

MAUDE M. SEVIGNY + SEBASTIEN GIGUERE

TO INFINITY – AND BEYOND!

HOW THE SKIES OF MONT MÉGANTIC WERE DARKENED

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MONT MÉGANTIC INTERNATIONAL DARK SKY RESERVE

Five years ago this fall, the world's first International Dark Sky Reserve (IDSR) was created in Quebec's Eastern Townships. Recognized in September 2007 by the International Dark Sky Association (IDA) and the Royal Astronomical Society of Canada (RASC), the Mont Mégantic International Dark Sky Reserve covers 5,500 square kilometres and three regional municipalities (Granit, Haut-St-François and the city of Sherbrooke). It includes 35 communities with more than 255,000 residents.

An international dark sky reserve is a territory in which light pollution is minimized. Everywhere in our world, light pollution is obscuring the night sky. The pollution comes from lighting systems designed without consideration for the starry sky, or systems that are incorrectly installed so that most of the light leaks into the night sky. As well as obscuring the sky, this pollution has undesirable impacts on human health, scientific research, fauna, flora, architectural aesthetics, energy efficiency and safety.

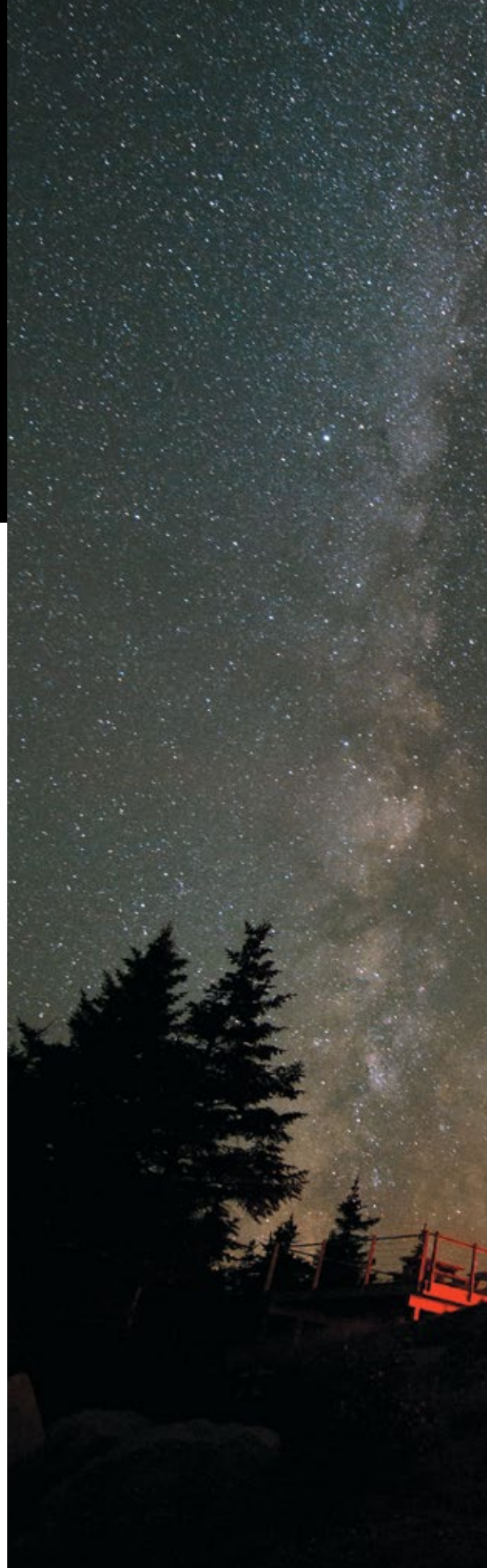
A WORLD FIRST

In 2003, when Mont Mégantic's dark sky protection process was beginning, the scientific viability of the Mont Mégantic Observatory was paramount. The observatory, administered by the universities of Montreal, Laval and McGill, is one of the world's best-equipped university research centres. The telescope with its 1.6m mirror makes it the most important observatory of North America's East Coast. Its closure would have been a major blow not only for scientific astronomy in Canada, but also for an entire region that had built a significant portion of its tourism identity on the starry sky. At the heart of the Dark Sky Reserve, right at the entrance to the Parc national du Mont-Mégantic is the ASTROLab, an astronomy activity centre devoted to making science accessible.

The Dark Sky Reserve campaign was led by the ASTROLab in conjunction with numerous partners including the Mont Mégantic Observatory and national park. It was a sweeping regional process with three initial thrusts: building local awareness, reconfiguring regulations and converting regional lighting. A decade later, the pristine night sky has been restored. In the process, 3,300 lights across the region were converted, resulting in a reduction of electricity consumption of about 9.5 million kw/h, for a savings of nearly \$1 million.

