Course Description

This course introduces students to geospatial information management, including the nature of geospatial data; access, representation, and communication of data and information; and relevant tools and materials such as census data, spreadsheets, and geographic information systems. Special topics may include privacy, health, citizen science, or the humanities.

Course Prerequisites:

ENVI 5507 is a core course for MREM students and INFO 6681 is an elective course for MLIS students. MLIS students should have taken INFO 5515, or have consent of the instructor.

Learning Objectives:

This course will provide students with...

- a knowledge of the unique characteristics of environmental and geospatial data
- an introduction to the tools and techniques used to access, manage, and communicate geospatial data and information, including Geographic Information Systems (GIS)
- an improved ability to manage both quantitative and qualitative data, to evaluate various methods, and to ethically and effectively communicate messages with data
- an understanding of potential legal and policy aspects of managing, distributing, and using geospatial data and information.

Learning Outcomes:

With successful completion of this course, students should be able to...

I. understand the unique characteristics of environmental and geospatial information;
II. develop skills in managing quantitative and qualitative data and to communicate information through the use of tools such as MS Excel and ArcGIS;
III. conceive of a question with environmental and/or geospatial implications and develop a project using appropriate data sources and techniques;
IV. explore the practical and theoretical implications of communicating environmental and geospatial information;
V. comprehend the possible ethical, legal, and policy aspects of managing, distributing, and using environmental and geospatial information in a variety of settings.

**Integration of MLIS Competencies:**

<table>
<thead>
<tr>
<th>PROGRAM COMPETENCY</th>
<th>COURSE LEARNING OUTCOME</th>
<th>COURSE ASSESSMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Management of Information Technology</td>
<td>I, II, IV, V</td>
<td>Workshops, Lab Assignments, Final Paper</td>
</tr>
<tr>
<td>2. Information Management Leadership</td>
<td>I, III, IV, V</td>
<td>Final Paper</td>
</tr>
<tr>
<td>3. Risk &amp; Change Management</td>
<td>I, V</td>
<td>Lab Assignments, Final Paper</td>
</tr>
<tr>
<td>4. User-centred Information Services</td>
<td>II, IV, V</td>
<td>Workshops, Lab Assignments</td>
</tr>
<tr>
<td>5. Research and Evaluation</td>
<td>I-V</td>
<td>Workshops, Lab Assignments, Final Paper</td>
</tr>
<tr>
<td>6. Workplace Skills &amp; Attributes:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) Collaborate &amp; communicate</td>
<td>II, IV</td>
<td>Lab Assignments, Final Paper</td>
</tr>
<tr>
<td>(b) Organize, Plan &amp; Manage</td>
<td>II-V</td>
<td>Lab Assignments, Final Paper</td>
</tr>
<tr>
<td>(c) Develop Personally &amp; Professionally</td>
<td>I-V</td>
<td>Workshops, Lab Assignments, Final Paper</td>
</tr>
</tbody>
</table>

**Format & Technology**

**Technology Used:**

You should be (or become) familiar with the course Brightspace site, where you will find announcements, the syllabus and course readings, discussion boards, and other relevant course materials. This course will also introduce you to ArcGIS software and MS Excel. You should be or become familiar with the digital, online environment, including downloading and uploading information and/or data sets.

**Instructional Methods:**

The course is designed as a combination of traditional lecture and hands-on lab that may include some instructor- and student-led discussions and guest speakers. A Brightspace course site will house all course materials, and be maintained as a resource and vehicle for announcements and notifications.

**Learning Materials:**

Readings are meant to supplement the lectures and in-class workshops, to help you understand various topics or act as resources you can access anytime. I have tried to provide a wide range of resources: some are academic articles that illustrate GIS in research or some aspect of geospatial information, some that are a bit more accessible online through ESRI (ArcGIS) or through QGIS’s (an open source GIS) A Gentle
Introduction to GIS, still others are shorter, more general articles or podcasts. Readings may be found on the Brightspace site, through Dalhousie Libraries, or via the InterWeb.

**Evaluation**

**Weekly Workshops:**

To understand (and become confident using) GIS and spreadsheet software like Excel, you need to do it. Therefore most classes will include a hands-on “workshop”. For each class that we have a workshop you will turn in something to Brightspace (it might be an Excel spreadsheet, a GIS map, or a description of a map.)

