificial colors populate our cities and houses. They are part of our daily landscape. Urbanization is the key demand driver for TiO₂ pigments. Colors, aesthetically overcoded in modern times, seem to have an existence in catalogs not in the world. Far from being a concept, titanium dioxide pigments that give color to white paints are literally disseminating particles present in sands by mixing them in the topcoat of industrial vehicles. Instead of talking of white as a standardized preference, can we say what is painted white is an extension of distant landscapes?

Titanium dioxide white paint was used to paint the Saturn V rocket. In 2002, a spectral analysis of J002E3, a celestial object, showed that it had titanium dioxide on it, giving evidence it may be a Saturn V S-IVB. The available titanium oxide paint measurements at near-infrared wavelengths were an excellent match with the telescopic measurements using NASA's Infrared Telescope Facility. The landscape is continuously spreading, even beyond the biosphere.



The city and the factory

Umeå was granted its city charter in 1622 and present-day Umeå's city centre still lies where the original city was built. Since the first university was inaugurated in 1965, the Umeå's population has doubled. Today people who have moved to Umeå are in the majority (54 % of the population), many of them foreigners. The city is home of many regional activities and companies. Volvo Trucks Umeå is a facility with 300.000 m² located near the centrum, by the riverside, employing 2069 people. The shortening of the plant is VLU, Volvo Lastvagnar Umeå.

From the river to the cabin

The city of Umeå is set on the riverbanks of the Umeälven. Close to the Ume River there is an underground ice river. This river runs beneath the ground's surface across sand banks located 35 meters below. Because of this, it maintains a constant cold temperature come summer or winter. The office responsible for water and sewage, waste and recycling and landfill in Umeå municipality has engineered this subterranean stream to pull out its icy waters via a two kilometre long pipe into the VLU. The waters of this subterranean river enter directly into the cooling system of the oven of the paintshop.



Alchemic laboratory of the landscape

There is something fluid, insubstantial, a little bit unreal in the lack of definition of the arctic winter landscape that is brought to mind when we think of winter white, the color most delivered by VLU.

But climate not only plays a role in the ideas associated with white color, the cold, ice, wind, rain or snow. The qualities from climate and local environment are translated into the process of applying painting. The coldness of the icy waters taken from the subterranean river to cool down the paint-shop cabin, enables a low temperature drying process and affecting opacity and transparency of topcoats.

If cold streams come trough the pipe and enter the cooling system, heat is brought to the ovens by the continuous flowing of recycled streams of the 40.000 thousand homes of Umeå that contribute to district heating.

As a result of these transfers, can we say the qualities of local landscape are fixated in the topcoat of truck's cabs?

Conjunctio / transference

We can trace back these binding operations, of the streamed river with the cooling system, of cold and hot at the furnace, to the fourth alchemical operation: conjunctio. Conjunctio was the most significant operation in alchemy. Conjunction is an alchemical operation that combines two chemicals to produce a third, a different chemical. Conjunction was more than a simple marriage however. Images of conjunction included the fruitful earth, sexual intercourse, double-chambered furnaces (athanors), glue or tape binding opposing entities, two streams coming together in one stream. To medieval artists, painting and alchemy are intimately bound up with color. For jungsians is also an alchemical correspondence to psychology's concept of transference.

The logistics' point of view

Volvo cabs are manufactured in Umeå, 250 miles away from the Polar Circle, and Ghent, Belgium, while the engines are made in the central town of Skövde. Among some smaller facilities Volvo has assembly plants in Sweden (Gothenburg - also the Head Office), Belgium, USA, Brazil, South Africa, Australia, China, India and Russia, making it a truly global producer. Some of the smaller factories are jointly owned. Its main parts distribution centre is located in Ghent, Belgium. The sales side is split into three areas – Europe and the Middle East, the Americas, and Asia Pacific. Offices and dealers are set up worldwide in Europe, North America, Latin America, Africa and Middle East, Asia and Pacific, occupying a surface of 1.243.875 m² with 10.263 employees.

In Volvo factory Umeå the cabins for all Volvo models are built and then transported to the assembly works in Gothenburg and Gent by rail. The production includes the complete metalworking, cab body construction, surface treatment, painting and final assembly. The Umeå factory also supplies CKD (completely knocked down) assembly kits for the cabs to factories in Asia, Africa, Australia and America.

