

Examples of Web Content & Entities Relevant to Climate Change

Background

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About Deploy Software Solutions

Our vision is to reduce the remarkably high rate of software project failures worldwide, by transforming the way companies manage them. Find out more at

<https://www.deploy.solutions>.

Examples Related to Climate Change Disaster Websites

These example web articles were found when we were searching for market research on the damage caused by climate change (in this case related to coastal erosion). Use these as good examples of the kinds of web page titles / sources / publishers that we would want to search for.

- “Save the coasts of the north!” - Canadian Space Agency and Natural Resources Canada joint challenge for Space Apps Ottawa 2018
 - “Coastal recession is one of today's biggest environmental issues. Use data to raise awareness of this issue or design solutions to ensure that northern coasts are not submerged.”
 - Source: <http://asc-csa.gc.ca/eng/events/2018/space-apps-citizen-scientist.asp> (Challenge 6)
- “Protecting Tuktoyaktuk from coastal erosion could cost \$50M, says mayor”
 - Source: <https://www.cbc.ca/news/canada/north/coastal-erosion-tuktoyaktuk-needs-more-money-1.5095115>
- “‘We're the most vulnerable': Measuring P.E.I.'s erosion from land and sky”
 - Example of how government funds student-led efforts. Notice how the work is manual and episodic, as opposed to the product we are building where these reports will be automated and available anytime
 - Source: <https://www.cbc.ca/news/canada/prince-edward-island/pei-coastal-erosion-drones-1.5171990>
- “Canada and Quebec invest to protect road 132 in Gaspésie against coastal erosion”
 - \$132 M investment by governments of Canada and Quebec to protect a vital highway from coastal erosion



Examples of Websites, Articles, Organizations Relevant to Climate Change

- Source: <https://markets.businessinsider.com/news/stocks/canada-and-quebec-invest-to-protect-road-132-in-gasp%C3%A9-against-coastal-erosion-1028281420>
- University of Quebec in Rimouski – White paper on Coastal Erosion project
 - Comprehensive academic survey of coastal erosion in Bay de Chaleurs
 - In summary, mentioned need for Web GIS platform: “more than 86% of respondents have identified that the development of a GIS-WEB platform would be a relevant tool for coastal risks management and prevention and would increase access to digital data of a GIS coastal land-use planning tool for coastal erosion adaptation based on the exposure of buildings and infrastructure to coastal erosion, Québec, Canada)”
 - Source: Full Terms & Conditions of access and use can be found at <https://www.tandfonline.com/action/journalInformation?journalCode=tgnh20> *Geomatics*, Natural Hazards and Risk ISSN: 1947-5705 (Print) 1947-5713 (Online) Journal homepage: <https://www.tandfonline.com/loi/tgnh20> *Development*
- “Rising sea levels leaving Canadian coastal real estate vulnerable”
 - climate science tells us sea levels over the next 100 years are expected to rise faster than in the previous century, and warming oceans are likely to fuel more powerful coastal storms. Combined, the resulting storm surges will cover more area, erode more land and damage more property.
 - “The challenge for the insurance industry, like anything in finance, is that it bases its assumptions on the last 100 years,” he said. “But history is no longer a reliable indicator. They’re driving down the road by looking in the rear-view mirror.”
 - Evidence shows the insurance industry is highly vulnerable to climate change, “but they’re not factoring in the risks,” he added. That means the coastal property owners, prospective buyers and developers are not getting the information they need to make decisions.
 - In PEI, erosion appears to be the biggest concern, but how sea-level rise can cause more flooding and make erosion worse hasn’t yet affected insurance premiums or the value of properties, and the province currently doesn’t factor sea-level rise into property setback rules.
 - Source: <https://www.thestar.com/business/2015/11/14/prince-edward-island-coastal-real-estate-and-the-impact-of-climate-change.html>
- “New bill will force owners to build farther back from Nova Scotia coastlines”
 - There are currently about 60,000 properties hugging Nova Scotia's 13,000 kilometres of coastline and about 70 per cent of the province's population lives within 20 kilometres of the coast.
 - More work needs to be done on mapping affected areas to determine what kinds of setbacks need to be put in place, said John Somers of the Environment Department.
 - Source: <https://www.cbc.ca/news/canada/nova-scotia/coast-protection-bill-building-water-1.5053299>
- “Erosion chewing up Canada’s coastlines, researchers warn”
 - On Haida Gwaii, “we’re seeing more extreme storm events, more storm surges superimposed on sea level rise that would be accelerating sea level erosion,” he said. “There are sites we have been monitoring for 15 years and we have seen rapid rates, averaging one to three metres a year along that coast.”
 - He lists other areas at risk across the country: “The Mackenzie Delta in the Northwest Territories, Prince Edward Island, portions of Nova Scotia and New Brunswick, Halifax