Weekly workshop marks: Each workshop is worth 2% (2 points)

<table>
<thead>
<tr>
<th>Description</th>
<th>Marks</th>
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<tbody>
<tr>
<td>Complete. Excellent work regarding accuracy, thoroughness, and visual presentation/organization</td>
<td>2</td>
</tr>
<tr>
<td>Complete. Good work regarding accuracy, thoroughness, and visual presentation/organization</td>
<td>1.75</td>
</tr>
<tr>
<td>Complete. Satisfactory work regarding accuracy, thoroughness, and visual presentation/organization, or otherwise good work with significant problem in one area.</td>
<td>1.5</td>
</tr>
<tr>
<td>Mostly complete, but with significant problems in one area</td>
<td>1.25</td>
</tr>
<tr>
<td>Mostly complete, with significant problems in more than one area</td>
<td>1.25</td>
</tr>
<tr>
<td>Attempted but incomplete, with significant problems in more than one area</td>
<td>0.75</td>
</tr>
<tr>
<td>Attempted but incomplete with significant problems in all three areas</td>
<td>0.5</td>
</tr>
<tr>
<td>Not attempted, or unexcused absence</td>
<td>0</td>
</tr>
</tbody>
</table>

9 workshops @ 2% each = 18% weeks 3, 4, 5, 6, 7, 8, 9, 10, 11; most due 1 week after workshop

ESRI Intro to GIS Module = 2% can be done any time, but due by start of class, Week 5 (1 October)

**Lab Assignments:**

Workshops will help you learn skills and software, and help you design your final project, but they will also prepare you for three intermediate Lab Assignments.

<table>
<thead>
<tr>
<th>Lab Assignment</th>
<th>UG %</th>
<th>GRAD %</th>
<th>DUE:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LA01: Reading a map/map metadata</strong></td>
<td>15%</td>
<td>15%</td>
<td>Week 4 – 24 September</td>
</tr>
<tr>
<td><strong>LA02: Wind Energy Site: McAdam, NB</strong></td>
<td>15%</td>
<td>25%</td>
<td>Week 9 – 29 October</td>
</tr>
<tr>
<td><strong>LA03: Spatial Statistics: Montreal</strong></td>
<td>15%</td>
<td>10%</td>
<td>Week 12 – 26 November</td>
</tr>
<tr>
<td><strong>Final Project: Portfolios</strong></td>
<td></td>
<td></td>
<td>3 December</td>
</tr>
</tbody>
</table>

**Undergraduate (UG):** 20%

**Graduate (GRAD):** 35%
CLASS POLICIES

Civility
In this course, a strong emphasis is placed on civility, which comprises a conscious demonstration of mutual respect – for people, their roles, knowledge, and expertise. Civility requires cooperation, tolerance, acceptance, inclusiveness, kindness, courtesy, and patience. It is expressed not only in the words we choose, but in our tone, demeanour, and actions. The instructor, students, and guests, are responsible for, and expected to, exemplify and promote civility. While it is understood that disagreement will, and should, occur in a collegiate setting, open communication, intellectual integrity, mutual respect for differing viewpoints, freedom from unnecessary disruption, and a climate of civility are important values that we embrace. Examples of civility include:

● Respect and courtesy in language, demeanour, and actions;
● Respectful acknowledgement of individual differences;
● Empathy and patience; and
● Refraining from insulting, disrespectful, dismissive, or humiliating language or actions

Attendance
Class attendance is required in all MI courses and is included in the participation mark. Attendance records will be kept by the instructor.

Citation Style
SIM courses use APA as the default standard citation style. Unless the instructor provides alternative written instructions, please use the APA citation style in your assignments to briefly identify (cite) other people’s ideas and information and to indicate the sources of these citations in the References list at the end of the assignment. For more information on APA style, consult Dalhousie Library website at https://libraries.dal.ca/help/style-guides.html or the APA’s Frequently Asked Questions about APA

Late penalties for assignments
A penalty for late assignments will be assessed, unless prior permission has been given by the instructor to submit an assignment late, which normally will be for extended illness, medical, or family emergencies only (see below). Late submissions will be assessed a penalty of five percent per day, including weekends. Assignments will not normally be accepted seven days or more after the due date; in such cases the student will receive a grade of zero.

