



SPRING 2016

Message from PICS' executive director



Dr. Sybil Seitzinger

Spring 2016 has been a busy time for PICS, with surprising new findings from our energy and forestry research projects bringing fresh information for policy-makers, as well as PICS fellows' work contributing to climate solutions in the wider community. Evidence that some trees are now growing faster in BC due to climate change has

implications for forest management regimes that are also dealing with other effects of a warming climate, such as heightened drought and fire risk. Likewise, the popular assumption that BC hydropower can substitute for Alberta's coal energy has been disrupted through new modeling scenarios for decarbonizing Canada's electricity grids, which offer different solution options.

Our annual gathering of PICS Fellows meeting in Vancouver on May 5 provided an invaluable opportunity for 21 of our graduate fellows to network and learn about each others' research that spans a wide range of disciplines: from renewable energy technologies and protecting vulnerable species, to city adaptation planning, and inspiring climate action. In this edition we profile three fellows whose research will help municipalities adapt to sea level rise, pinpoint the best policy approach for geothermal heat pumps, and help BC's salmon fisheries survive in a changing climate.

As we look forward to summer and its inevitable water restrictions, take a minute to read our [latest PICS Brief](#) and [feature article](#) that combine PICS-supported glacier-hydrology and modeling projections to give a sobering insight into the security of BC's hydroelectricity supplies to the year 2100. Planning for changing hydrology flows is vital so that this renewable source, which currently supplies approximately 90% of BC's electricity, remains a mainstay of our energy mix.

Climate change fuelling fast tree growth

PICS-funded scientists have found that [trees are growing faster](#) in British Columbia due to global warming, and this is starting to counter the carbon-loss impacts of the province's devastating mountain pine beetle (MPB) outbreak, that affected more than 18 million hectares of forests.

The findings were made by scientists working on PICS' [Forest Carbon Management Project](#), and were published this spring in [Geophysical Research Letters](#). This study took field-based observations of tree growth and scaled up the results via modelling to the province as a whole. Lead researcher, Vivek Arora of the [Canadian Centre for Climate Modelling and Analysis \(CCCMA\)](#), said the factors driving this trend are warmer and wetter conditions, and increased levels of the greenhouse gas carbon dioxide, taken up by trees during photosynthesis.

"By 2020, the enhanced growth will more than compensate for the carbon loss emitted from dead rotting trees," he said. "This turn-around (from forests being sources of carbon to becoming sinks again), is happening much sooner than we had imagined." This rare bit of positive climate change news attracted a lot of media attention from outlets including Global News TV, CBC's Quirks and Quarks, the Weather Network, the



PICS & CCCMA researcher Vivek Arora interviewed on Global TV

Vancouver Sun, National Post, The Province, and the Times Colonist.

Werner Kurz, who heads the project, said the research is useful for forestry management, including projecting future timber supplies. However he stressed that the results must be viewed in light of other climate change

impacts that can also harm forests, such as increasing drought conditions and fire risk, plus new insects and disease outbreaks.

Incentives for geothermal

The effectiveness of tax credits and rebates to encourage households to install geothermal as a clean energy solution has been analyzed as part of a successful PhD by PICS UBC fellow Thor Jensen.

His research revealed that even generous financial incentives have largely been unable to displace natural gas heating with geothermal, and have even increased costs for households. In addition,



Thor Jensen graduated this year after defending his thesis, a joint-PhD at UBC and the University of Versailles Saint-Quentin-en-Yvelines, France.



he noticed that heat-pump subsidies result in a short spike in uptake, followed by a sudden drop-off. It appears geothermal is only economically compelling to a minority of homeowners served by costly fuel oil and propane, out of reach from natural gas distribution networks. Geothermal heating is better suited to larger buildings, such as schools and hospitals, where higher energy bills offer a greater return on investments, which in turn, reduce the facilities' energy costs and free more funds for the core services these institutions provide.

In BC, public sector organizations are motivated to reduce their energy use by a carbon tax on natural gas and by a requirement to purchase carbon offsets to adhere to their carbon neutral mandate. Unfortunately, they also face strict capital expenditure caps limiting their options for building improvements. These two policy frameworks: carbon pricing and financial constraints can be in conflict. Thor's thesis calculated the cost of these unintended interactions of climate mitigation policy and restrictions on public spending, and provides policy recommendations to guard against negative outcomes.

Thor's research concludes that rebates, while popular among politicians, are poor tools for influencing energy transitions away from natural gas. Instead, governments should target larger buildings and public assets with low-interest loans, which can be recycled to future energy efficiency projects.

Supporting Fraser River salmon

Declines in salmon populations in the Salish Sea are the impetus behind a project to better adapt fisheries management strategies to changing environmental conditions. PICS UVic fellow Lia Chalifour is partnering with the Raincoast Conservation Foundation to take a closer look at how fish use different habitats



The first experts meeting North Saanich's Resilience Project, June 7, 2016: (L to R), Tugce Conger, Mayor Alice Finall, and councillors Heather Gartshore, Geoff Orr, Murray Weisenberger, Jack Thornburgh.

within the Fraser River estuary—a confluence of the world's largest salmon-bearing river, the cities of Greater Vancouver and the Salish Sea.

