Spatial Technologies

Lorraine Chaffer
GTA NSW President 2017

http://www.bellsfire.co.za/.cm4all/mediadb/ire-earth-globe-wallpaper.png

Geography is visual

VISUAL TOOLS

Photos
Video clips / animations
Maps
Graphs
Diagrams / 2D & 3D
Illustrations /Picture books
Models
Interactive websites / Apps
Spatial technologies
Fieldwork
Websites / textbooks

The Geography advantage

Spatial technologies

Spatial technologies are geographical **tools**, to be used by students along with maps; graphs and statistics, fieldwork and visual representations such as diagrams to **acquire, process and communicate geographical information** (undertake geographical inquiry) .

SYLLABUS : SPATIAL TECHNOLOGIES – ST

Spatial technologies include any software or hardware that interacts with **real world locations**.

Examples include, **but are not limited to**, virtual maps, satellite images, global positioning systems (GPS), geographic information systems (GIS), remote sensing and augmented reality.

Spatial technologies are used to visualise, manipulate, analyse, display and record spatial data.

Tools continuum

K–10 GEOGRAPHICAL TOOLS CONTINUUM

	Maps M	Fieldwork F	Graphs and Statistics GS	Spatial Technologies ST	Visual Representations VR
Stage	**Examples may include:**				
ES1	• pictorial maps	• observing and recording data	• tally charts • pictographs	• virtual maps	• photographs • illustrations • story books • multimedia
1	• pictorial maps, large-scale maps, world map, globe	• observing, collecting and recording data, conducting surveys	• tally charts • pictographs • data tables • column graphs • weather data	• virtual maps • satellite images	• photographs • illustrations • diagrams • story books • multimedia • web tools
2	• large-scale maps, world map, globe, sketch maps • maps to identify location, direction, distance, map references, spatial distributions and patterns	• observing, measuring, collecting and recording data, conducting surveys or interviews • fieldwork instruments such as measuring devices, maps, photographs	• tally charts • pictographs • data tables • column graphs • simple statistics	• virtual maps • satellite images • global positioning systems (GPS)	• photographs • illustrations • diagrams • story books • multimedia • web tools
3	• large-scale maps, small-scale maps, sketch maps, political maps, topographic maps, flowline maps • maps to identify location, latitude, direction, distance, map references, spatial distributions and patterns	• observing, measuring, collecting and recording data, conducting surveys and interviews • fieldwork instruments such as measuring devices, maps, photographs, compasses, GPS	• pictographs • data tables • column graphs • line graphs • climate graphs • multiple graphs on a geographical theme • statistics to find patterns	• virtual maps • satellite images • global positioning systems (GPS)	• photographs • aerial photographs • illustrations • flow diagrams • annotated diagrams • multimedia • web tools

	Maps M	Fieldwork F	Graphs and Statistics GS	Spatial Technologies ST	Visual Representations VR
Stage	**Examples may include:**				
4	• sketch maps, relief maps, political maps, topographic maps, flowline maps, choropleth maps, isoline maps, précis maps, cartograms, synoptic charts • maps to identify direction, scale and distance, area and grid references, latitude and longitude, altitude, area, contour lines, gradient, local relief	• observing, measuring, collecting and recording data, developing and conducting surveys and interviews • fieldwork instruments such as weather instruments, vegetation identification charts, compasses, GPS, GIS	• data tables • pie graphs • column graphs • compound column graphs • line graphs • climate graphs • population profiles • multiple tables and graphs presented on a geographical theme • statistics to find patterns and trends	• virtual maps • satellite images • global positioning systems (GPS) • geographic information systems (GIS)	• photographs • aerial photographs • illustrations • flow charts • annotated diagrams • multimedia • field sketches • cartoons • web tools
5	• relief maps, political maps, topographic maps, choropleth maps, flowline maps, cadastral maps, thematic maps, isoline maps, land use maps, précis maps, special-purpose maps, cartograms, synoptic charts • maps to identify direction, scale and distance, area and grid references, degrees and minutes of latitude and longitude, bearings, aspect, altitude, area, density, contour lines, gradient, local relief	• observing, measuring, collecting and recording data, developing and conducting surveys and interviews • fieldwork instruments such as weather instruments, vegetation identification charts, compasses, clinometers, GPS, GIS or remote sensing	• data tables • pie graphs • column graphs • compound column graphs • line graphs • scatter graphs • climate graphs • population profiles • multiple tables and graphs presented on a geographical theme • statistics to find patterns and trends; and to account for change	• virtual maps • satellite images • global positioning systems (GPS) • geographic information systems (GIS) • remote sensing data • augmented reality	• photographs • aerial photographs • illustrations • flow charts • annotated diagrams • multimedia • field and photo sketches • cartoons • mind maps • web tools

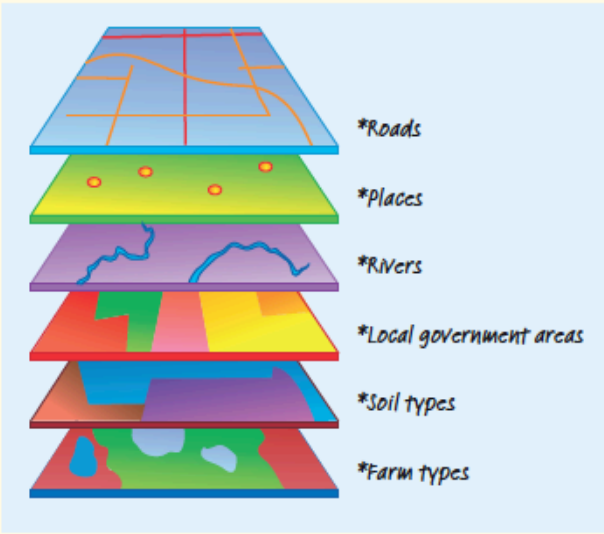
Syllabus p 34 (K-10 documents)

GIS and GPS

GPS

A GPS device locates places via satellite

The device can also **collect data about a place** e.g. latitude, longitude, altitude e.g. Garmin Sports App, phone camera



GIS:

Geographic information system

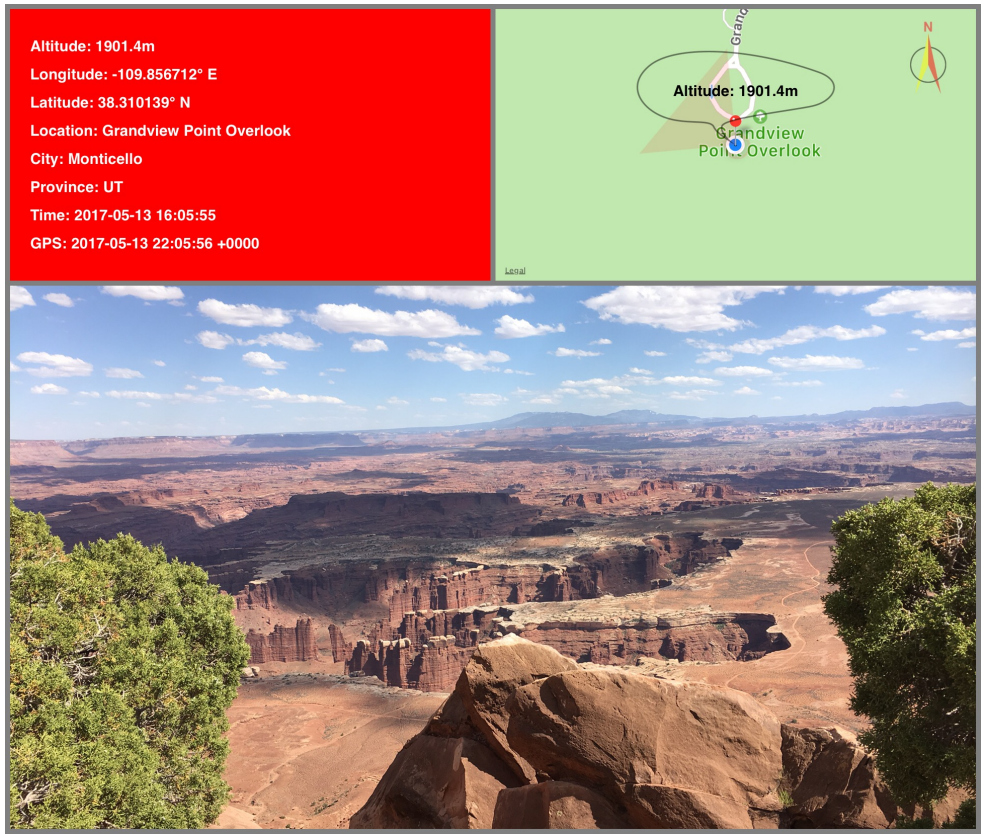
The **digital plotting of spatial data** to create visual images is a GIS e.g. Google Earth

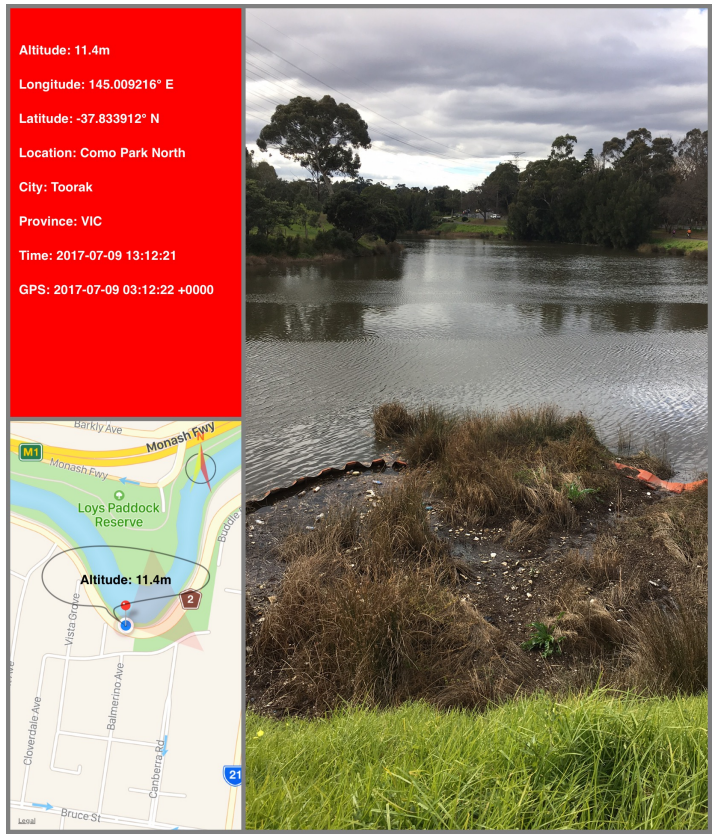
Syllabus glossary

GPS: Navigation systems that provide location and time information anywhere there is a line of sight to GPS satellites.