Missed or Late Academic Requirements due to Student Absence:
Dalhousie University recognizes that students may experience short-term physical or mental health conditions, or other extenuating circumstances that may affect their ability to attend required classes, tests, exams or submit other coursework.

Dalhousie students are asked to take responsibility for their own short-term absences (3 days or less) by contacting their instructor by phone or email prior to the academic requirement deadline or scheduled time AND by submitting a completed Student Declaration of Absence form to their instructor in case of missed or late academic requirements. Only 2 separate Student Declaration of Absence forms may be submitted per course during a term (note: faculty, college, school, instructor or course-specific guidelines may set a lower maximum).
**SIM GRADING POLICY**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>90-100</td>
<td>Demonstrates original work of distinction.</td>
</tr>
<tr>
<td>A</td>
<td>85-89</td>
<td>Demonstrates high-level command of the subject matter and an ability for critical analysis.</td>
</tr>
<tr>
<td>A-</td>
<td>80-84</td>
<td>Demonstrates above-average command of the subject matter.</td>
</tr>
<tr>
<td>B+</td>
<td>77-79</td>
<td>Demonstrates average command of the subject matter.</td>
</tr>
<tr>
<td>B</td>
<td>73-76</td>
<td>Demonstrates acceptable command of the subject matter.</td>
</tr>
<tr>
<td>B-</td>
<td>70-72</td>
<td>Demonstrates minimally acceptable command of the subject matter.</td>
</tr>
<tr>
<td>F</td>
<td>&lt;70</td>
<td>Unacceptable for credit towards a Master's degree.</td>
</tr>
</tbody>
</table>

**ACCOMMODATION POLICY FOR STUDENTS**

Students may request accommodation as a result of barriers experienced related to disability, religious obligation, or any characteristic protected under Canadian human rights legislation.

Students who require academic accommodation for either classroom participation or the writing of tests and exams should make their request to the Advising and Access Services Center (AASC) prior to or at the outset of the regular academic year. Please visit www.dal.ca/access for more information and to obtain the Request for Accommodation form.

A note taker may be required as part of a student’s accommodation. There is an honorarium of $75/course/term (with some exceptions). If you are interested, please contact AASC at 494-2836 for more information or send an email to notetaking@dal.ca.

Please note that your classroom may contain specialized accessible furniture and equipment. It is important that these items remain in the classroom, untouched, so that students who require their usage will be able to fully participate in the class.

**ACADEMIC INTEGRITY**

In general:

The commitment of the Faculty of Management is to graduate future leaders of business, government and civil society who manage with integrity and get things done. This is non-negotiable in our community and it starts with your first class at Dalhousie University. So when you submit any work for evaluation in this course or any other, please ensure that you are familiar with your obligations under the Faculty of Management’s Academic Integrity Policies and that you understand where to go for help and advice in living up to our standards. You should be familiar with the Faculty of Management Professor and Student Contract on Academic Integrity, and it is your responsibility to ask questions if there is anything you do not understand.

Dalhousie offers many ways to learn about academic writing and presentations so that all members of the University community may acknowledge the intellectual property of others. Knowing how to find, evaluate, select, synthesize and cite information for use in assignments is called being “information literate.” Information literacy is taught by Dalhousie University Librarians in classes and through Dalhousie Libraries’ online Citing & Writing tutorials.
Do not plagiarize any materials for this course. For further guidance on what constitutes plagiarism, how to avoid it, and proper methods for attributing sources, please consult the University Secretariat’s Academic Integrity page.

Please note that Dalhousie subscribes to plagiarism detection software that checks for originality in submitted papers. Any paper submitted by a student at Dalhousie University may be checked for originality to confirm that the student has not plagiarized from other sources. Plagiarism is considered a very serious academic offence that may lead to loss of credit, suspension or expulsion from the University, or even the revocation of a degree. It is essential that there be correct attribution of authorities from which facts and opinions have been derived. At Dalhousie, there are University Regulations which deal with plagiarism and, prior to submitting any paper in a course; students should read the Policy on Academic Dishonesty contained in the Calendar.