Juvenile salmon from 56 conservation units migrate through the river annually, but it is not well understood how they use different habitats within the estuary. Sand flats, dense eelgrass meadows, and salt marshes provide different benefits, as well as offer potential carbon uptake. The goal is to demonstrate habitat use patterns, and to evaluate salmon health by analyzing growth rings on their otolith bones.

Results from this study will contribute to the [Salish Sea Marine Survival Project](#), an agreement between the US and Canada to recover shrinking Chinook and Coho populations. The project is the field component for a [MEOPAR](#) project co-led by Dr. Julia Baum from UVic and [Dr. Tara Martin](#) from UBC.

Adaptation for sea level rise

The District of North Saanich Municipal Council has enlisted the help and research of PICS UBC Fellow Tugce Conger, as part of a major initiative to plan for climate change, particularly the local impacts of projected sea level rise.

Tugce's PhD research examines the potential of 'green infrastructure', such as saltmarshes, to minimize damage from sea-level rise and storm surge, in the Salish Sea region. Coastal vegetation can play an important role in

strengthening coastlines against erosion (through roots binding soil), as well as elevating land and providing rough surfaces, thus attenuating waves and offering surge protection. The council's adaptation framework will weigh up the [options](#) of avoid (no-built areas), protect (e.g. dikes and vegetation), accommodate (e.g. retrofitting structures) and retreat (gradual retreat of developments from frequently flooded areas).

In May 2016 the council released a [Flood Construction Level Study](#) that found in the event of a "designated storm", 210 of the district's 715 waterfront lots could expect substantial flooding, with a further 74 also at risk unless action is taken. The flood risk was calculated as a combination of tide, storm surge (0.65m) and 1 metre net sea level rise, at a probability of a 1/500-year event—although the report noted that a 1m sea level rise will likely occur before the year 2100. Tugce is working alongside climate change adaptation experts from government, environmental law, non-profits and the community to develop the District of North Saanich Resilience Planning Project.

Her key role will be creating maps that show the impact of flooding on parts of the North Saanich coastline, and also developing scenarios of how different green adaptation actions can influence flooding outcomes.



Lia Chalifour and the research team use a custom built purse seine, a 40-meter fishing net, to scoop up small fish to measure their health.

Getting Alberta off coal – can BC really help?

Expanding the existing electricity transmission connection (or intertie) between BC and Alberta could help “green” the grid but it’s not as straightforward as commonly portrayed, according to new research released this spring from the PICS [2060 Project](#).

The project, which is a partnership between PICS and the Institute of [Integrated Energy Systems](#) at UVic, uses computer models to assess how Canada can decarbonise electricity generation using a range of potential scenarios including existing and potential energy sources, and energy conservation. One politically popular scenario analysed by the team is the call for BC to help Alberta meet its climate targets by supplying clean energy hydropower as a substitute for AB coal power; the assumption being that BC has surplus energy to sell.

In an [Op Ed](#) published April 19 in the *Vancouver Sun* and the *Ottawa Citizen*, 2060 engineers found on the contrary that, in the long term, BC will have little or no energy to spare due to growing domestic demand driven by population growth and commitments to electrify transportation. Even if the highly controversial Site C dam is built, BC would not have sufficient energy to supply Alberta in bulk. It can only help “fill some of the gaps” next door, they concluded.

Any substitute power (of various carbon intensities) would in fact be originating in the United States and just routing via BC.

Furthermore, if Alberta goes ahead with its plans to replace its coal plants only with wind turbines, it would need to build out almost as many [natural-gas-fired plants](#) to provide back-up for when the wind does not blow. The researchers however did conclude that an expanded intertie could support renewable energy investment in Alberta, through the selling of its surplus clean energy to BC, thereby saving water in BC’s dams. This stored water can then be used to produce electricity for Alberta at times when wind and solar generators are not producing.

These research findings were part of a PICS public talk by postdoctoral fellow [Iman Moazzen](#) on April 20 at UVic, who covered topics including the BC-AB intertie capacity expansion, wave energy integration on Vancouver Island, and incorporating risk into energy planning.

The Climate Examiner

The PICS News Scan, running since 2014, was re-launched in April 2016 as [The Climate Examiner](#) with a contemporary design that aids sharing and easy search of our archive. *The Climate Examiner*

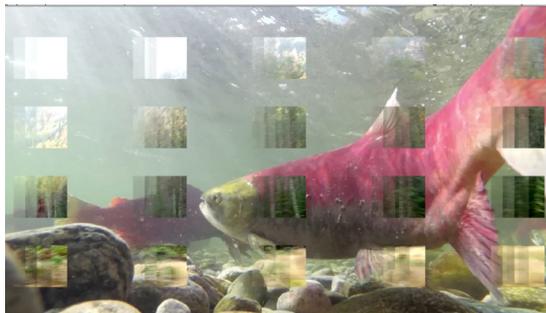
(TCE) scours the headlines and recent scholarly papers to put the solutions research that PICS performs in context of latest developments, and to explain key climate and energy concepts to policymakers, stakeholders and the interested public. The makeover has already resulted in an upswing in readership and social media sharing.

