SCHOOL PROJECT:

The MEP as an Educational and Awareness-raising Tool for Secondary-School Students

1. Objectives

- Leverage the millennium earth project to help students learn about what is going on in the world specifically as it relates to the millennium goals in the least developed countries.
- Provide teachers with a basic GIS training enabling them to use the ME
- Provide teachers with an educational toolkit enabling them to integrate the issues tackled by the ICGC regarding the MDGs into their curriculum and use the ME as a supporting and inspirational tool

2. School Project Phases

Phase Identification	Who is involved ?	Objectives	Remarks (Q&A ?)	Estimated time
1)PRELIMINARY MEETING	Maeva	Presents the ICGC, its goals and the MEP in more details		15min
	Teacher	Presents its class (subject, number of students, hours per week), its curriculum, the material available	Establish a list of general questions to establish a profile	15min
2) GIS	Maeva +	Provide the necessary	-User guide	2h

WORKSHOP	Scott + Teacher	tools and knowledge enabling the teacher: 1) To use the MEP 2) To teach the students how to use it	previously provided by Scott and adapted to non-user audience by Maeva) -Use the same computers that will be used by students	
3) TOOLKIT DVLPT AND CUSTOMIZATION	Maeva + Potentially MDGs directors, Etta?	Present the toolkit containing the teaching material and work with her/him to integrate the ME to the current curriculum	Made according to subject and grade What are the main difficulties? How to overcome them?	3h
4) SESSIONS WITH STUDENTS	Teacher	Conduct ME/MDG-oriented classes		TBD
	Maeva	Evaluation : notes + assist students with the MEP functions	Ask Heather what elements should be part of the evaluation	
5) ASSESSMENT	Maeva + Teacher + Heather	Were the educational goals (TBD) reached?		TBD

3. Deliverables (for the teacher and the ICGC)

- A **video** presenting the ICGC and its role in regard to MDGs prepared Claudia and Sacha
- A **user guide** prepared by Scott and adapted by Maeva
- A **toolkit** containing a course plan, activities and other teaching material: Maeva and Etta?
- A **Prezi** for each unit used by the teacher and presenting the toolkit content addressed to students

- **Q&A assessment sheets** : Heather and Maeva

In addition to the learning outcomes of primary school, secondary school teachers need to enable their students to :

- Know the digital earth concept and its tools *(apply to MEP)*
- Understand the basic purpose and application of digital earth to real world problems *(apply to MEP)*
- Be able to gather and evaluate information
- Use advanced digital earth tools for learning (starting with Web-GIS, GIS viewers to GIS software)
- Manipulate maps: display information on maps ; create own maps; communicate cartographic information
- Understand the construction of digital maps as a representation of the world
- The power of maps (reliability of data, classification and colour schemes): Topology: points, lines, polygons ; Layers ; Database
- Know about the professional use of GIS and other digital earth tools
- Gather information from data resources or through fieldwork activities (use GPS devices, mobile applications)
- Use digital earth tools for investigation/research :Identify and ask significant questions that clarify various points of view and lead to sustainable solutions ; Frame, analyze and synthesize information in order to solve problems and answer questions.

Digital-Earth.eu

3.1. Video

1.1.   http://www.youtube.com/watch?v=lJ_JdfxpjQU

1.2.   MEP user guide content

1.3. Toolkit content: 10th grade Science & Technology

- Course plan

- Lessons and related activities divided into units

- Assessment propositions

- Glossary containing the main specific terms mentioned in the toolkit

N.B. *Words in blue* will be part of the glossary, and this symbol implies the use of the ME 🌐

1.3.1. Course Plan

1.3.1.1. Objectives

Leverage the millennium earth project to help students learn about what is going on in the world specifically as it relates to the millennium goals in the least developed countries.

1.3.1.2. Expectations

✓ **Use the ME as a tool to reach three official objectives**

The ability to seek answers or solutions to a scientific or technological problem

The ability to apply their scientific and technological knowledge

The ability to communicate using the scientific and technical language

✓ **Four main topics will be covered:**

Climate change

Deforestation

Energy

Drinking water

1.3.2. <u>Unit 1 : Introduction to the MDGs (30' min)</u>

1.3.2.1.   Short ICGC presentation (composition and goals)

The Institute for Conscious Global Change is an NGO established in New York that works towards the achievement of the Millennium Development Goals set by the United Nations in 2000, with a deadline fixed in 2015. The ICGC is working more particularly on the 49 Least Developed Countries, which have the poorest and most vulnerable populations and therefore needs the most help from the international community.