GIS: Systems for storing, managing, analysing and portraying spatial data.

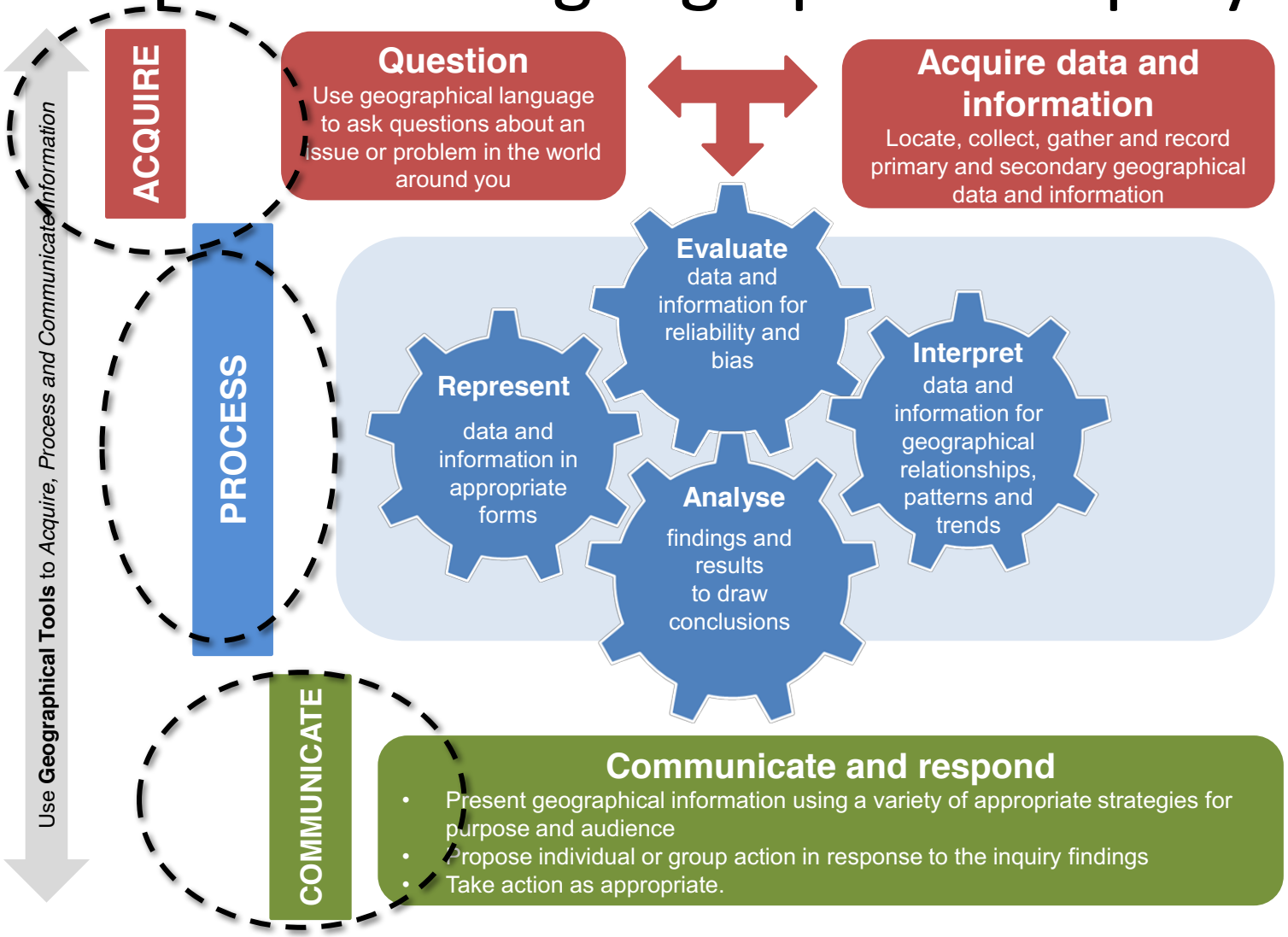
Tablet / phone camera apps & GPS





Altitude DC / GPS Data apps Images by L Chaffer

A process for geographical inquiry



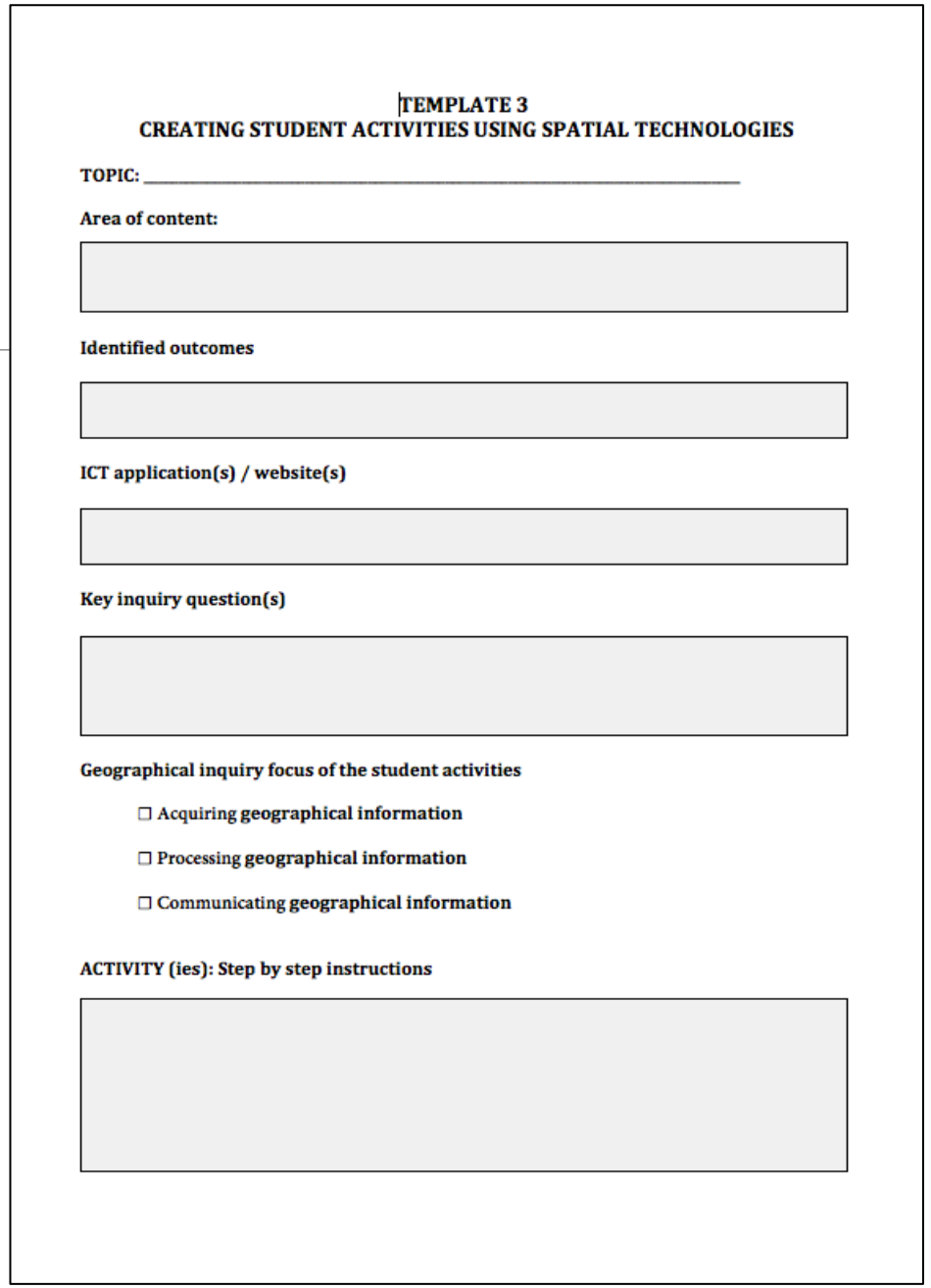
Spatial technologies are tools for inquiry

Image : www.hsiensw.com

Planning

When planning the integration of spatial technologies
link to the syllabus –outcomes, inquiry questions, inquiry focus, content area

Template : Planning scaffold



TEMPLATE 3
CREATING STUDENT ACTIVITIES USING SPATIAL TECHNOLOGIES

TOPIC: _____

Area of content:

Identified outcomes

ICT application(s) / website(s)

Key inquiry question(s)

Geographical inquiry focus of the student activities

- ☐ Acquiring **geographical information**
- ☐ Processing **geographical information**
- ☐ Communicating **geographical information**

ACTIVITY (ies): Step by step instructions

Template on USB created by L Chaffer

Mapping

Map where you could use different spatial technologies in the content areas of the syllabus

Units	National Geographic Mapmaker	Google Earth Elevation OR Global Elevation ESRI	Google Tour Builder	Scribble Maps	Other eg VR
Stage 4					
Water in the world					
Place and liveability					
Landscapes and landforms					
Interconnections					