Bounds and bindings

The modern narrative embodied in the supply chain describes exchanges of matter, energy and information through a logistics point of view. From this perspective there is always an inbound and an outbound, connected but differentiated between inside

and outside.

We need to explore other narratives that consider the intertwining of cities, localities and ecosystems. Like those of Umeå, Ghent and Tuve where Volvo plants are situated. We need another scripting for these hybrid communities where bounds should be changed into bindings.

LIGHTBULB

Entangled stories

The uniform light produced by an incandescent electric bulb is the result of an assemblage of different sources of energy. The electric bulb could be traced back to several affluents. Depending on what we want to trace back, we would be taken to different places through several different paths.

Those energetic affluents shape a dense network leading to where our houses and buildings belong. To the question Where do you live? Should we answer addressing the myriad of ramifications of those energy fluxes which amplify and interlace our place with others?

"We can not say which electrons come in your particular outlet. Your electricity is a mixture of different production sources". Umeå Energi statement.



Burning forestry

The consumption of the nearby forests to heat the city was still visible in the columns of smoke that arise in a picture of 1965. One house, one fireplace, one chimney. Today distant planted forests resonate together in the heat and cold carried by the pipes of the district heating. Domestic waste leaves homes as raw material to generate electric power. Houses, buildings and factories inhabit together this loophole with the cogeneration powerplants. This transfer of energy between different landscapes can be understood as a symbiosis.

The house, the forest the river but also the waste have generate together this hybrid landscape.

District Heating

Umeå Energi is the municipal company that provide heating and cooling, electricity, cable television and broadband. At Dåvamyran, UE has two combined power and heating plants. The plants produce the vast majority of the heat used in Umeå and Holmsund but they also produce electricity to more than 10.000 houses. Dåva 1 is UE's combined power and heating plant with waste as a primary fuel. Dåva 1 began operating in 2000 and Dåva 2 in 2010. In Dåva 2 mainly regional biofuels are fired, such as logging residues, wood chips, bark, sawdust and peat.

District heating means that hot water is produced at one place and distributed in pipes out to private houses, blocks of flats, offices, industries, etc, which use the heat of the water. Then the same water, though a little colder now, returns to the production unit where it is reheated in order to be repeated again and again in a closed cycle.

A CHP (Combined Heat and Power) plant at Dåva, replaces many small boilers. Almost all district heating is heat that otherwise would not have been beneficial, such as waste heat from industry, energy from waste and residues from logging.

How to run a river into a cable

More than of 40% of the electric energy produced in sweden comes from water motion. The electric grid is part of the hydrology of the country, so the weather counts. The amount of precipitation, and subsequently also runoff to the reservoirs and hydropower stations, is decisive for hydropower production. So when an electric bulb

is switch on, the river comes into our house and working places.

The Stornorrfors Power Station and Norrfors Dam, run by Vattenfall, are located on the Umeälven. The power station was completed in 1958, has a head of 75 m, four turbine units (5.2-m runner diameter), and the capacity to discharge 1,000 m³/s of water and produce 600 MW of power. Vattenfall is wholly owned by the Swedish government. Stornorrfors translates the kinetic energy of the river into electric power by delivering millions of subatomic particles that UE later distributes through its network downstream. Once completed a proper description of this network should take us, like the salmon, again upstream.

Viewing the river from inside the stream

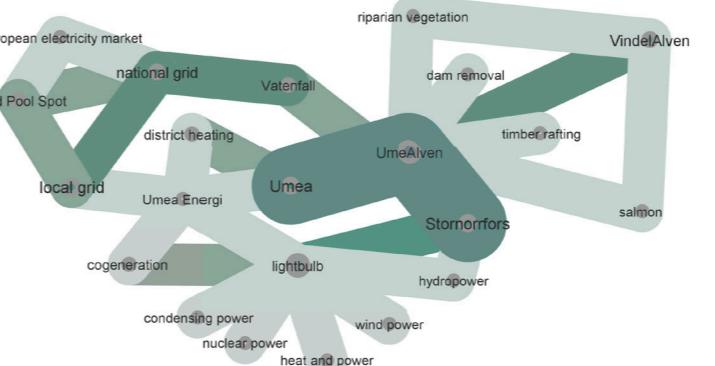
The Umeälven/Vindelälven river system is a large salmon and sea trout river, flowing from the lake Överuman by the Norwegian border within the Scandinavian mountain range to the Bothnian Bay.