The ICGC's goal is to provide an interactive tool called the Millennium Earth providing crucial information regarding the Millennium Development Goals, which will be available to stakeholders working or willing to work towards the development of these countries, like government agencies, NGOs, Universities or citizens. The Millennium Earth uses the Geographic Information System technology to visually represent key indicators based on data collected on field by collaborators and online by researchers. In doing this we are able to map historical data as well as create a projection of what a country can look like in the future if these goals are met. Mapping through GIS can therefore enable more precise (because linked to a geographic point or area), enlightened land-use planning, public policy drafting and poverty-reduction strategies development thanks to the simultaneous aspect provided by different map layers.

1.3.2.2. MDGs Presentation

In 2000, 189 countries made a promise to free people from extreme poverty and multiple deprivations.

Questions:

- Do you think all major topics related to poverty are covered?
- Do you think they only concern poor countries?
- Would you add any other goal?
- Do you think 15 years was a reasonable time frame to achieve them?
- Would you have set it longer or shorter? Why?

1.3.2.3. Post-2015 agenda: the SDGs

The Sustainable Development Goals will be completing the MDGs in the post-2015 development agenda. They are still being debated right now as to what they should be. Columbia, Guatemala and Peru have been the only countries so far making propositions. According to them, the SDGs must be "based on (a) social and economic dimensions; and (b)

conservation and management of resources for development" and cover the following topics:

- Food security
- Energy access, including with renewable sources
- Oceans, including fisheries
- Sustainable human settlements (cities)
- Water, integrated management

Questions:

- Do you agree with these goals? Would you add/remove any?
- What link can you make with the MDGs?
- Should North countries, including Canada, also target these goals?
- Should developed and developing countries have the same constraints? (Regarding consumption, energy, fisheries…)

1.3.3. <u>Unit 2: GIS and International development (60' min)</u>

1.3.3.1. Presentation of GIS

Definition

A geographic information system (GIS) is a collection of interacting and interdependent geographic components used to describe the earth. It integrates hardware, software, and data for capturing, managing, analyzing, and displaying all forms of geographically referenced information.

Why the Millennium Earth Project?

Geography is a lens, revealing the "who, what when, why, and how" of "where." Our GIS attaches the "who, what, and when" to the "where" and allows us to ask "why and how." Until recently this lens has been unable to truly focus on what was happening on the ground and display it in a profound way.

The Millennium Earth Project embraces new technologies and finds innovative ways to implement them in order to bring our focus, our data, to the ground. We utilize the top down data that organizations have been collecting for years in concert with our ground level data to fill in the spatial gaps of global development statistics with the sights, sounds, and stories which collectively compose the narrative of life.

1.3.3.2. Link between GIS Potential and International Development

- How can we measure the progress of MDGs? (Data collection on field activity?)
- How can GIS can be used to monitor the MDGs? What features can be used?
- How can GIS/Our MEP can help achieve MDGs?

1.3.3.3. Exploration of the "Millennium Earth"

Presentation of the Countries:

- Localization of the three prototype countries: Haiti, DRC, Afghanistan

    - Where are they located?
    - What continent are they part of?
    - In which hemisphere are they located?
    - What's their climate? (tropical, temperate,…)
        What consequences this can have on everyday life for the local population and on their efforts of development?

- o Presentation of the countries
  - What do you know about these countries?
  - How are they represented in the media?
  - What do you think about that?
- o LDCs and MDGs
  - What are the biggest issues they are facing?

- Use of the MEP prototype:
  - o Haiti: display basic information (population, poverty rate, health indicators, environmental indicators…)
  - o Saint Raphaël in the Nord Department: more detailed information and more complete portrait of each MDG for this particular area
  - o Let students explore the maps

1.3.4.   Unit 3: Climate change (60' min)

1.3.4.1.   Climate Change in the Least Developed Countries : Introduction

Climate Change, A Key Challenge for the Attainment of MDGs

As 2012 has seen record-breaking temperatures across the US, climate change and its collateral damages are getting harder to avoid. This is even truer for developing countries. So to what extent is it affecting them and what are the consequences for the global development agenda?