Template : Mapping grid

Simple Spatial Technologies

SPATIAL TECHNOLOGY APPLICATIONS

SEE DOCUMENT WITH LINKS

http://www.gispeople.com.au/what-is-gis/

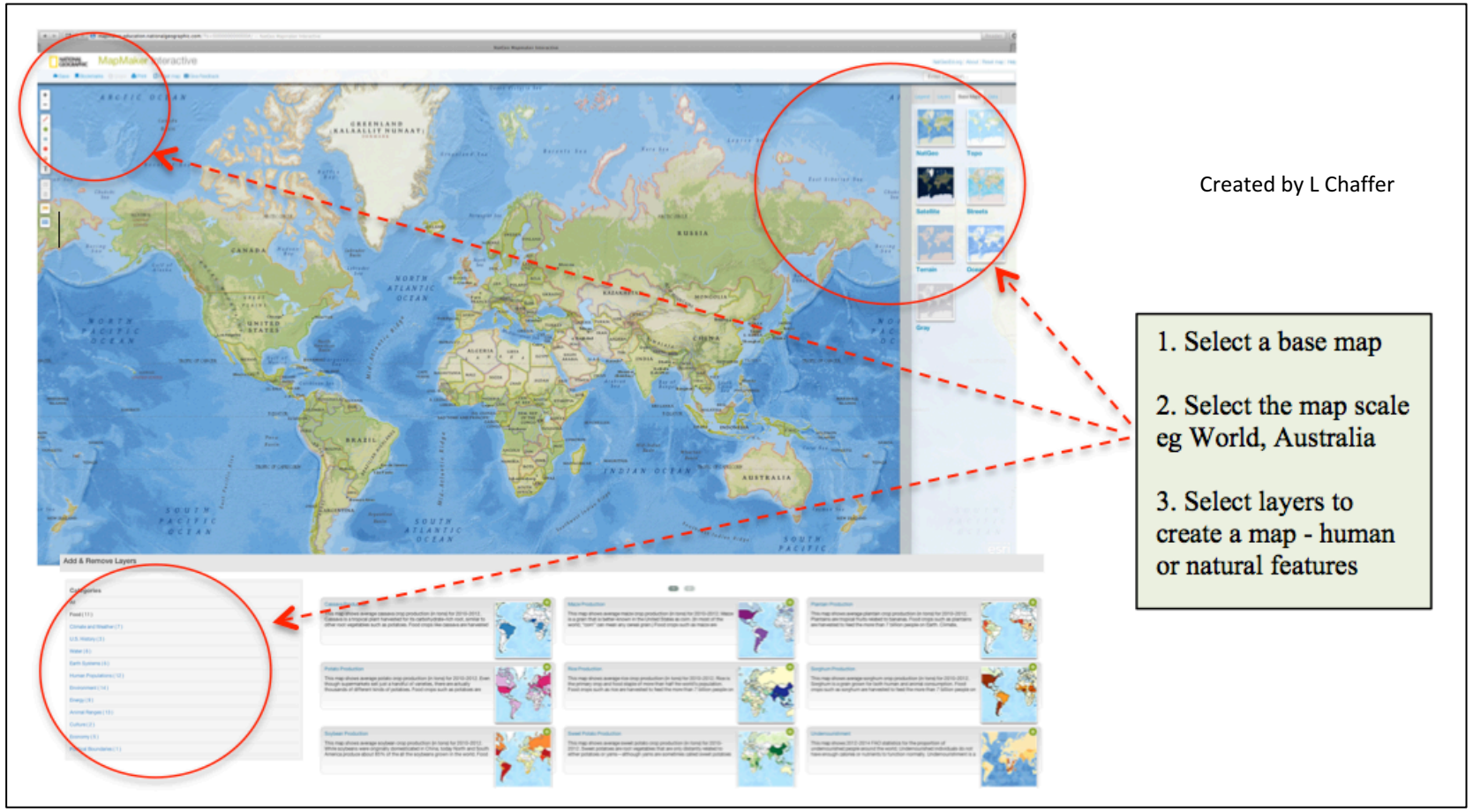
Acquiring, interpreting & analysing

National geographic mapmaker
& similar

Biome viewer app

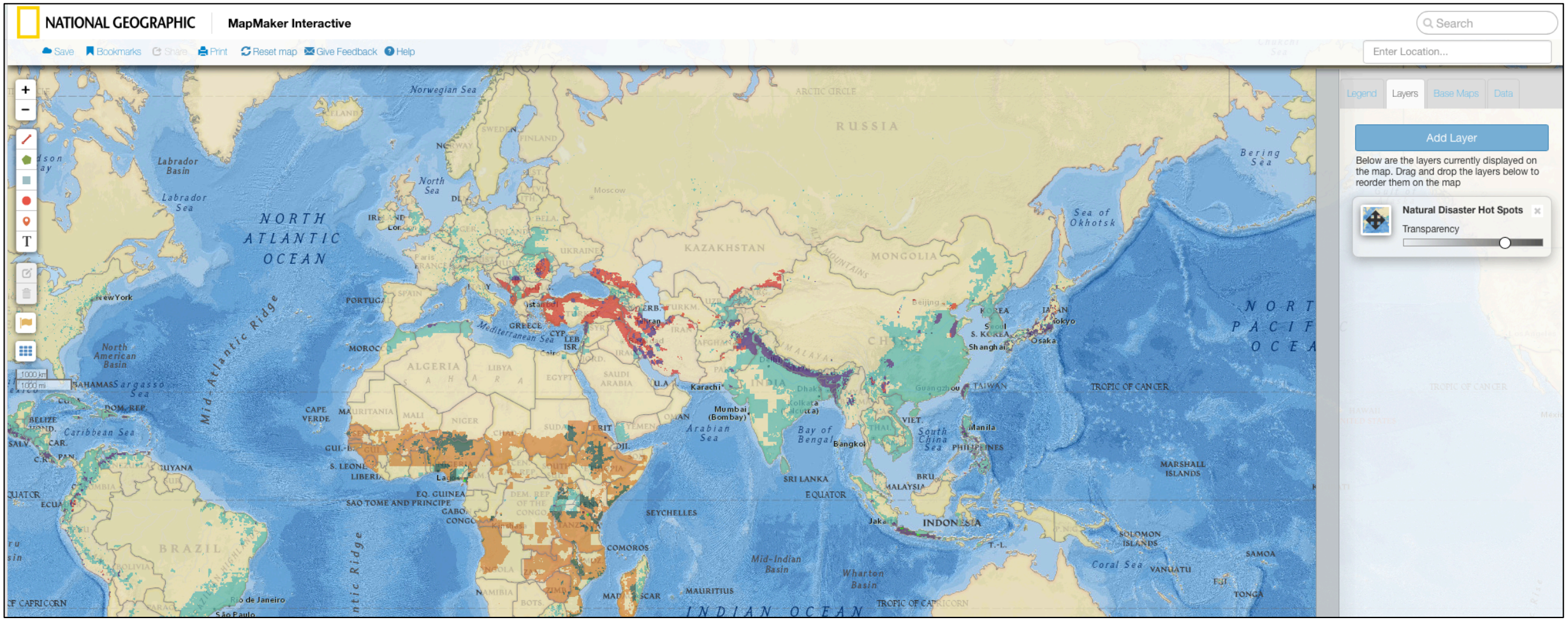
Real world / real time GIS

1.National Geographic mapmaker



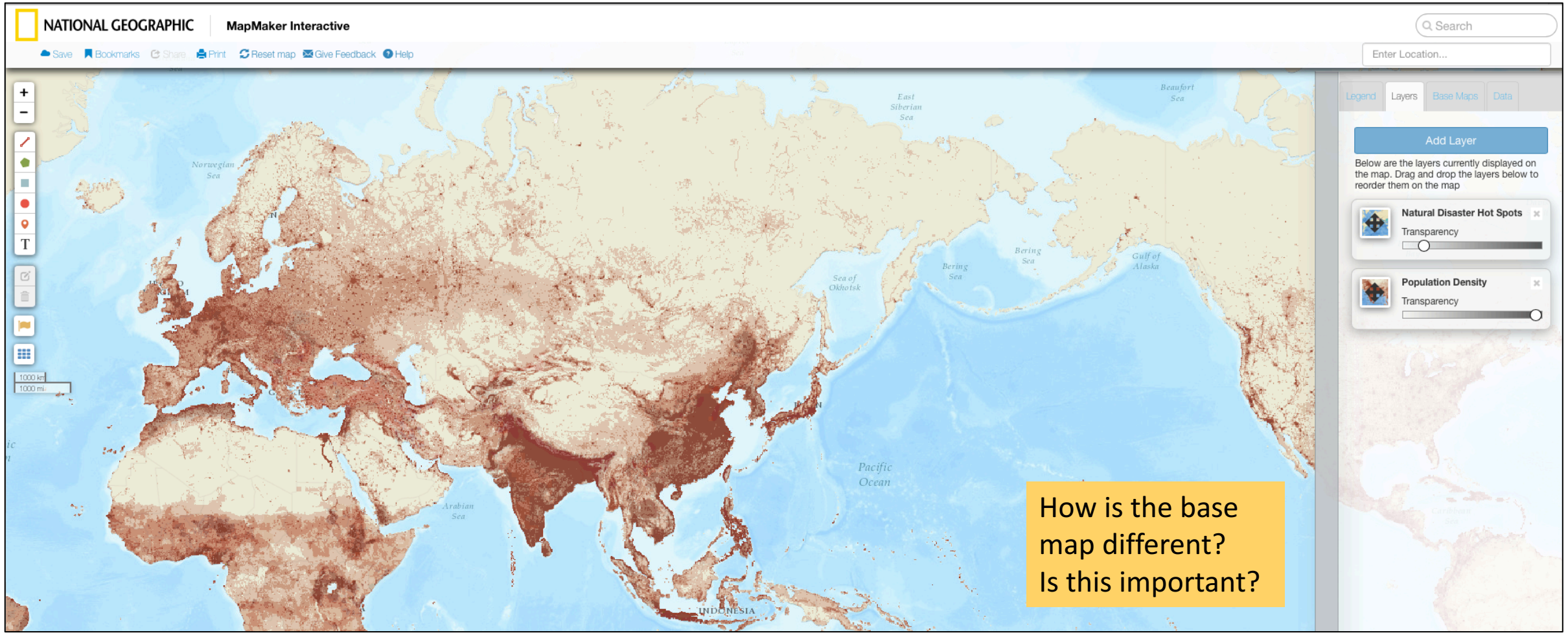
http://mapmaker.nationalgeographic.org

Exploring spatial patterns / answer simple inquiry questions / acquiring information
HOT
Analysing relationships / synthesise interconnections / answer complex inquiry questions