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- harbour, Charlottetown harbour – these are all areas that are subject to fairly rapid sea level rise and in some cases, not all, subject to enhanced erosion,” he said.
- The problem, says Walker, is that “we’ve developed a lot of our houses and communities and infrastructure on coastlines or on flood plains for historic reasons, for esthetic reasons, cultural reasons that in the face of climate change put us in increasing hazard and . . . increasing risk of economic losses.”
 - Source: <https://globalnews.ca/news/73299/erosion-chewing-up-canadas-coastlines-researchers-warn/>
 - Coasts Alive! Project in Norfolk
 - Current poor understanding of key characteristics of relationship between land and sea; Current poor understanding of landscape condition and objectives for different landscape types/areas in the area; Lack of data for monitoring of landscape change;
 - Organisations from Norfolk have need for robust, current environmental information to help with:
 - Land use planning, including mitigation measures within the terrestrial environment
 - Management of the environment and protection of important landscapes, habitats and cultural heritage
 - Modeling and protecting the coast and inland waters
 - Forward planning and future scenario operation.
 - Benefiting from such information implies:
 - monitoring and forecasting;
 - recording and documenting relevant phenomena;
 - sharing and disseminating information among professionals but also among the general public.
 - Having good strategic maps covering the Norfolk area, accessible to stakeholder organisations, as well as the general public through a common Information System will aid planning, modeling, species survey work, mitigation planning after development etc and would quickly fund itself through saving time and effort in the management, dissemination and planning processes. Such an Information System can be achieved through a ... web-based geographical information system using satellite imagery and air photography, among other data sources.
 - Source: Eurisy https://www.eurisy.org/data_files/publications-documents/11/publications_document-11.pdf?t=1391448156
 - Estimating Recent Local impacts of Sea-Level Rise on Current Real-Estate
 - <https://link.springer.com/article/10.1007/s11113-018-9473-5>
 - Coastal communities represent some of the most valuable property in the U.S. (Fu et al. 2016) and are disproportionately populated when compared to more inland areas of the country (NOAA 2013). Recent research estimates that as many as 16 million people in coastal counties of the U.S. could be affected by the potential 1.8 meters of Sea-Level Rise (SLR) by the year 2100 (Hauer et al. 2016).
 - Globally, estimates of populations at risk are as high as 315–411 million people in low elevation coastal regions under varying assumptions of population growth by the year 2060 (Neumann et al. 2015).
 - Keenan et al. (2018) have identified patterns of settlement and investment in the Miami-Dade area that signal a sort of “Climate Gentrification” through the redistribution of population and investment into areas within neighborhoods that are less at risk of flooding due to higher elevation. Particularly in neighborhoods near the coast, properties at higher



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- elevations seem to be appreciating at a faster rate than lower elevation counterparts. Hauer et al. (2016)
- This trend creates shifts in housing market demand, which further necessitates a change in the practical behaviors associated with buying and selling of homes, including the hardship of owning a home that eventually will not sell, or will only sell below the original cost of the home.
 - the costs to cities for adaptation to rising seas are likely to grow from an estimated \$6 billion in 2005 to \$52 billion by 2050 (Hallegatte et al. 2013).
 - since 2005 the estimated total amount of lost real-estate value due solely to future near-term tidal flooding of property lots in this analysis totals to – \$115,684,000. The total loss figure grows about four times larger once the lost value due to future near-term road flooding is included, an additional – \$349,906,000. This combined loss of – \$465,554,000 in value is relatively small compared to the hundreds of billions of total real-estate value in Miami-Dade; however, without significant intervention, this value is likely to increase. The results also indicate that our current understanding of the impact of flooding on real-estate prices is likely undervaluing the potential losses or projecting the losses to occur too far in the future.

Examples related to published Disaster Recovery action documents

We gathered a list of published PDF files (often by insurance companies) that are about preparing for, surviving, and recovering from a disaster of some type. That's relevant because climate change disasters are like regular disasters, just more frequent/damaging/bigger.

Download these files from our public repo: <https://github.com/NickKellett/ClimateChangeDocs>

The 2 CSV files at the root of the repository contain list of example actions (one manually extracted, one using Machine Learning techniques). Use these examples to help identify “terms and topics” you should be searching on. The documents are also good examples of the kind of organizations we would want to search for (ex insurance companies and municipal governments).

Examples of Environmental Groups and Organizations in Canada

This is a small subset but represents the kind of organizations that are concerned with the environment and climate change, in Canada.

“List of Environment Groups and Organizations in Canada.csv”

Examples of Online Link References

These are some websites that have curated lists of relevant websites.

- Environment Canada Climate Change website: <https://climate-change.canada.ca/climate-library> (use the search engine to find resources and see what kind of entities/metadata might be useful)
- <https://www.environmentalsciencedegree.com/climate-change/>



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- Inside Climate News.org - <https://insideclimatenews.org/> Provides examples of news articles (and thereby people, organizations, events)

Examples related to Earth Observation Satellites

EO Satellites are one of the primary ways in which climate change and atmospheric surveillance is done, so these are key entities for you to search for.