Going creative on climate

Finding new and creative ways to communicate the need for climate action is the goal behind a new partnership between PICS UNBC and the Two Rivers Art Gallery in Prince George, which this spring launched *Art, Change & Creativity*; a project that explores new ways of knowledge sharing and social mobilization in the context of climate change.

Following Bill Horne’s environmentally themed exhibition, [Behind the Lines](#), about 50 Prince George residents attended an April 7 public panel event featuring Northern BC artists and environmentalists. The panel presented indigenous and non-indigenous perspectives on the role of art and creativity in addressing the climate change challenge, followed by a discussion led by PICS UNBC’s program manager Michelle Connolly.

The panel included Kym Gouchie (Lheidli T’enneh artist and musician), Helen Knott (Dane Zaa and Cree writer from Prophet River First Nation) and Nadia Nowak (Prince George community organizer). According to Dr. Mark Groulx, professor



L: Ruth Beer (2015) *Intersections* (video still), 4 minutes 33 sec. R: Michele J Jensen (2016) *Memory of the Draining*, Acrylic on canvas, 48” by 72”. Images from the *Art, Change & Creativity* project with the Two Rivers Gallery.

of environmental planning at UNBC: “The panel highlighted the fact that there are many stories attached to large scale resource projects that often go unheard. The panel, at least for me, was full of individuals who for their own reasons have refused to accept this reality.” The project aims to reach beyond conventional audiences and runs until January 2017. It will include school-tours, a climate solutions themed paint night, and other hands-on events that remind us of our collective responsibility in addressing climate change.

Naomi Klein

If you missed the sold-out public talk by author Naomi Klein on April 7, you can catch the [recording on YouTube](#). PICS partnered with UBC Reads Sustainability to bring Klein to UBC to talk about her book *This Changes Everything*. The talk highlighted a paradox

of the climate change challenge—a landmark political breakthrough with the Paris climate goal to limit global warming to 1.5 degrees Celsius, at odds with nations’ climate plans that commit the world to an anticipated 3 to 4 degrees of warming. Yet, Klein did provide examples of how local-level action, including clean energy transitions and commitments to 100 percent renewable energy supplies happening around the globe, can offer solutions. Over 500 people attended the event, with hundreds more joining online.

Community outreach in Vancouver

PICS staff in Vancouver continued their ongoing program of outreach activities in the Lower Mainland, with a series of events this spring.

PICS UBC program manager, Sara Muir Owen, spoke on “Why Climate Change Matters” to over 60 seniors as part of the **Brock House Society** lecture series on April 12. Her talk prompted discussion on topics including carbon pricing, government incentives, and international issues like the COP21 Paris agreements.

Laura Secord Elementary School

invited Sara—for the 3rd consecutive year—to give presentations to grade 6 and 7 students on their 10th annual Earth Day activities on April 20. Professional illustrator Olusha Susan Milley joined the talks, graphically recording key climate change issues, impacts and solutions presented. Students were then invited to add their ideas on issues and solutions such as renewable energy and social justice. The poster is on display in the school’s main hallway as a colourful message about climate change and the many possible solutions to address it.

For the fourth year in a row, PICS SFU participated in the May 7 **Science Rendezvous**, a science festival held coast-to-coast at research institutes across Canada. PICS joined the SFU Faculty of Science organized event, which brought over 5,000 youth and adults to the Burnaby campus. The booth run by PICS SFU program manager Nastenka Calle featured hands-on activities

to teach children about using renewable resources to generate electricity, the greenhouse effect and the importance of conserving energy, as well as showcasing the PICS educational online videos.

Coming up...

Learning from Germany’s clean revolution

What can BC and Canada learn from Germany’s successes and challenges in moving towards an energy portfolio dominated by renewables? PICS aims to answer that question through a partnership with the University of Calgary and UBC that will host German ministerial heads and local government leaders in Vancouver, Edmonton, Ottawa, and Toronto.

The project, started this May and runs to spring 2017, will connect experts in Germany’s clean energy transition with Canadian political leaders, policy analysts, scientists and engineers, businesses, universities, and NGOs.

The tour’s first guest was [Detlef Gerdts](#), head of environment in Osnabück—a city on track for achieving 100% renewable electricity, 90% renewable heating and cooling, and 60% renewable

transportation by 2050. The project, *Building Capacity in Canada for Fostering Effective Public Policy for a Canadian Energiewende (Transition to Renewable Energy)*, is funded through a Social Sciences and Humanities Research Council (SSHRC) funding award. Other partners include SFU’s Renewable Cities and Clean Energy Canada.

Podcasts: Stay tuned for a new series of podcast documentaries, some of which feature research from the PICS “Big Five” research projects.

Cited is an “experiment in academic storytelling, partnering researchers with journalists to make documentary radio programs and long-form articles about the relationship between big ideas and everyday life.” Through funding from the SSHRC Partnership Development Grant, Cited will prepare 18 documentaries over two years—six tied to climate change.



Students at Laura Secord Elementary School collaborating on a climate solutions poster

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