Inquiry question

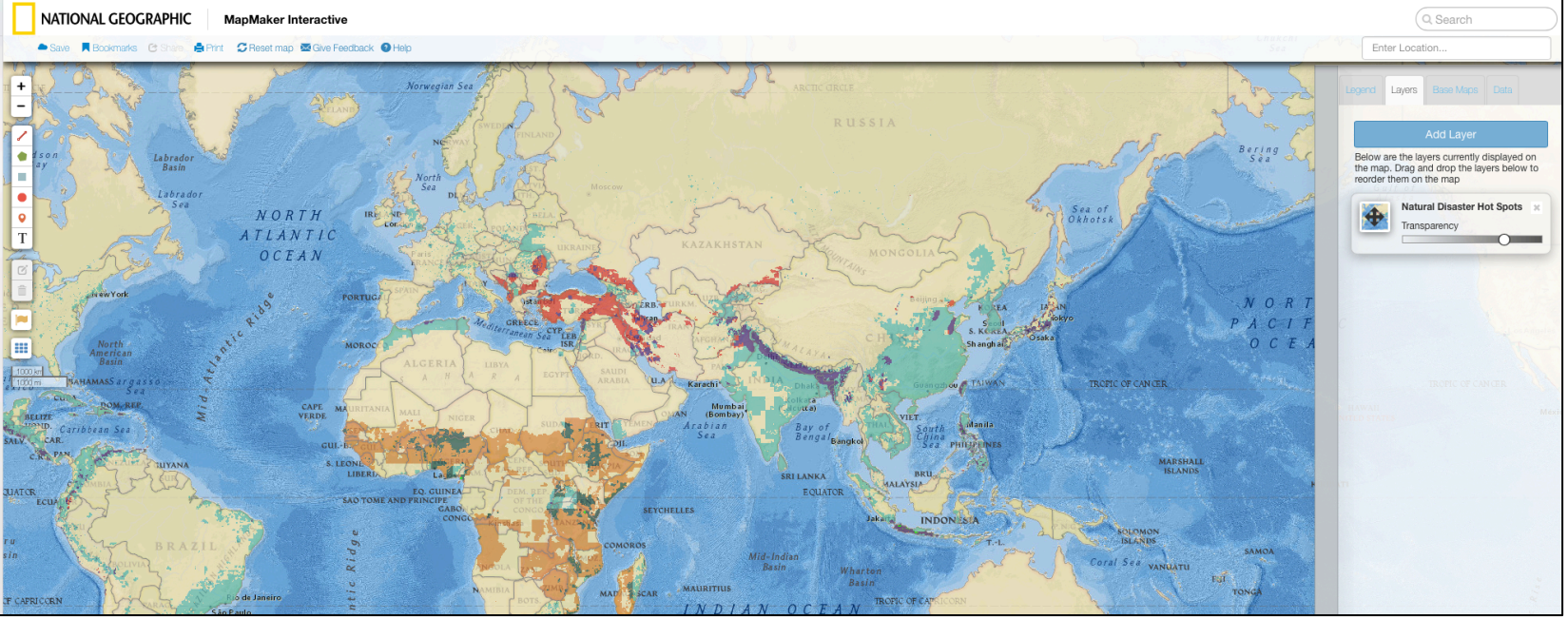
Where are the global hotspots for geomorphic hazards ? (Acquiring information)

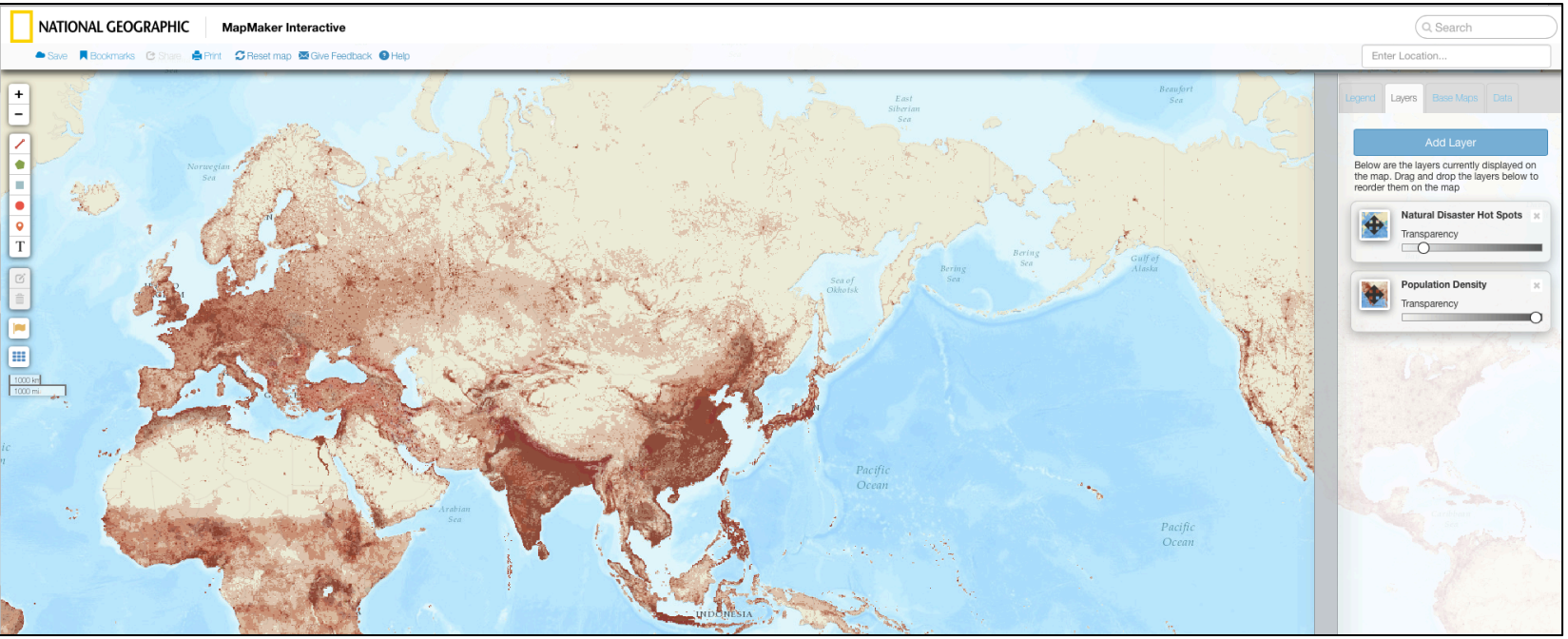


Inquiry question

Where are the areas of greatest population concentration in the world? (Acquiring information)

http://mapmaker.nationalgeographic.org





Inquiry

Synthesise - Where are the greatest numbers of people vulnerable to natural hazards and disasters?

Analyse - Which natural disasters have the potential to impact on the greatest number of people?