Furthermore, the University’s Senate has affirmed the right of any instructor to require that student assignments be submitted in both written and computer readable format, e.g.: a text file or as an email attachment, and to submit any paper to a check such as that performed by the plagiarism detection software. As a student in this class, you are to keep an electronic copy of any paper you submit, and the course instructor may require you to submit that electronic copy on demand. Use of third-party originality checking software does not preclude instructor use of alternate means to identify lapses in originality and attribution. The result of such assessment may be used as evidence in any disciplinary action taken by the Senate.

Finally:

If you suspect cheating by colleagues or lapses in standards by a professor, you may use the confidential email: ManagementIntegrity@dal.ca which is read only by the Assistant Academic Integrity Officer.

Faculty of Management clarification on plagiarism versus collaboration:

There are many forms of plagiarism, for instance, copying on exams and assignments. There is a clear line between group work on assignments when explicitly authorised by the professor and copying solutions from others. It is permissible to work on assignments with your friends but only when the professor gives you permission in the specific context of the assignment. University rules clearly stipulate that all assignments should be undertaken individually unless specifically authorised.

Specific examples of plagiarism include, but are not limited to, the following:

- Copying a computer file from another student, and using it as a template for your own solution
- Copying text written by another student
- Submitting the work of someone else, including that of a tutor as your own

An example of acceptable collaboration includes the following:

- When authorised by the professor, discussing the issues and underlying factors of a case with fellow students, and then each of the students writing up their submissions individually, from start to finish.
ACCESSIBILITY
The Advising and Access Centre serves as Dalhousie’s Centre for expertise on student accessibility and accommodation. Our work is governed by Dalhousie’s Student Accommodation Policy, to best support the needs of Dalhousie students. Our teams work with students who request accommodation as a result of: disability, religious obligation, an experienced barrier related to any other characteristic protected under Canadian Human Rights legislation.

STUDENT CODE OF CONDUCT
Everyone at Dalhousie is expected to treat others with dignity and respect. The Code of Student Conduct allows Dalhousie to take disciplinary action if students don’t follow this community expectation. When appropriate, violations of the code can be resolved in a reasonable and informal manner—perhaps through a restorative justice process. If an informal resolution can’t be reached, or would be inappropriate, procedures exist for formal dispute resolution.

DIVERSITY AND INCLUSION
Every person at Dalhousie has a right to be respected and safe. We believe inclusiveness is fundamental to education. We stand for equality.

Dalhousie is strengthened in our diversity. We are a respectful and inclusive community. We are committed to being a place where everyone feels welcome and supported, which is why our Strategic Direction prioritizes fostering a culture of diversity and inclusiveness (Strategic Priority 5.2).

RECOGNITION OF MI’KMAQ TERRITORY
Dalhousie University would like to acknowledge that the University is on Traditional Mi’kmaq Territory.

The Elders in Residence program provides students with access to First Nations elders for guidance, counsel and support. Visit the office in the McCain Building (room 3037) or contact the programs at elders@dal.ca or 902-494-6803 (leave a message).
**Course Schedule** – Note! Readings and/or Topics Subject to Change. All academic journal articles can be found through Dalhousie Libraries [https://libraries.dal.ca/research.html](https://libraries.dal.ca/research.html)

**Week 1 – 3 September**

Course Introduction; Introduction to Geography, Environmental/Geospatial Data and Information, the language of spatial thinking; Data and data types

*Thinking like a geographer is not just “Where is X?” or “What is the importance of Y?”, but “How does Z work? What changes can be made to Z and what will happen? What is the context of Z and what will Z look like in the future? What comparisons can you make between X, Y, and Z, and what do they mean?* Thinking geographically allows you to create, acquire, and represent (i.e., “manage”) geospatial information. In this first class I will introduce you to geography and some theories, terms, and “language;” and I will have you start asking geographic questions. By the last class, you might find it comes naturally...

Readings:


**Week 2 – 10 September**

Cartography: making and reading maps, critiquing maps, maps, power, and objectivity; layout, colour, and type

*In-class: Begin LA01 – Reading a map/map metadata*

**NOTE: after class, maps will be in the GIS Lab (5th floor, Killam Library, hours: 9am-4pm, M-F).**

We struggle to understand our world and to represent it through various media. At some level, these representations are instinctual; at other levels they are mystifying. Were we ever really taught how to make or read maps? Professional cartographers certainly have, but as new software inspires the layperson to cartographic inclination, creating and reading maps has entered the digital democratic age with varying degrees of success. Therefore the first half of the class is devoted to how to manage geospatial information the way a cartographer would. The second half of this class is devoted to how to read a map as a geographer or cartographer might read it.