Questions

- Do you remember of any events that happened here or in the world and that can be linked to climate change?
- Did these events make damages?
- Do you think here in Canada we are safe? Why? Why not?
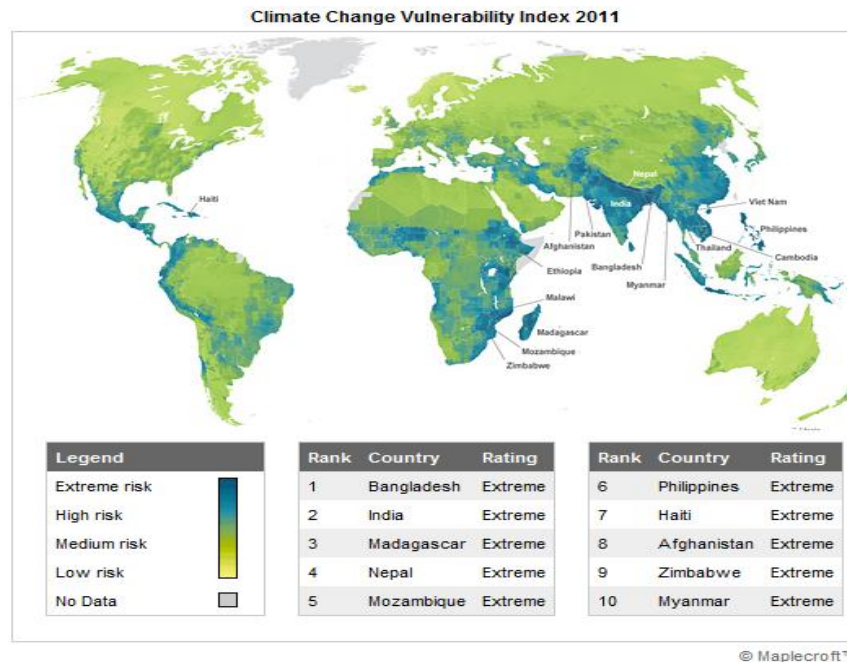
How is Climate Change Affecting Developing Countries?

Climate change effects can be observed through different forms and at different time and space levels. They are particularly hitting developing countries and LDCs through the following events:

- Longer droughts and/or more frequent floods according to the concerned area

- Increased water-stress

- Expanding parasites range

- Crop decline and increase of arid and semi-arid lands

- Sea-level rise threatening low-lying areas like deltas and small-island states

- More frequent tropical storms due to warmer ocean temperature

- Higher risks of social conflicts over natural resources and land use and increasing number of climate-refugees

Unfortunately, given the amount of greenhouse gas emissions already emitted these effects are expected to amplify over time due to positive retroactions - i.e. mechanisms triggered by climate change and amplifying climate change in return, following a cyclic pattern. Considering this, they need to be addressed as soon as possible in poverty-reduction strategies through an adaptation process, aiming at merely preparing population to face these inevitable effects.

Why are LDCS Particularly Vulnerable to Climate Change?

Climate Change Vulnerability Index 2011

Legend	
Extreme risk	
High risk	
Medium risk	
Low risk	
No Data	

Rank	Country	Rating
1	Bangladesh	Extreme
2	India	Extreme
3	Madagascar	Extreme
4	Nepal	Extreme
5	Mozambique	Extreme

Rank	Country	Rating
6	Philippines	Extreme
7	Haiti	Extreme
8	Afghanistan	Extreme
9	Zimbabwe	Extreme
10	Myanmar	Extreme

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http://maplecroft.com/about/news/ccvi.html

Three factors are making LDCs particularly vulnerable to climate change, namely:

- Their Low Adaptive Capacity:

This factor is the result of various parameters including the poor and/or lack of infrastructures (in terms of housing, energy, health and emergency), low human capital (in terms of education and personal security), low technological development and low institutional and social capital (in terms of governance and decision-making).