Screen capture

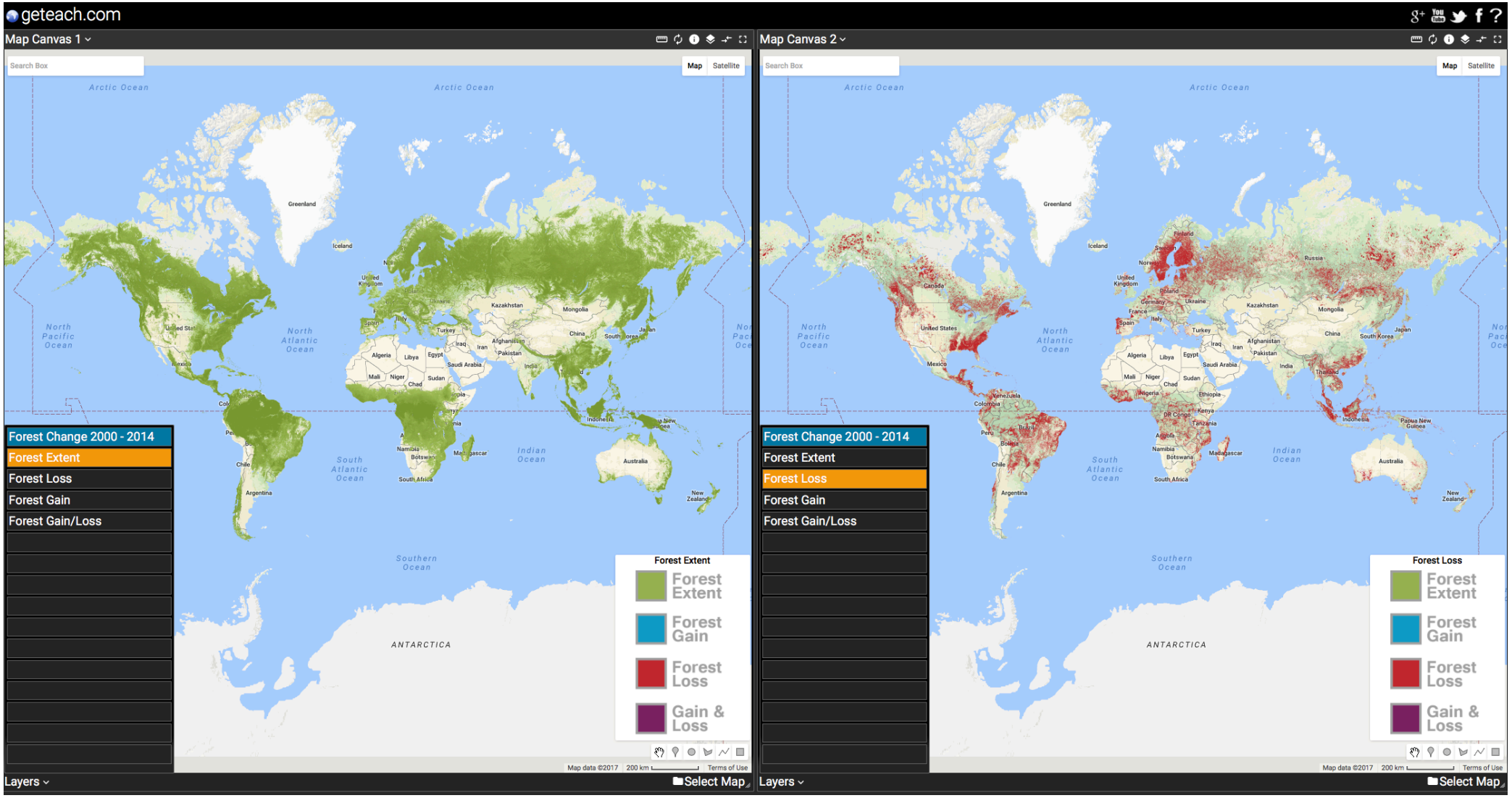
http://mapmaker.nationalgeographic.org

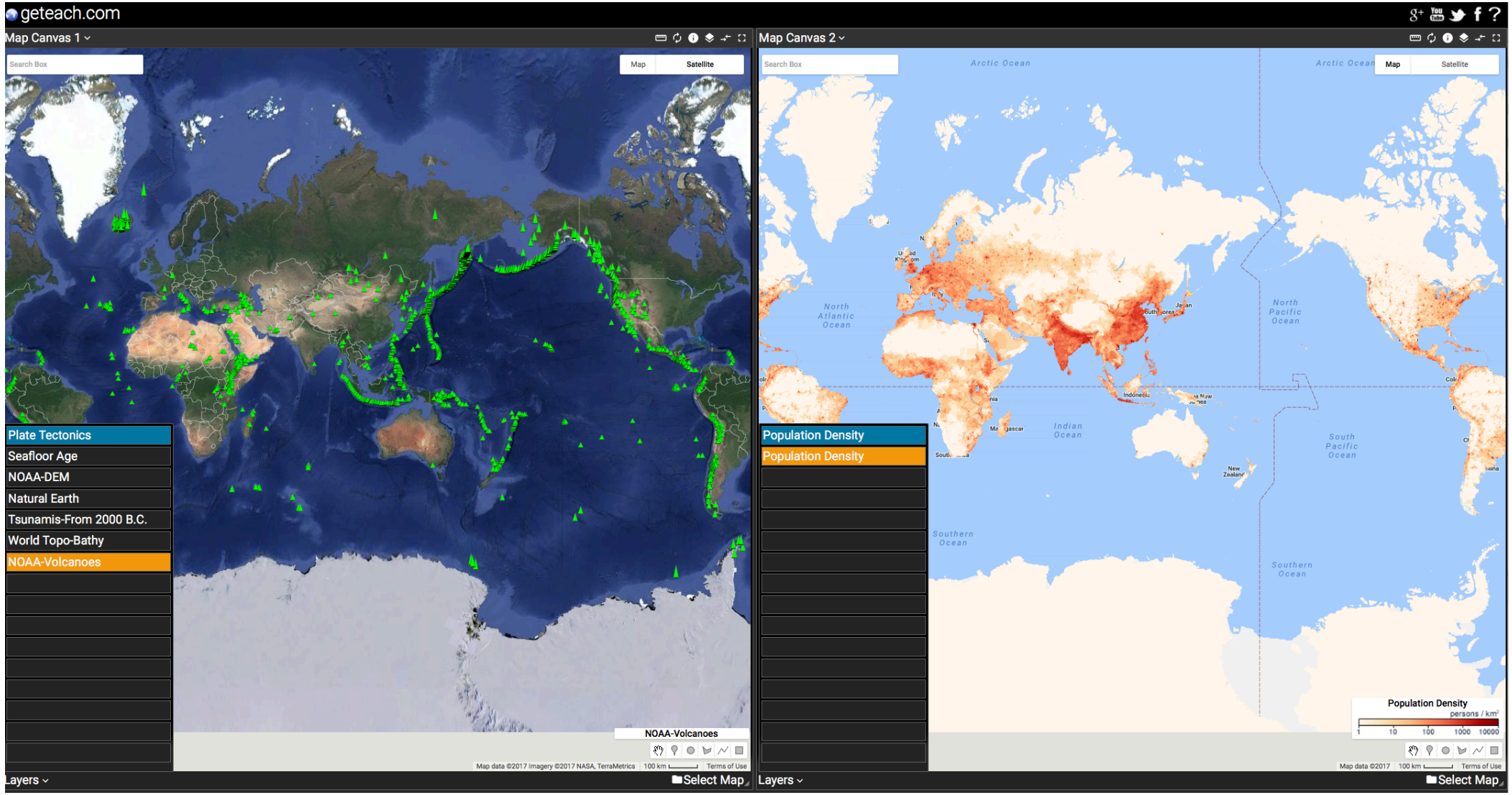
Learn the tool

- Find layers you could use for different content areas
- Find layers that can be used to analyse relationships
- Develop inquiry questions
- Differentiate - challenge talented students

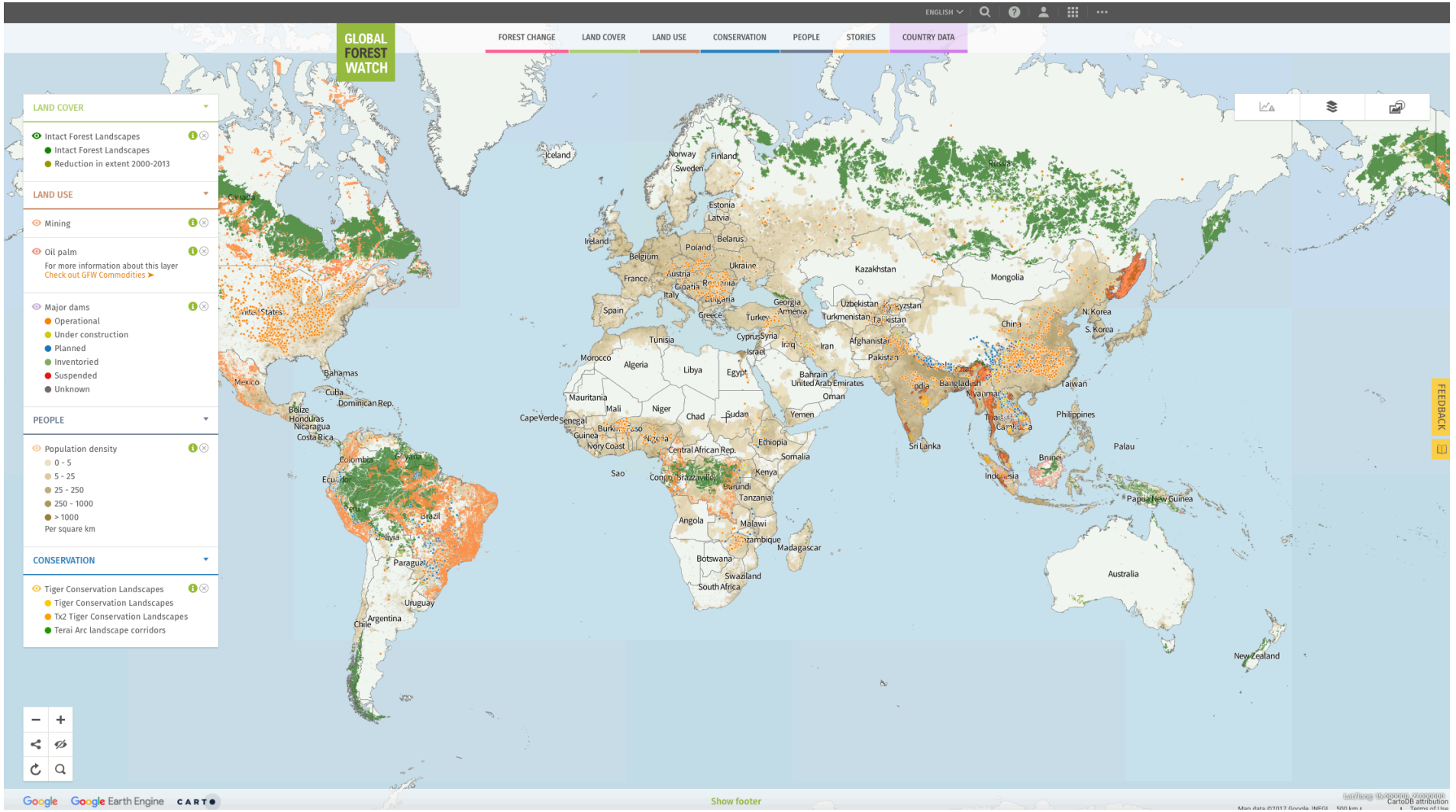
SOMETHING SIMILAR

https://www.geteach.com



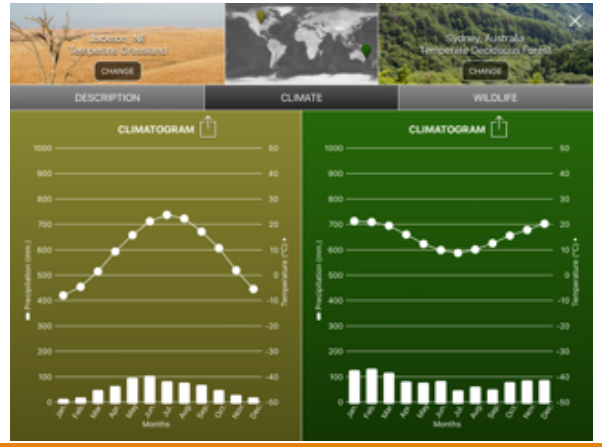

geteach.com
Map Canvas 1
Search Box
Map
Satellite
Plate Tectonics
Seafloor Age
NOAA-DEM
Natural Earth
Tsunamis-From 2000 B.C.
World Topo-Bathy
NOAA-Volcanoes
NOAA-Volcanoes
Map data ©2017 Imagery ©2017 NASA, TerraMetrics
100 km
Terms of Use
Layers
Select Map
Map Canvas 2
Search Box
Arctic Ocean
North Atlantic Ocean
North Pacific Ocean
Indian Ocean
South Pacific Ocean
Southern Ocean
Map
Satellite
Population Density
Population Density
Population Density
persons / km²
1
10
100
1000
10000
Map data ©2017
100 km
Terms of Use
Layers
Select Map