Readings:


As a cartographer, I have many sources on this topic! I can also recommend the following, or if there is an aspect of cartography you are particularly interested in, just let me know!
Week 3 – 17 September
Fundamentals of Geospatial/Environmental Information: Data types and descriptive statistics (frequency, central tendency, distributions)

**In-class workshop 01: Excel pt. I**

By now you’ve had some experience thinking geographically, but before we start managing geospatial data through the ArcGIS software, it is wise to understand how to manage ‘regular’ or aspatial data. Part of this process is understanding how information about our world can be represented in the digital environment, and which types of information translate more easily (and which really, really don’t). One way is to create data about our world through measurements and observations. Once we have the data, we can then use statistics to turn data into information...

Readings: (You don’t need to read all of these. I wanted to provide a few examples of the same material; just mentally add in your career title for ‘nurse’ or ‘librarian’ or ‘environmental scientist’ and they still work!)

Byrne, G. (2007). A statistical primer: Understanding descriptive and inferential statistics. Evidence Based Library and Information Practice, 2(1), 32-47. (Concentrate on pp. 37-40, the inferential stats sections will be next week.)


Recommended Websites:
Want to learn more about why statistics are important? Watch any TedTalk by Hans Rosling. One possibility is the following: [https://www.ted.com/talks/hans_rosling_shows_the_best_stats_you_ve_ever_seen](https://www.ted.com/talks/hans_rosling_shows_the_best_stats_you_ve_ever_seen) and you can also check out the website he started: [https://www.gapminder.org/](https://www.gapminder.org/)

Want more information about MS Excel? There are hundreds of online tutorials and here’s one place to start...


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Week 4 – 24 September
Fundamentals of Geospatial/Environmental Information: Classification of data and inferential statistics (introduction to Chi-square and linear regression)

**In-class workshop 02: Excel pt. 2**

**DUE: LA01: Reading a map/map metadata, ws01**
From last class we learned that descriptive statistics can tell us some things about the data we have, but that isn’t all stats has to offer. I must stress here, however, that this is not a stats class, but merely an introduction into inferential statistics.

Readings:


Websites for today’s in-class assignment:

Ivo Dinov’s Statistical Online Computational Resource. Normal, Student’s T, Chi-Square and F Statistical Tables. http://www.socr.ucla.edu/Applets.dir/Normal_T_Chi2_F_Tables.htm

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**Week 5 – 1 October**

Introduction to Databases & Managing Geospatial Data; Geographic Information Systems (GIS); Properties of geospatial data

*In-class workshop 03: Introduction to ArcGIS*

**DUE: Have the ESRI intro GIS module done before class, ws02**

The day has finally arrived! You get to work with ArcGIS and start managing geospatial data!

Readings:


QGIS (n.d.) A gentle introduction to GIS. Retrieved from https://docs.qgis.org/2.8/en/docs/gentle_gis_introduction/index.html (Read: Preamble, Introduction to GIS, and Data Capture)

*Note In lieu of textbooks that quickly go out of date, I will often refer you to ESRI’s and QGIS’s websites for relevant readings.

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**Week 6 – 8 October**

Coordinate Systems and Projections; Spatial Reference (Guest lecture by Greg Baker, Maritime Provinces Spatial Analysis Research Centre, Saint Mary’s University)

*In-class workshop 04: Projections*

**DUE: ws03**
Contrary to what paper maps and computer screens insist, the world we live on is not flat. But did you know the world is not round, either?

Readings:

https://esripress.esri.com/storage/esripress/images/315/mapuse_ch1.pdf [also available on Brightspace]


Recommended:

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**Week 7 – 15 October**
Vector GIS: Properties of Vector data and how to use and analyze it
In-class workshop 05: Begin LA02 – Wind Energy Site: McAdam, NB, originally presented by SRES alumnus Jason Parisé
DUE: ws04, and draft of LA02 for ws05 (done in class)

In week 3, we discussed different data types for GIS: raster and vector. This week we take a closer look at vector data and its pluses and minuses.

