

## Polluting the sacred Lake Baikal

### A case study from Siberia, Russia

Lake Baikal, the world's largest and deepest freshwater lake as well as a UNESCO World Heritage Site, known for its water purity and great biodiversity, has suffered serious impacts from the pulp and paper mill located in its South-eastern shore.

In this case study, WWF presents a collation of facts taken from publicly available sources and interviews it conducted about the Baikalsk Pulp and Paper Mill (BPPM) in Siberia and its ecological and social effects on its surrounds. The case study is intended to paint a picture of a remote place in Russia, deeply affected by a paper industry not adopting responsible practices.

The Baikalsk Pulp and Paper Mill's history goes back to the 60s. It was closed in October 2008 following decades of critique about pollution of the lake and international calls to modernize the mill. In July 2010 it reopened without major modernizations and without closed-water cycle technology, following legislative changes weakening the protection of Lake Baikal.

### Impacts on water quality and human health

#### Water pollution

*"...so they opened up the system and dumped waste directly into the lake"  
Anatoliy, used to work at the plants water treatment system*

Using chlorine to produce bleached cellulose, Baikalsk Pulp and Paper Mill discharged as much as 100,000 m<sup>3</sup> (4 million cubic feet) of wastewater into Lake Baikal annually. More than 6 million tonnes of solid waste has accumulated in huge open-air pits near Baikal's shore.<sup>1</sup>

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<sup>1</sup> Elena Agarkova, Institute of Current World Affairs , posted on McClatchy Washington Bureau, 7 April 2010 <http://www.mcclatchydc.com/2010/04/07/v-print/91779/putin-about-face-on-paper-mill.html>; Greenpeace <http://www.greenpeace.org/international/en/campaigns/toxics/water/what-you-can-do/Lake-Baikal/>

Although the wastewater was treated and the mill claimed that its emissions to the lake were not harmful, there are many anecdotes about the malfunctioning of its effluent treatment. Anatoliy, a fisherman from Vidrino, said, “My son-in-law, who died two years ago, used to work at the plant's water treatment system. He said that sometimes they received calls saying there is no space left for discharges, so they opened up the system and dumped waste directly into the lake. It all went straight into the lake.”

In April 2010 a consortium of scientists<sup>2</sup> wrote an open letter to the Prime Minister expressing their concern about the mill being granted permission to recommence production. They said, “As a result of the operations of pulp and paper mills with chlorine bleaching, dioxins and chlorinated furans are formed as by-products...Many of these contaminants are highly toxic, they explain. ”Dioxins have been found in a number of Baikal fauna. When these are a regular part of people’s diet, the risk of cancer amongst the local population increases, as has been found along the shores of water bodies where chlorine bleaching is used at local pulp mills...Higher concentrations of phenol than are permissible for water bodies are found in the mill’s wastewaters; the same is true for chloride and sulfate ions. Elevated concentrations of PCBs, whose origins are as yet unclear, have been noted.”

According to them, the plant's discharges of chlorine compounds and other pollutants have resulted in a 30 square kilometer (12 square mile) dead zone in the south of Lake Baikal.

## Accidents happen

***“The Mill is situated in an area of high seismic activity”***  
(Scientists’ consortium)

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<sup>2</sup> Letter from scientists on the official site of the Federal Service for Nature Management Supervision - <http://controlmnr.ru/node/1012>; <http://baikalwave.blogspot.com/2010/04/elite-scientists-open-letter-to-prime.html>; <http://savebaikal.ru/en/scientists-opinion.php>

There is an increasing risk of accidental discharges. The mill is old and its pipework is rusting and increasingly prone to leakages. There have been reports of workers being injured due to equipment malfunctioning and while the mill was preparing to be re-opened, in late 2009, two workers were reported to have been killed in an explosion at the mill.