SOMETHING SIMILAR



http://www.globalforestwatch.org

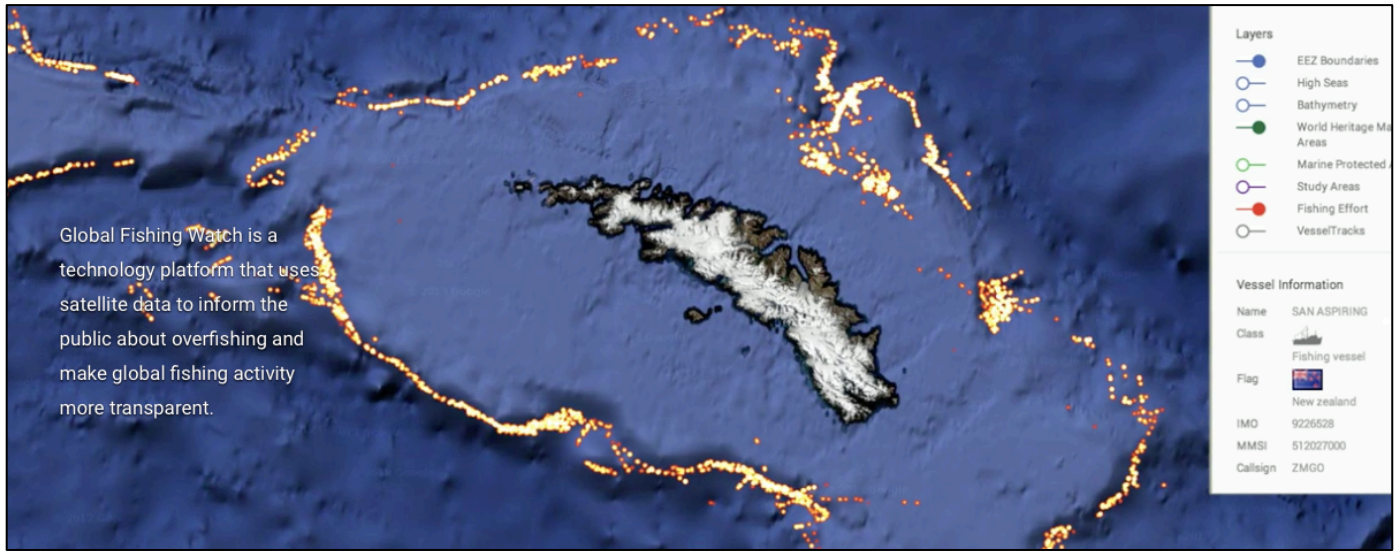
App - Biome viewer (iPad)



Saves time

Deeper analysis

Real world/ real time GIS

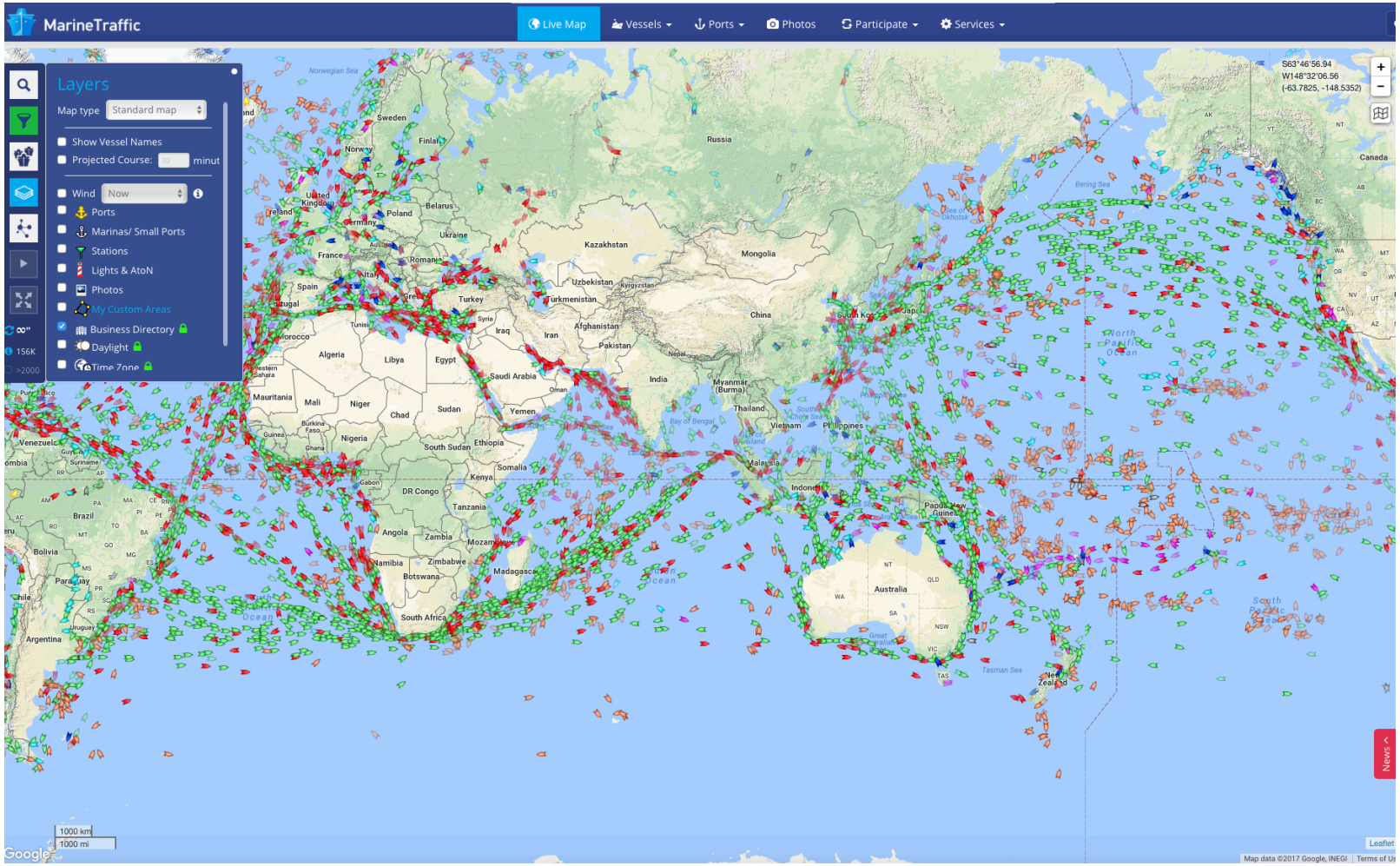


Contemporary issues

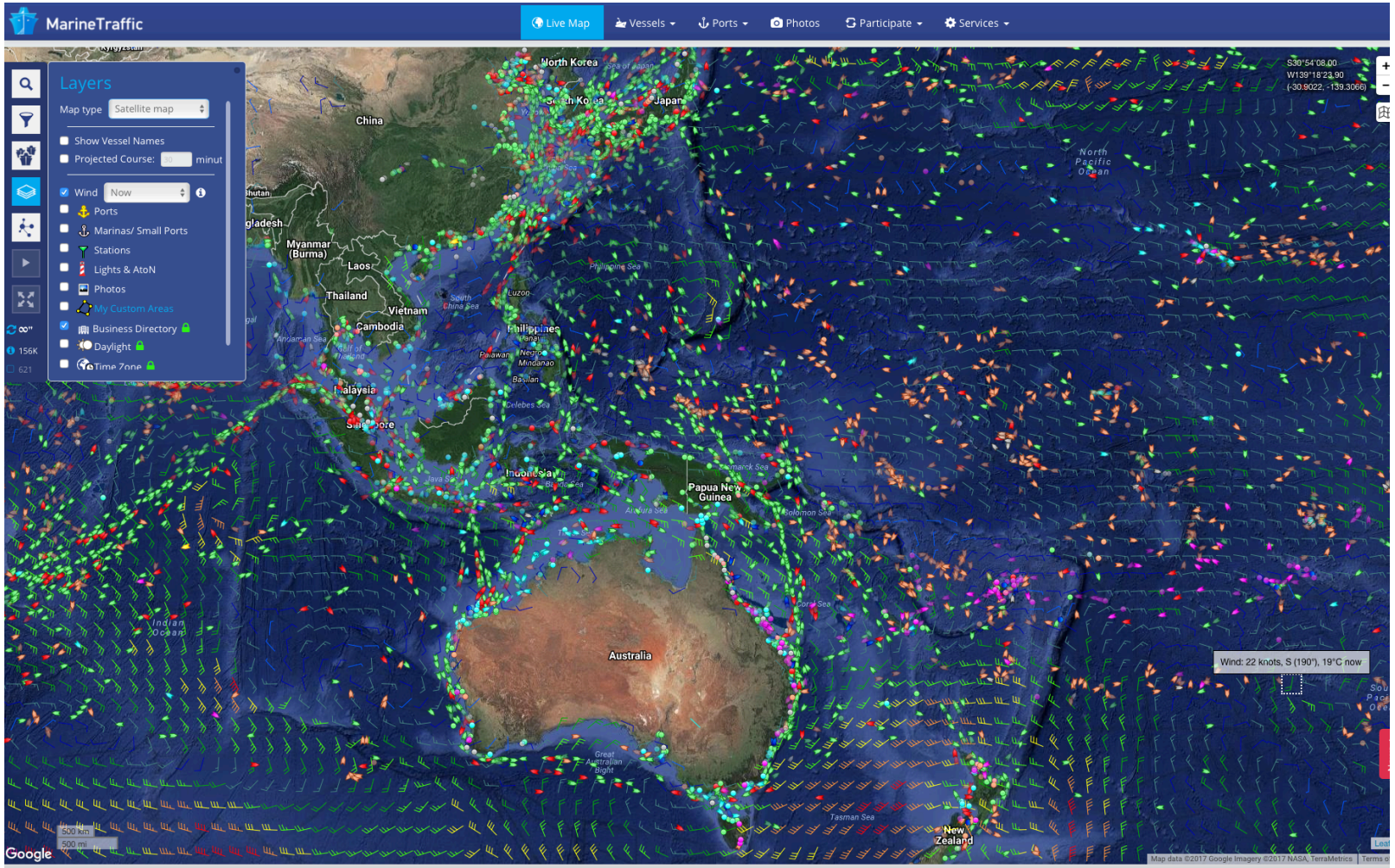
Environmental monitoring : Global fishing watch

http://globalfishingwatch.org

Flights https://www.flightradar24.com/multiview/30.25,266.14/7

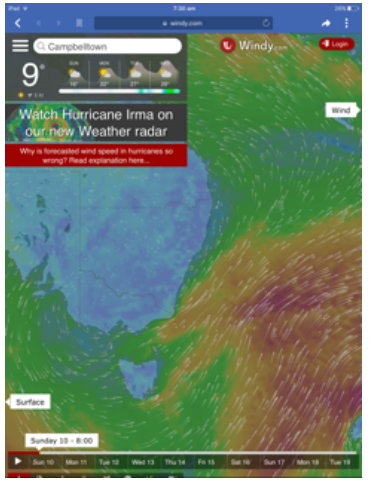


Marine Traffic https://www.marinetraffic.com/


MarineTraffic
Live Map
Vessels
Ports
Photos
Participate
Services
Layers
Map type
Satellite map
Show Vessel Names
Projected Course:
minut
Wind
Now
Ports
Marinas/ Small Ports
Stations
Lights & AtoN
Photos
My Custom Areas
Business Directory
Daylight
Time Zone
156K
621
China
Japan
North Korea
Myanmar (Burma)
Laos
Thailand
Vietnam
Cambodia
Philippines
Malaysia
Indonesia
Papua New Guinea
Australia
New Zealand
North Pacific Ocean
Indian Ocean
Philippine Sea
South China Sea
Celebes Sea
Coral Sea
Tasman Sea
Great Australian Bight
Wind: 22 knots, S (190°), 19°C now
S30°54'08.00
W139°18'23.90
(-30.9022, -139.3066)
500 km
500 mi
Google
Map data ©2017 Google Imagery ©2017 NASA, TerraMetrics