The salmon is a witness affected by the changes of the river Ume during the XX century. The intertwining between salmon, streams, and sediments can give us an idea on the costs of connecting river, electric grid, and city. This will be part of changing the mindset to a new alliance between networks and entities which that even as it begins, is part of several controversies.

Migrating across dams

The salmon fishing was so intensive around the mouth of the river as far back as the 17th century that most salmon catches eventually became unprofitable and had to be discontinued. In the mid-1800s timber rafting began in a big way. During the next 100 years stones and boulders were cleared from the rapids on a 1,600 kilometre floating channel on the Vindel River and its tributaries. When you also consider the 140 floatway dams that were constructed on these tributaries, and the intensive use of Ume river for hydropower, you will appreciate what effect this has had on the fish population and fishing, but riparian vegetation are also affected; riparian ecosystems are a key piece in regional species richness.

Salmon and sea trout may pass the fish way at the power plant at Stornorrfors and ascend to the reproduction areas in the tributary Vindelälven. Water from the forbay created by the dam Norrfors is directed to the Stornorrfors power-station. At times, 100% of the river water is directed to the power-station. A new improved fish ladder for migrating fish was open in 2010.



Hydropower and dam removal

Sweden is facing simultaneously two scenarios; the increase of rain regime and new possibilities for hydropower and the river ecology restoration vision. Hybrid communities are perhaps a way to inhabiting the complexity of these contradictions.

The UN's Intergovernmental Panel on Climate Change has concluded that global warming so far has been 0.7 degrees over the last 100 years. Temperature will rise more in Sweden and Scandinavia than the global mean. An increase in water inflow, particularly in the northern parts of the country, will take place gradually. This creates very favorable conditions for increased hydropower production. Sweden's have more than 5300 dams, about 5100 (96%) are small. The increasing number of deteriorating old dams that need renovation or have lost their function, but also law and policy, economy, and ecology make dam removal a viable management option. But this scenario is not scientific driven process, it is a highly controversial one. Therefore assemblage of knowledge from different stakeholders - human and non-human, is becoming crucial.

Elområden

On November 1, 2011 the Swedish Kraftnät (Swedish national grid) divided the Swedish electricity market in four elområden, electricity areas. Division makes it clear where in Sweden there is a need to expand the national grid for electricity, reducing the need to transport electricity over long distances. The decision to introduce elområden included in the EU's efforts to create a single European electricity market. The Swedish national grid is placed within the Nordic electricity exchange "Nord Pool" that covers Denmark, Finland, Sweden, Norway, Estonia and Lithuania, which also is interconnected with Russia, Germany, the Netherlands and Poland.

The EU currently imports 82% of its oil and 57% of its gas, making it the world's leading importer of these fuels. Only 3% of the uranium used in European nuclear reactors was mined in Europe. The electric bulb not only shows the complexity of the European electric grid, it is also the witness of an hybrid energy creation.

The grid is inhabited by hybrid communities

Although drawing this network seems complex, the key to understanding it should be that it cannot be completed, it is in permanent construction. Let's imagine that each node of generation and distribution of electric energy interlaces with a multiplicity of heterogeneous communities. The electric grid becomes a togetherness of hybrid communities. Is the electric grid only visible through the eyes of the salmon?

At home in the forest

"For the Sámi, home is open-ended and unbounded. Far from being a narrowly circumscribed clearing in the woods - a low-level place encompassed by the higher-level, more expansive place of the forest - home comprises the entire web of trails that converge upon the dwelling. For what is called the forest, meahcci (equivalent to the Finnish metsä), is understood no so much as a tree-covered expanse as a texture densely interwoven from the paths along which people carry on their activities of herding, fishing, berry-gathering and so on. Indeed the forest may, as in the tundra, be almost or entirely treeless. If you were to ask where a person is, the answer would come back in terms of what they were doing; thus they may be in the "herding forest", the "fishing forest" or the "berrying forest", referring in each case to the paths that people would take in that particular activity." Being along: place, time and movement among Sámi people by Nuccio Mazzullo and Tim Ingold, in "Mobility and Place: Enacting Northern European Peripheries", Jorgen Ole Barendt, Brynhild Granås, Ashgate Publishing, Ltd., 2008.



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