- Their High Exposure :

Africa, Asia and Small Island States are particularly hit by climate change because mainly located in the tropical areas of the world which are subject to intense climatic activity (drought, flood, heat, hurricanes, monsoon, El Niño...). High mountain regions depending on glaciers are also particularly vulnerable to climate change as their balance is tightly linked to hydrological cycles, atmospheric dynamics and thermal characteristics.

- Their High Sensitivity:

Climate change-induced events are generally directly felt by LDCs population with immediate consequences in terms of victims, damages and costs determined by the two previous factors.

What is the link between MDGs and climate change?

Climate change directly affects four key components of poverty-reduction strategies, namely: water, food, energy and human securities which compose the basis of Millennium Development Goals or at least play a role in their respective achievements. Water security is a perfect example of climate change multi-sectoral nature. Although it is targeted by MDG#7 (drinking water and sanitation), it plays a prominent role in the achievement of:

- MDG1 (End Poverty and Hunger): Irrigation and food production are directly dependant on water quantity, quality and availability;
- MDG2 (Universal Education) and MDG3 (promote gender equality and empower women): water chores are mostly borne by children and women, preventing them from going to school or attend other activities (paid-job, community implication). With increased water stress, women and children are likely to be required to spend even more time to fetch water because of further or deeper water sources;
- MDG 4, 5 (Child and Maternal Health) and 6 (Combat Major Diseases): access to water in sufficient quantity and of good quality is a primordial health factor, including in terms of prevention and hygiene;
- MDG9 (Infrastructures): Basic infrastructures like hospitals and schools are highly dependent on water accessibility to function correctly.

Therefore, a holistic approach should be set as a priority in poverty-reduction strategies by not only considering climate change in the perspective of environmental sustainability, embodied by MDG7, but by making a mainstream implementation at all MDGs levels to enable the emergence of effective adaptation and sustainable development.

Questions

- What effects do you think climate change has on these countries?
- Are they prepared to face these impacts?
- Why are they vulnerable?
- How is climate change linked to MDGs?
  - How do you think you can help?
  - Can you name other relationships between MDGs regarding climate change impacts?
- How do you think you can help?
- Can you name other relationships between MDGs regarding climate change impacts?

1.3.4.2. Learning Objectives Regarding Climate Change

The ability to seek answers or solutions to a scientific or technological problem
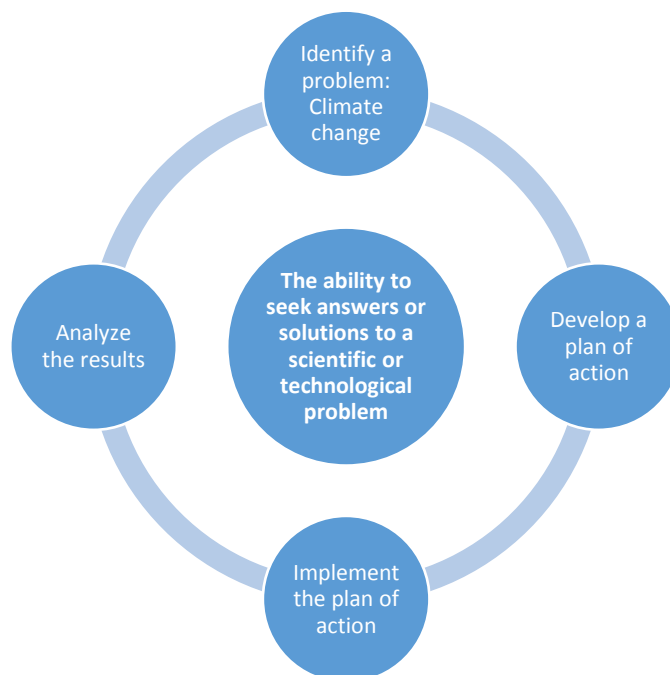
1. Identify The Problem: Climate Change

- Consider the situation context: *LDC*, geography (Haiti in tropical area, Caribbean sea)
- Identify initial data: temperatures, precipitations
- Identify the links between them: link between climate change and hurricanes, droughts, floods, wildfires
- Reformulate the problem using the proper terminology: effects of *GHG* emissions on ocean temperature, *water cycle*, *thermodynamics*
- Propose explanations or possible solutions: where do GHG come from? *Anthropic warming* (ex:burning of fossil fuels from human activities) vs *natural warming* (Earth regulating system). Who is more responsible for these emissions? Haiti and other LDcs or developed countries? (also mention GHG-emitting activities in LDCs but at a lower scale)