Wind, weather and ocean systems

- Earth – https://earth.nullschool.net
- NOAH Weather Radar (App)
- Weatherzone - weather radar www.weatherzone.com.au
- WOW – ABM web service – information sharing www.bom.gov.au/support/
- Google earth radar – weather layers tab in GE sidebar + animations + forecasts



Representing, analysing and communicating

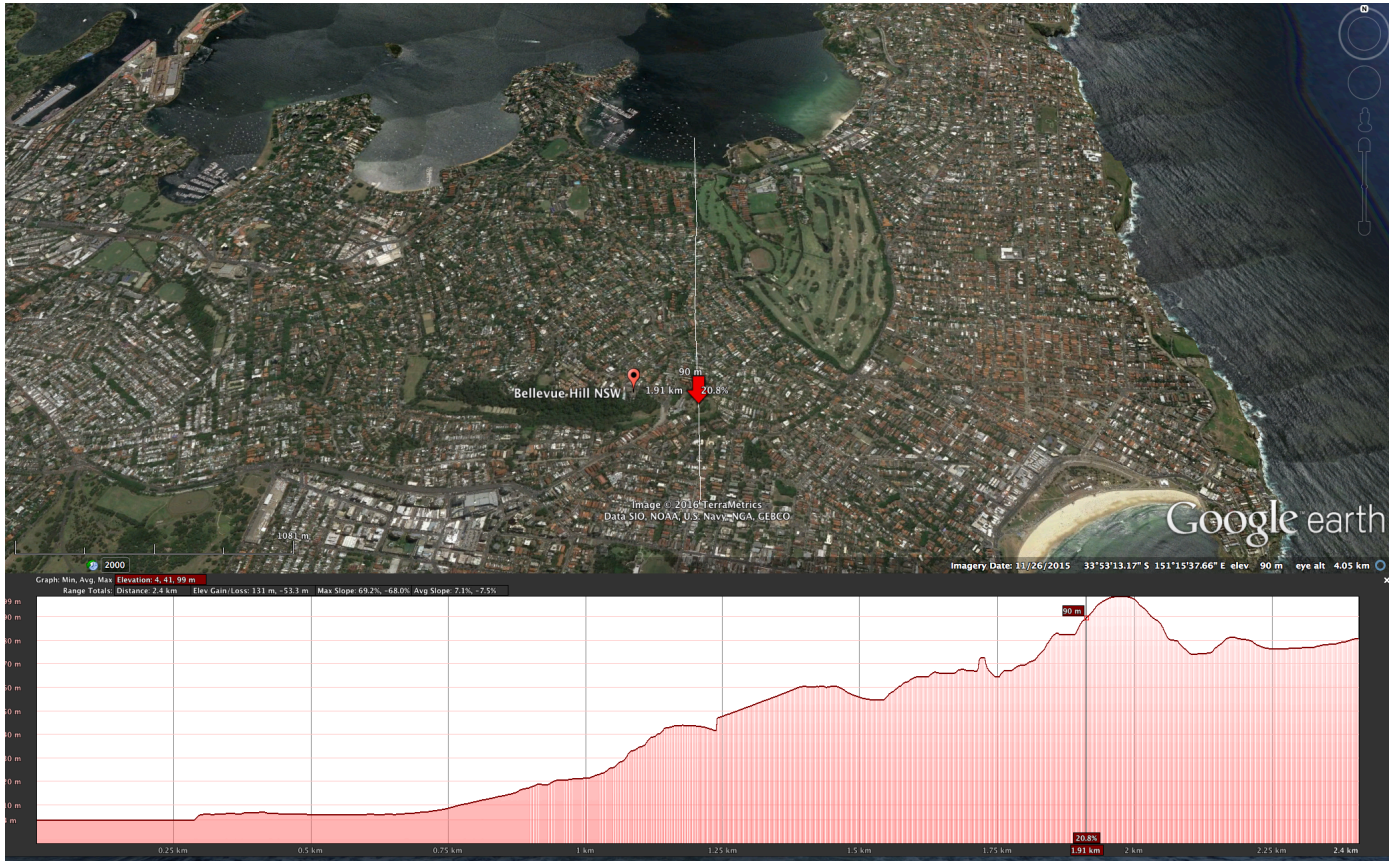
Creating elevation profiles

Google tour builder

Scribble maps

Citizen science

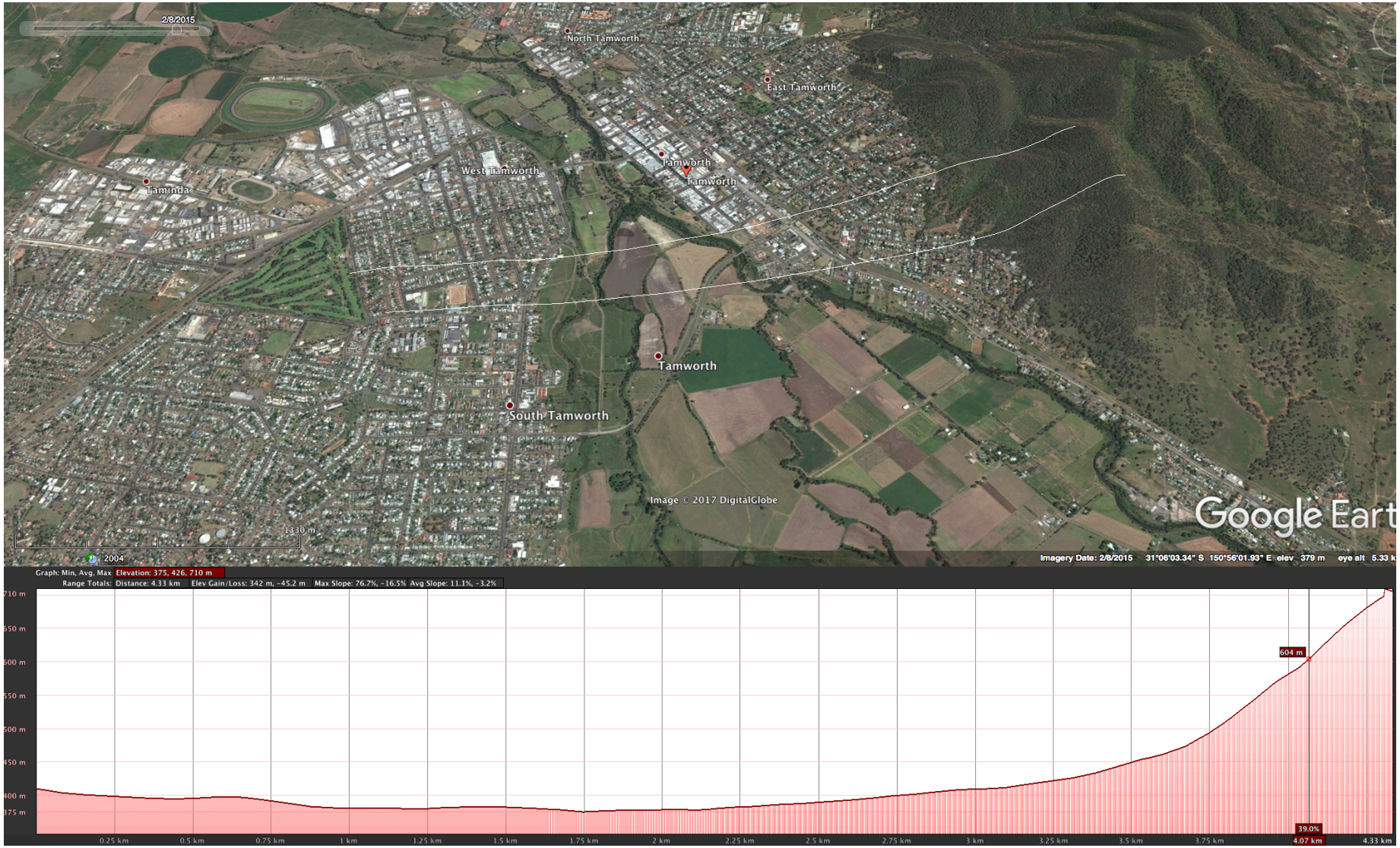
2. Elevation profiles – Google Earth



Where could this be used?

What Geographical inquiry skills are being used?