<http://gazeta.babr.ru/?IDE=83631>

There are particular concerns because the area is an active earthquake zone. The scientific consortium said, “The Mill is situated in an area of high seismic activity with the possibility of earthquakes of up to 9-11 degrees on the 12-point Richter scale. Thus, in the case of an earthquake, reagents and waste could find their way into Baikal from broken vessels and reservoirs. When considering possible risks, it is essential to bear in mind the possible leakage of liquid chlorine and the rupture of vessels containing white and black sulphite liquors, oil products and sulphuric acid, also the rupture of protective structures and influx of the accumulated waste after wastewater treatment from sludge ponds into the lake. Other serious environmental consequences are possible.”

Vasily Z, a Baikalsk resident, said, “There are three big cess pools and several big ash dumps. There have been instances where the cess pools spilled over, flowing directly onto the shore of Baikal. Workers were rounded up when the spill went out onto the ice, they were gathering the ice up, cutting it out, scooping it up. They brought machines but ended up drowning the equipment. These are the kinds of things that used to happen.”

Another impact on water quality is that in the past, many logs were accidentally dumped into the lake when rafts of larch and pine being transported across the lake broke up in storms: pine floats, but larch is dense and sinks to the bottom where the logs rot, using up oxygen from the water, with serious impacts on the fauna and flora of the lake. Wood for the mill now comes entirely by rail since rafting by water has been banned, but there is still a legacy from past negligence.<sup>3</sup>

In recent years, the omul fish have been reducing in number and there are concerns that this is due to pollution and damage to its feeding grounds in Baikal's shallows. There are also reports from local people about fish being sick and found with sores.<sup>4</sup>

When the mill shut in 2008, some of these impacts began to reduce. Anatoliy, a fisherman from Vidrino, said, "This is the first summer when the fish began to go up into the river. During the two years when the plant hasn't been working, the number of fish with sores has decreased noticeably. There are less sick fish."

Vasiliy Z, a Baikalsk resident, said, "Baikal and all of us got a reprieve from the pulp plant for just one year. The air and water were clean, fish started to come closer to the shore. All of this will come to an end now that the pulp plant will start dumping its waste again. As far as the effect on Baikal, which is a unique lake, this may cause irreversible processes – most likely they are already going on."

### **Air pollution**

*"There are substances that the chimneys are spewing into the air, especially methyl mercaptan – that's a nightmare. We breathe it. Our children breathe it."*

*"The plant didn't work for a year and during that year my child didn't have any problems, she didn't have rashes or anything"*

*(Former worker of BPPM and mother of 2)*

The mill's air emissions are problematic, with levels of some gaseous emissions said to be reaching 10 times safety limits.

In the consortium of scientists' open letter the scientists said, "The atmosphere around the mill is polluted by foul-smelling compounds of bivalent sulfur, hydrogen

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<sup>3</sup> [www.sras.org/environmental\\_policy\\_and\\_politics\\_lake\\_baikal](http://www.sras.org/environmental_policy_and_politics_lake_baikal)

<sup>4</sup> БАЙКАЛ.mp4

sulfide, methyl mercaptan, dimethyl sulfide and methyl disulfide. The smells of mercaptan can be sensed distinctly over distances of up to 70 kilometers. The mill releases a tonne of ill-smelling substances into the atmosphere every day. Concentrations of mercaptan exceeding those permitted by 10 or more times have been registered in the residential part of the town of Baikalsk. This is of considerable discomfort to people in the town and its environs.”

Taisa B, a Baikalsk resident, said: “This smell, that you can smell all of the time, is methyl mercaptan, which is a highly toxic substance. People could live easier if the smell wasn't here. For a year and three months they let us breathe fresh air without these smells and people cheered up.”

A former worker for BPPM, and mother of 2, who doesn't want to be identified, said, “Regarding the plant, I want to say that it surely should have been closed a long time ago. There are substances that the chimneys are spewing into the air, especially methyl mercaptan – that's a nightmare. We breathe it. Our children breathe it. Take my oldest daughter, she used to have allergies and now they have turned into asthma. The plant didn't work for a year and during that year my child didn't have any problems, she didn't have rashes or anything. But once the plant started working again, we barely resuscitated her. My child almost died. She had a severe swelling of the throat, it was terrible.”