2. Develop a Plan of Action

- Explore possible explanations: where are populations settled (near shores/rivers)? What materials are used to build their homes? What is their primary source of food? What is their primary source of energy? How does it affect climate change and populations security? (buffering effects of trees and mangroves + coral reef/ *ocean acidification*) Identify the main *risks* threatening the population
- Explore possible solutions: how can populations *adapt* to climate change and prepare themselves to be less *vulnerable* and more *resilient*?
- Identify the most dangerous and most secure areas for Saint Raphaël population and what is needed to face the adverse effects of climate change (*dykes, watershed management, ecosystem conservation, strategic settlement, emergency infrastructures*, etc…?)
- Choose an option and identify the steps required to reach the objective
  Example: reduce flood risk

- Identify areas most at risk of floods according to the maps: Should this area be expanded? To what extent? Why (climate change amplification)?
- Short-term: Can we "adjust" or fix the situation with Dykes, elevated houses, emergency measures regarding health and security?
- Long-term (considering a worsening of the situation): Consultation of the population (How can we motivate population to move from these areas? Who should be part of this process (local authorities, government, citizens, international aid)? What role would each *stakeholder* have?
- Where should population be authorized to settle to be in security?
- (To Be Considered: How many people are concerned? Is there any natural hazards that need to be considered (earthquake, hurricane)?

3. Implement the Plan of Action

- Apply the previously identified steps and answer the questions
- Collect data if necessary
- Take notes of observations
- Ex: Establish a code of color for areas at risk, justify your choice

4. Analyze the Results

- Search for significant correlations, links
- Identify possible limits/difficulties
- Conclusion

4.1.1. <u>Unit 4: Deforestation & Energy (60')</u>

The Ability to Apply Their Scientific and Technological Knowledge
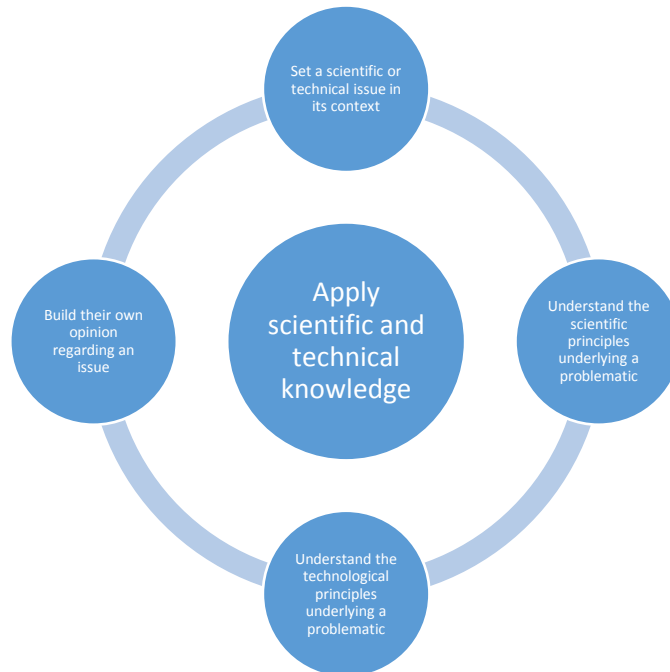
1. Introduction

Where are the three biggest forests in the world?

- Location
- Statistics: area, biodiversity (number of species), CO2 capacity

What role do trees play? How do we benefit from forests? What tree by-products do we use?

What is Deforestation?

Deforestation refers to the cutting, clearing, and removal of rainforest or related ecosystems into less bio-diverse ecosystems such as pasture, cropland, or plantations (Kricher, 1997)

- **Understanding the causes and consequences of deforestation**

What are the causes of deforestation?

Are they the same here in Canada than in developing countries?

What can you do to stop or at least lessen deforestation?

<u>ACTIVITY</u>

What was the forest cover in Haiti in 1930? 1990? 2000?

What activity/use can explain this phenomenon?

What consequences do you think deforestation have on people livelihood (in terms of agriculture, natural disasters vulnerability, etc.)? On biodiversity? On water resources?