Readings:
QGIS (n.d.) A gentle introduction to GIS. Retrieved from https://docs.qgis.org/2.8/en/docs/gentle_gis_introduction/index.html (Read: Vector Data, Vector Attribute Data, Topology, and Vector Spatial Analysis (Buffers))

For Lab01:


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**Week 8 – 22 October**
Data Acquisition and Ethics; Metadata; Topics in Geospatial Information Management: Census Data (Guest Lecture by Jennifer Strang, GIS Centre, Dalhousie University)
In-class workshop 06: Census Data
DUE: LA02
As you know, paper maps and cardboard globes are no longer the sole bearers of geospatial information. Digital media on various platforms have expanded the ways in which we understand, create, and display this information. Mobile devices and Global Positioning Systems (GPS) are alternatives to paper maps, due to their portability, while Google Maps and Geographic Information Systems (GIS) act in similar ways to globes and atlases by displaying varyingly complex geospatial situations. But the data, oh, the data!

Locational data is fantastic – as long as the data about you is not accessible to anyone else. What is a military secret base if it can be spotted on Google Earth? What is too location-sensitive re: health and well-being? Or socio-economic status? Census data is a treasure trove to researchers (now that the long form is back!) but privacy and security are questions that need answers.

Readings:


For further reading:

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**Week 9 – 29 October**

Raster GIS: Properties of raster data and how to use and analyze it

*In-class workshop 07: Raster and Elevation*

*DUE: ws06*

The yin to vector’s yang, raster data behaves a bit differently...

Readings:
QGIS (n.d.) A gentle introduction to GIS. Retrieved from https://docs.qgis.org/2.8/en/docs/gentle_gis_introduction/index.html (Read: Raster Data and Spatial Analysis (Interpolation))


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**Week 10 – 5 November**

Spatial Statistics and Autocorrelation. (Guest lecture by Dr. Chris Greene, Earth Sciences Department, Dalhousie University.)

*In-class workshop 08: Begin LA03 –Spatial Statistics: Montreal*

*DUE: ws07, and UG: draft of LA03 for ws08, GRAD: data check for Open Data project*

So, now that you understand a bit about stats, and a bit about geographic data and information, let’s put the two together... We can also chat about the final paper today.
Readings (these are examples of spatial statistics methods; you don’t need to understand everything, but it will help you with your final paper):


12-16 November: Fall Break! (Yay!)

Week 11 – 19 November
Topics in Geospatial Information Management: HGIS – GIS & the Humanities; Multi-Criteria Evaluation (MCE)
In-class workshop 09: MCE
DUE: LA03 Spatial Stats

Three letters, one big idea. Multi-Criteria Evaluation is a powerful way to bring together many aspects – both qualitative and quantitative, raster and vector – of a question and find out how they influence what is happening (has happened, will happen) in a given location.

One of the most interesting (from my point of view) trends in GIS is Humanities research using GIS to visualize spatial dimensions of historical events and aspects of film and literature. The oft-touted “spatial turn” is taking shape as other disciplines have realized that a geospatial perspective can shed light on various avenues of research. It also develops the idea that a GIS is not solely a tool of the positivist scientific approach.

Readings:


Tuda, A.O., Stevens, T.F., & Rodwell, L.D. (2014). Resolving coastal conflicts using marine spatial planning. Journal of Environmental Management, 133, 59-68. (Pay attention to the question the research is trying to answer, the criteria, and the methods. You do NOT have to understand the equations in order to understand this article!)

Week 12 – 26 November
Topics in Geospatial Info Mgmt: Guest Lecture: James Boxall, Director of Dalhousie GIS Centre
DUE: ws09

James has his finger on the pulse of all things geospatial, especially looking at future trends like surveillance and AI. I could guess what he’ll talk about, but I don’t want to ruin the surprise.
After James’ talk, I am happy to answer questions about the Final Papers, or the course in general.

Readings (let’s be honest! These are optional, but you might find them interesting):


Recommended:


A few ‘citizen science’ websites to peruse:
Old Weather: http://www.oldweather.org/
Ushahidi: http://www.ushahidi.com/
Zooniverse: https://www.zooniverse.org/projects

PORTFOLIOS DUE 3 DECEMBER