Methyl mercaptan is listed in the UN hazardous substances as a toxic gas and the Oxford University directory of toxins describes it as follows. ‘Very toxic to aquatic organisms - may cause long-term damage in the aquatic environment. Harmful if inhaled. Skin, eye and respiratory irritant. Chronic exposure may cause lung damage.’

### **Impacts on health**

In their open letter to the Prime Minister, the consortium of scientists said, “The considerable emissions of methyl mercaptan, dimethyl sulfide and methyl disulfide have an adverse effect on human health. The combined impact of these compounds gives rise to irritation of the respiratory system, depresses oxidation-reduction processes, causes irregularities of carbohydrate metabolism, and has a negative impact on the state of human protein molecules. Investigations have shown the adverse impact of these compounds on female reproductive functions. Staff of the Scientific Research Institute of Occupational Medicine and Human Ecology, East Siberian Scientific Centre SB RAS, have determined that a high frequency of

complications during pregnancy and childbirth can be observed in women of child-bearing age that have been exposed to methyl sulphurous compounds. Such abnormalities as placental pathology, threat of miscarriage, and possibility of miscarriage have been registered (with a risk of 54-76%).”

As noted earlier, there are also risks of cancers from the persistent pollutants in the lake, particularly to people, such as the indigenous population, who eat a lot of fish and seal products. Some of the toxic substances, such as PCBs and dioxins, are known to accumulate up the food chain and cause long term health problems.

Taisa B, a Baikalsk resident, said, “There are a lot of sick kids here. Scientists from the Russian Academy of Sciences conducted studies in Baikalsk and found a lot of cancer cases here, a lot of allergic illnesses and kids who are born with diseases.” A mill worker (who wants to remain anonymous) agreed, “Children here even get cancer, blood cancer. We recently buried a boy who died from this illness. He was three years old.”

***“it should have been closed a long time ago”***

Jennie Sutton, from Baikal Environmental Wave, said, “Here in the Baikal region and in Russia as a whole the environmental movement and hundreds of ordinary people sincerely believe that the only 'solution' to the problem of the Baikalsk mill as a threat to the lake is to close the mill and deal with its 40-odd years of accumulated waste in a way that would best safeguard the lake from possible catastrophe.”

In their open letter to the Prime Minister, the consortium of scientists said “The scientific community is categorically against the re-launching of the Baikalsk Mill with the discharge of its wastewaters directly into Baikal. Similar pulp mills abroad are going over to pulp bleaching with hydrogen peroxide and ozone.”

Even UNESCO has condemned the Russian Government’s negligence and demanded that the pollution from the mill is stopped. “UNESCO has grown concerned with the situation surrounding the world heritage site of Lake Baikal, namely with the decision of the Russian government to allow the waste of the Baikalsk Pulp and Paper Mill (BPPM) to pollute the Lake,” declared Francesco Bandarin, General Secretary of UNESCO at a meeting with coalition representatives in July 2010. “UNESCO's convention on the protection of World Cultural and Natural

Heritage Sites demands that the factory's work be conducted in a system of closed-water circulation.“<sup>5</sup>

Nicolay O, an artist who lives in Baikalsk, said, 'It would be great if the world community unequivocally stated on some authoritative level that this is the world's wealth, this is our water reserve for the future.' He says, 'It is absolutely clear that the mill must be closed. We need to get chemicals out of here and direct this region to developing a year-round tourism industry.'

Taisa B, a Baikalsk resident, said, "It's insulting and painful that this lake – this World Heritage – isn't protected by anyone. All harmful industry on Baikal should be closed down. It's absolutely necessary to close it. Here all the drains go straight into the lake. I feel pity for it. I feel pity for all of us who live here. I wish we had clean air here. Baikal should be protected, like a sacred place.”

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<sup>5</sup><http://baikalwave.blogspot.com/2010/07/unesco-appeals-to-russian-government-to.html>;  
<http://whc.unesco.org/en/decisions/4431>