3. Best practices and "solutions"

What could be done to reverse this trend?

A couple examples of best practices:

- **The Satoyama Initiative**: promotes the sustainable management of forests to benefit downstream ecosystems and communities. It relies on five socio-ecological perspectives, namely:

  • Resource use within the carrying capacity and resilience of the environment

  • Cyclic use of natural resources

  • Recognition of the value and importance of local traditions and culture

  • Multi-stakeholder participation and collaboration in sustainable and multi-functional management of natural resources and ecosystem services

  • Contributions to sustainable socio-economies including poverty reduction, food security, sustainable livelihood and local community empowerment

- **Holistic management:** promotes cattle management to improve soil quality and combat desertification, enabling weeds and trees to grow and crops to be planted.

[Include 3:25' video presenting how it works: http://www.rtcc.org/how-copying-nature-can-stop-desertification-in-its-tracks/]

- Identify locations in St Raphael where these best practices could be implemented
- What would be the benefits to:
  - The environment?
  - The farmers?
  - The community?
- Why and how could the surrounding villages benefit from it too?
- Given that wood is a major source for energy in Haiti and in LDCs in general, how could these initiatives help combat deforestation while providing new sources of energy?
  - E.g. Satoyama Initiative: reforestation with fast growing species of trees allows for rotating cutting of trees. Different parcels of lands are designated to be used alternatively. Once a parcel is cut a given year, it is replanted and only cut again after two or three years, allowing for the regeneration of trees and constant presence of forests.
  - E.g. Holistic management: part of cattle manure can be used to power gas stove. However, manure is also essential to the biological process on which rely holistic management. This must therefore be taken into consideration also.

4.1.2. Unit 5: Drinking Water

The ability to communicate using the scientific and technical language
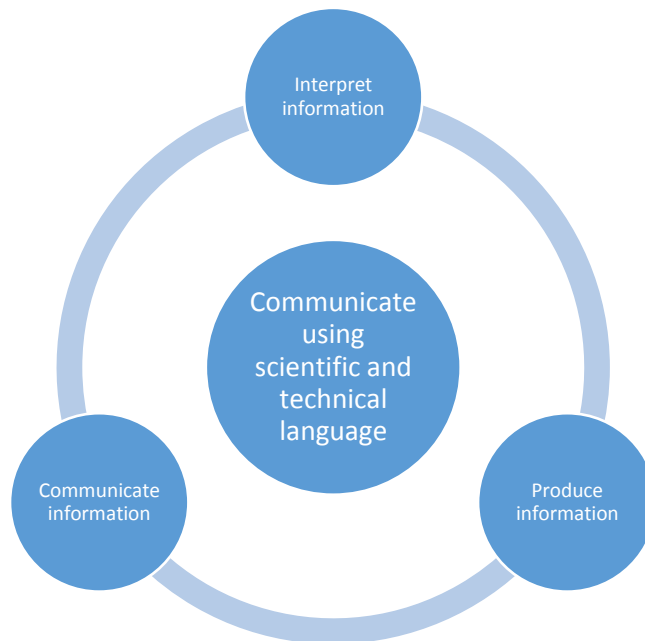
ACTIVITY

- Explore the following document: (5')

    http://www.who.int/water_sanitation_health/monitoring/jmpfinal.pdf

    - What's the title?

    - What issue does it cover?

    - What is its purpose?

- Identify: (15')

    - Information that can be used to make a GIS map

    - At what geographic and temporal scales this would be used?

    - What kind of information would it provide?

    - What is the difference between a GIS map and the kind of maps included in this report?

    - How can it be used?

- In the table page 28 to 40, find the information related to: (15': 5' for each country)

- Afghanistan

- Haiti

- Democratic Republic of Congo

- What can you say from these figures and their ability to reach MDG7?

- Regarding St Raphael, are these figures consistent with what you see in the ME? (25')

    - Why or why not?

    - How can you relate it to other MDGs? (Environment, Education, Health, Poverty, Infrastructures…)

    - Explain your point of view to your fellow students by using what you've learned in the previous sessions.

    - How can the issue of access to drinking water can be addressed?

    - What are the barriers to it?

    - How would you overcome them?

4.2.   Q&A assessment sheets content:

[To be defined with Heather]

- For the teacher
- For students