Earth Observation Satellites, Companies, and Resources

- NOAA-real time, full resolution satellite imagery: <https://www.nesdis.noaa.gov/content/imagery-and-data>
- Can download climate data to pair with images - <https://www.canada.ca/en/environment-climate-change/services/climate-change/canadian-centre-climate-services/display-download.html#toc0>
- EOS: program but only using imagery from satellites, drones, airborne systems, not other data sources. Cloud based platform and analytics tool: <https://eos.com/>
- ESdat- specialist environmental database system; used to validate, import, analyze and report a broad spectrum of Environmental Data as Exceedance Tables, Graphs, Maps, statistics and more: <http://esdat.net/Info.aspx> missing satellite imagery it appears but they have a very long list of users.
- Global Human Settlement Layer (GHSL)-population of people and urban developments: <https://ec.europa.eu/jrc/en/news/new-satellite-image-database-maps-dynamics-human-presence-earth>
- Coastal erosion for PEI datasets, ground and remote sensing: <https://open.canada.ca/data/en/dataset/12e17685-405d-4f7e-8c46-404323daf70d>
- Open government portal : https://open.canada.ca/data/en/dataset?portal_type=dataset&q=coastal+erosion
- Download and display climate data (gov Canada): <https://www.canada.ca/en/environment-climate-change/services/climate-change/canadian-centre-climate-services/display-download.html#toc0>
- **BlackSky**: High resolution color Imagery (2019+). <https://www.blacksky.com/>
- **NorthStar and Space** (2019/2021): Hyperspectral and Infrared sensors. Similar concept of pairing data and imagery for predictions and historical trends. <https://www.northstar-data.com/index.php>
- **Wyvern**: Hyperspectral-in development (University of Alberta). <https://www.wyvern.space/>
- **Spire** (in orbit and building)- data and analytics, sensors only to track, monitor, and predict resources and weather. <https://www.spire.com/en>
- **Earth-i**: multispectral (TripleSat/DCM3), SAR & Optical (KOMPSAT), Optical (SuperView), Optical/GSD & full color and motion video (Vivid-i)-ongoing launches of additional high resolution satellites (2019+). <https://earthi.space/>
- **Capella Space**: SAR-in development. <https://www.capellaspace.com/>
- **Astro Digital** (now/in development): multispectral. <https://astrodigital.com/>



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- **Iceye:** SAR (2020), partnered with Esri. Iceye-X1 archived imagery available.
<https://www.iceye.com/>

Research groups using Satellite Imagery

- Monitoring Coastal Zone Changes from Space: <https://eos.org/opinions/monitoring-coastal-zone-changes-from-space>
- Development of a GIS coastal land-use planning tool for coastal erosion adaptation based on the exposure of buildings and infrastructure to coastal erosion, Québec, Canada- published 2017 -
<https://www.tandfonline.com/doi/full/10.1080/19475705.2017.1294114> (small area targeted)
- Coastline change analysis and erosion prediction using satellite images (2018):
https://www.researchgate.net/publication/327598539_Coastline_change_analysis_and_erosion_prediction_using_satellite_images
- Monitoring Coastline Change Using Remote Sensing and GIS Technology: A case study of Acıgöl Lake, Turkey (2016): <https://iopscience.iop.org/article/10.1088/1755-1315/44/4/042033/pdf>
- Middleton geomatics researchers focus on Canadian coastline (2017)
:<https://www.annapoliscountyspectator.ca/news/local/middleton-geomatics-researchers-focus-on-canadian-coastline-554/>
- SHORELINE CHANGES AT THE REGIONAL SCALE IN TUKTOYAKTUK AND THE MACKENZIE DELTA, CALCULATED USING LANDSAT SATELLITE IMAGERY FROM 1985 TO 2013 (2014):
http://digital.library.ryerson.ca/islandora/object/RULA%3A3470/datastream/OBJ/download/Shoreline_changes_at_the_regional_scale_in_Tuktoyaktuk_and_the_Mackenzie_Delta_calculated_using_Landsat_satellite_imagery_from_1985_to_2013.pdf
- USE OF SATELLITE DATA IN COASTAL MAPPING (2002):
<http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.460.646&rep=rep1&type=pdf>
- An Application for Regional Coastal Erosion Processes in Urban Areas: A Case Study of the Golden Horseshoe in Canada (used imagery from Landsat, IKONOS, LIDAR and MODIS) (2013): <https://www.mdpi.com/2073-445X/2/4/595/htm>

University Research

- Scarborough College Coastal Research Group (SCCRG)-
<https://www.utoronto.ca/~greenw/research.html> (mention satellite imagery, 2006 last update)
- Nova Scotia Community College (NSCC):
https://www.nscc.ca/about_nscc/applied_research/areas-of-research/geomatics-research/



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- Instability of Coastal Landscapes in Arctic Communities and Regions (2013):
http://www.arcticnet.ulaval.ca/pdf/compendium2013-14/coastal_landscape_2013-14.pdf -Various universities collaborated