CONVERTING THREE THOUSAND LIGHTS

Cooperation was central to the process. How could the needs of the various parties be reconciled? Local regulations needed to change, and by 2005, the multilateral approach started to pay dividends when the Granit regional municipality adopted a lighting by-law, followed in 2006 by Haut-Saint-François and Sherbrooke in 2007.



“We’ve also had to get back into the habit of using flashlights when walking outside the observatory.”
– Bernard Malenfant

As regulations were rewritten, the conversion project got underway. While there had been other dark sky preservation efforts before Mont Mégantic, the Quebec process was distinctive. It was the first to involve an immediate, large-scale transformation of municipal, commercial, industrial and residential lighting. By 2007, the municipalities were converting their street lighting to dimmer but more efficient equipment, significantly reducing light pollution and improving the quality of the nocturnal environment. The impact on the starry sky was immediate and impressive, exceeding the expectations even of the project’s founders.

1 LIGHTING THAT IS RESPECTFUL OF THE DARK SKY CAN REDUCE LIGHT POLLUTION.

PHOTO PARC NATIONAL DU MONT-MÉGANTIC, GUILLAUME POULIN



BEFORE



AFTER



1, 2

3, 4

5, 6

... our greatest nocturnal sensitivity is ...in that blue part of the spectrum.

“We no longer see a light dome over these municipalities under overcast conditions. We’ve also had to get back into the habit of using flashlights when walking outside the observatory. It’s incredible!” says Mont Mégantic Observatory technician and ASTROLab founding president, Bernard Malenfant.

In 2009, the resulting reduction of light pollution was estimated at 35 percent. This measurement was tabulated by professor Martin Aubé and the GRAPHYCS research group at the Sherbrooke cégep, who scientifically monitor the project’s progress. Now recognized as a global leader in light pollution measurement, in 2011 Mr. Aubé installed two complementary measurement devices on the roof of the ASTROLab – equipment developed specifically for this kind of measurement.

REBOOTING THE SYSTEM

After a few years, lighting equipment that did not meet by-law standards gradually began to reappear in the region. In 2011, the ASTROLab therefore rebooted the dark sky preservation project, mobilizing elected representatives and stakeholders. A new action plan was drafted, emphasizing the availability of compliant equipment from local distributors, and the municipalities improved by-law enforcement. In all three municipalities, dark sky preservation committees were formed to target priorities

specific to each. Energized by the reboot, the reserve’s managers nevertheless realized that they had underestimated an even greater threat: the uncontrolled arrival of mass-market white LED lighting.

THE THREAT OF LED’S BLUE LIGHT

Within a few years, LED technology may possibly become THE primary lighting technologies used worldwide. LEDs have compelling advantages: low power consumption, fine control, colour accuracy, long lifespan, and so on. But there are also drawbacks. In their current form, white LED lights emit a significant part of their light in the blue range of the spectrum. Because the atmosphere preferentially transmits blue light, the impact of white LEDs on light pollution is much greater than that of high-pressure sodium, whose peak emission is in the yellow-orange range.

In addition, for humans, the greatest nocturnal sensitivity is also in that blue part of the spectrum. In the last decade, scientists have better documented the major impact of blue light on the suppression of melatonin – the “sleep hormone” that regulates our biological clock (circadian rhythm). Faced with this worrisome knowledge and possible issues for human health, the ASTROLab and its allies have joined forces with numerous partners in science and industry to study the issues related to this lighting

technology and, above all, to contribute to solutions aimed at mitigating its negative impacts. The first phase of this new thrust was launched in December 2012 with an interdisciplinary symposium on “problems and solutions related to white LED lighting.” As well as updating the public, the presenters shared technical solutions under consideration. For more information: www.astrolab-parc-national-mont-megantic.org/en/symposium.htm

POINTING THE WAY FORWARD

More and more lights that respect the dark sky are on the market, available to landscape architects interested in preservation of our nocturnal environments. For more information on how to protect the night, visit the Dark Sky Preserve section of the ASTROLab website. www.astrolab-parc-national-mont-megantic.org/en/light-pollution.htm

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1 BEFORE AND **2** AFTER: THE POSITIVE IMPACT OF CONVERSION - LIGHT POLLUTION AND WASTE ARE VASTLY REDUCED **3** BEFORE AND **4** AFTER: AT LA PATRIE, ORIGINAL LIGHTING WAS INTRUSIVE EVEN IN HOMES **5** BEFORE (2006) AND **6** AFTER (2008): THE EFFECTS OF CONVERSION IN THE VILLAGE OF LA PATRIE
PHOTOS 1-6 PARC NATIONAL DU MONT-MÉGANTIC, GUILLAUME POULIN