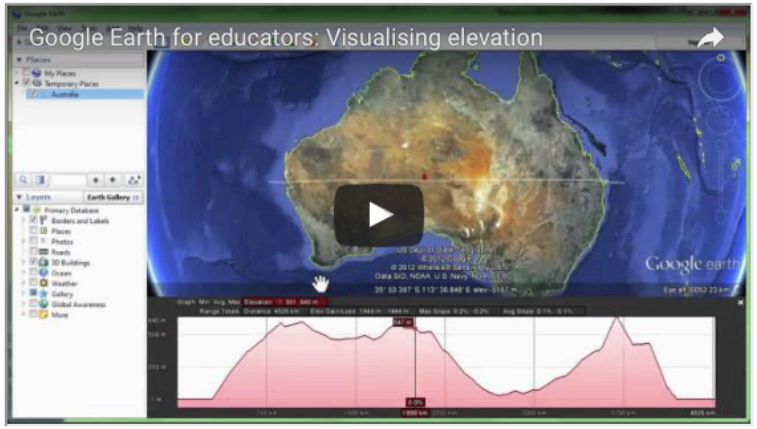
Created using Google Earth



Created by L Chaffer using Google Earth

Google Earth tutorial

Watch the video below to see how to create an elevation profile in Google Earth



http://www.contoureducation.com/resources

SPATIAL TECHNOLOGY APPLICATIONS

1. NATIONAL GEOGRAPHIC MAPMAKER INTERACTIVE (NGMI)

http://mapmaker.nationalgeographic.org

- *Demonstration*
- *Geographical inquiry applications*
- *Links to syllabus content*

Tutorials
https://blog.education.nationalgeographic.com/2014/04/21/mapping-monday-mapmaker-interactive-tutorials/
https://www.youtube.com/watch?v=-MpojaoZ4es

**** SIMILAR:**

- GETEACH
  https://www.geteach.com

- GLOBAL FORST WATCH
  http://www.globalforestwatch.org

BIOME Viewer App

Real world Real time GIS

- Global fishing watch
  http://globalfishingwatch.org
- Flights / Flightradar
  https://www.flightradar24.com/multiview/30.25,266.14/7
- Marine Traffic
  https://www.marinetraffic.com/

2. GOOGLE EARTH ELEVATION PROFILE

USE: Google Earth Pro

- *Demonstration* – how to create a digital cross section
- *Geographical inquiry*
- *Links to syllabus content*

Tutorial

Spatial Technologies webinar Lorraine Chaffer for GTA NSW

Creating an elevation profile in Google Earth
https://www.youtube.com/watch?v=TZZ-dKOp8NY
Blog: Google Earth Elevation Profile
https://www.gearthblog.com/blog/archives/2015/04/google-earth-elevation-profiles.html

**** SIMILAR:**
ESRI GLOBAL ELEVATION (ArcGIS)
http://esriukeducation.maps.arcgis.com/apps/Profile/index.html?appid=f0a2a2a3e1964129b22c715e31282f6c

- *Demonstration*
- *Geographical inquiry*
- *Links to syllabus content*

3. GOOGLE TOUR BUILDER

https://tourbuilder.withgoogle.com
- *Demonstration*
- Fieldwork and inquiry applications - Acquiring, processing and communicating geographical information

Tutorials
https://www.youtube.com/watch?v=-M207eNweBI
https://www.youtube.com/watch?v=EAvuOSMKU4Y
http://googleearthdesign.blogspot.com.au/2014/01/google-earth-tour-builder-howto.html
Interesting Blog - refers to Google Classroom and Google Maps as well.
http://www.edgaged.net/2016/01/tour-builder-with-google.html

4. SCRIBBLE MAPS

https://www.scribblemaps.com

- *Demonstration*
- *Geographical inquiry*
- *Links to syllabus content*

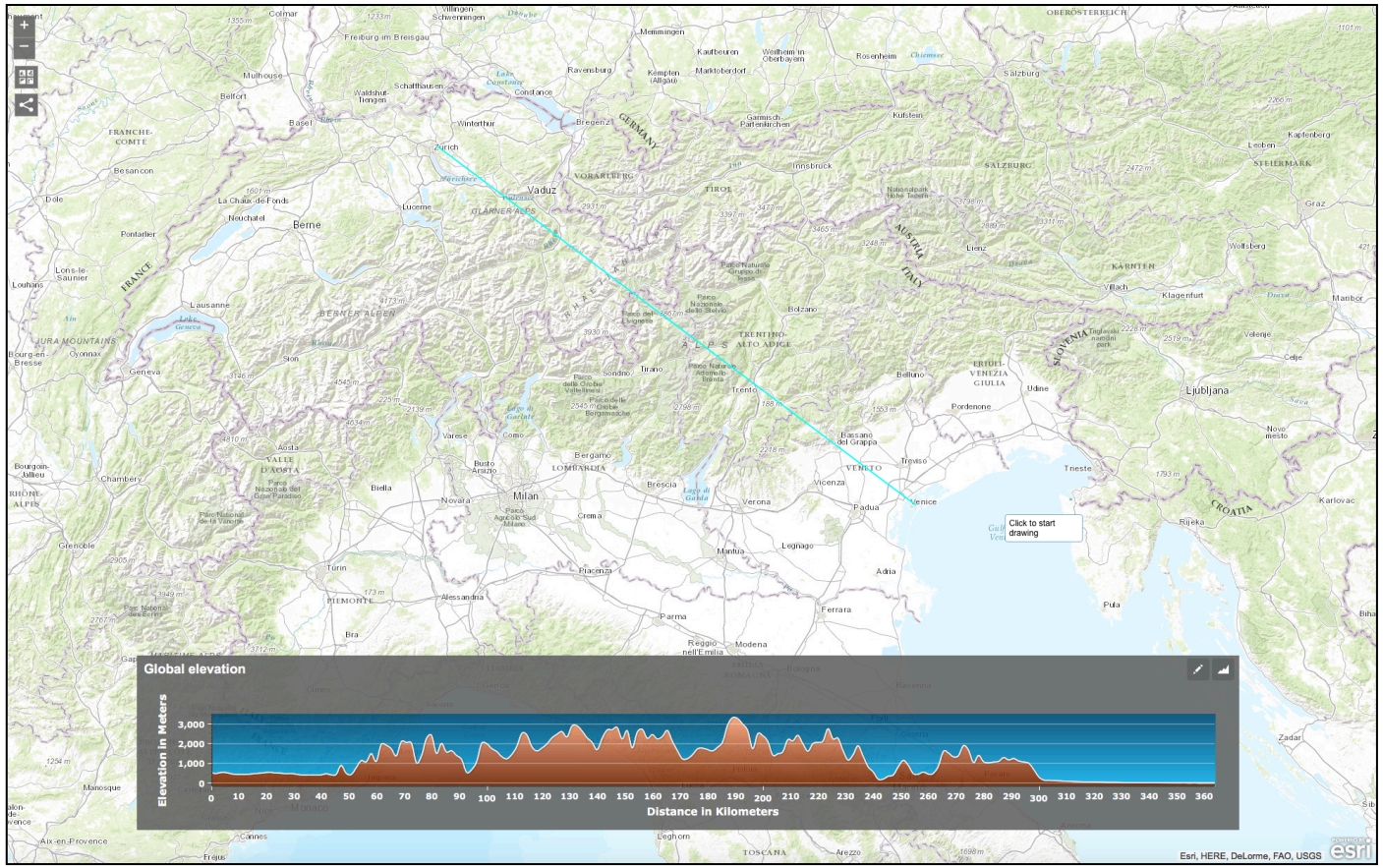
Tutorials
An introduction to Scribble maps
https://www.youtube.com/watch?v=tNvmcQ-6n60
Using scribble maps and Google Earth for your projects

Relevance

- Suggest relevant content areas
- What is being represented ?
- Look for relationships eg. landforms & land use
- Interpret /analyse eg. Vulnerability to hazards
- Use inquiry questions

SOMETHING SIMILAR

ESRI arcgis: Global elevation



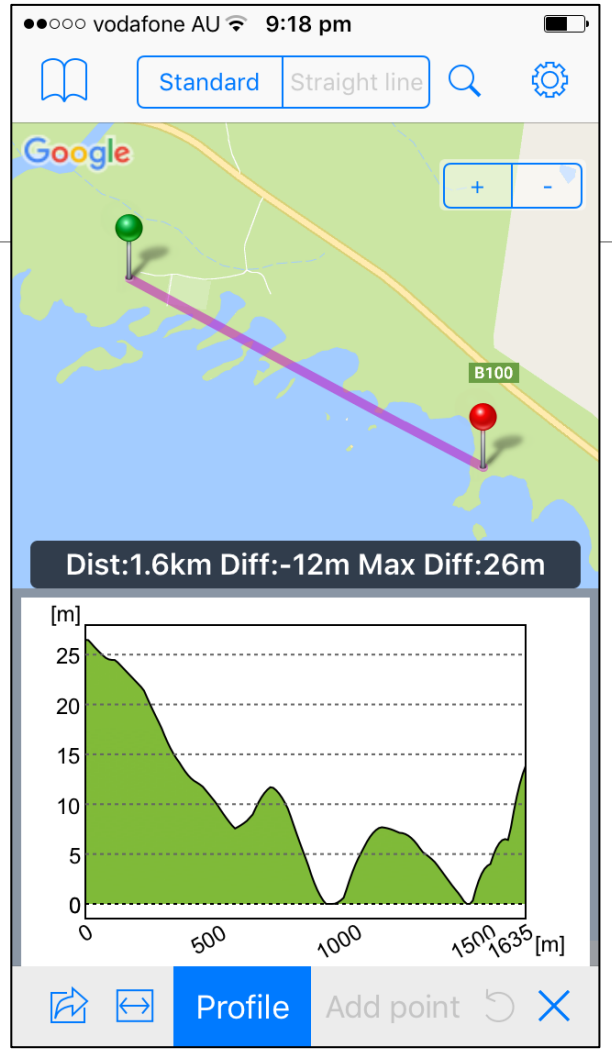
Small subset of the GIS for schools program free to Australian schools

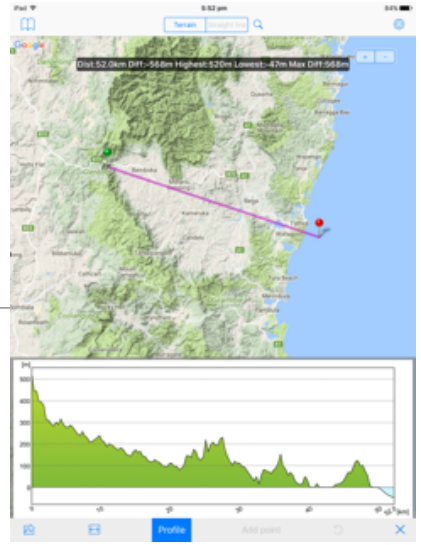
Global elevation

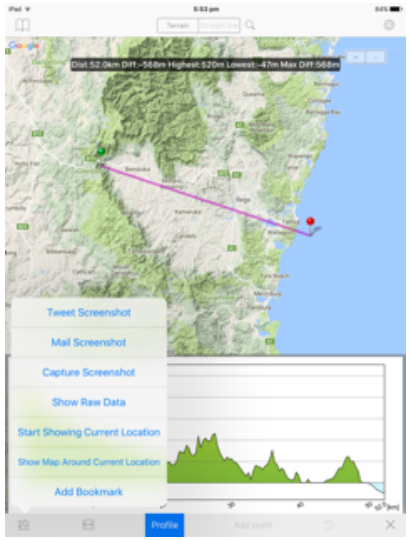
http://esriukeducation.maps.arcgis.com/apps/Profile/index.html?appid=f0a2a2a3e1964129b22c715e31282f6c

Topo Profiler

… and there is an iPhone / iPad App!



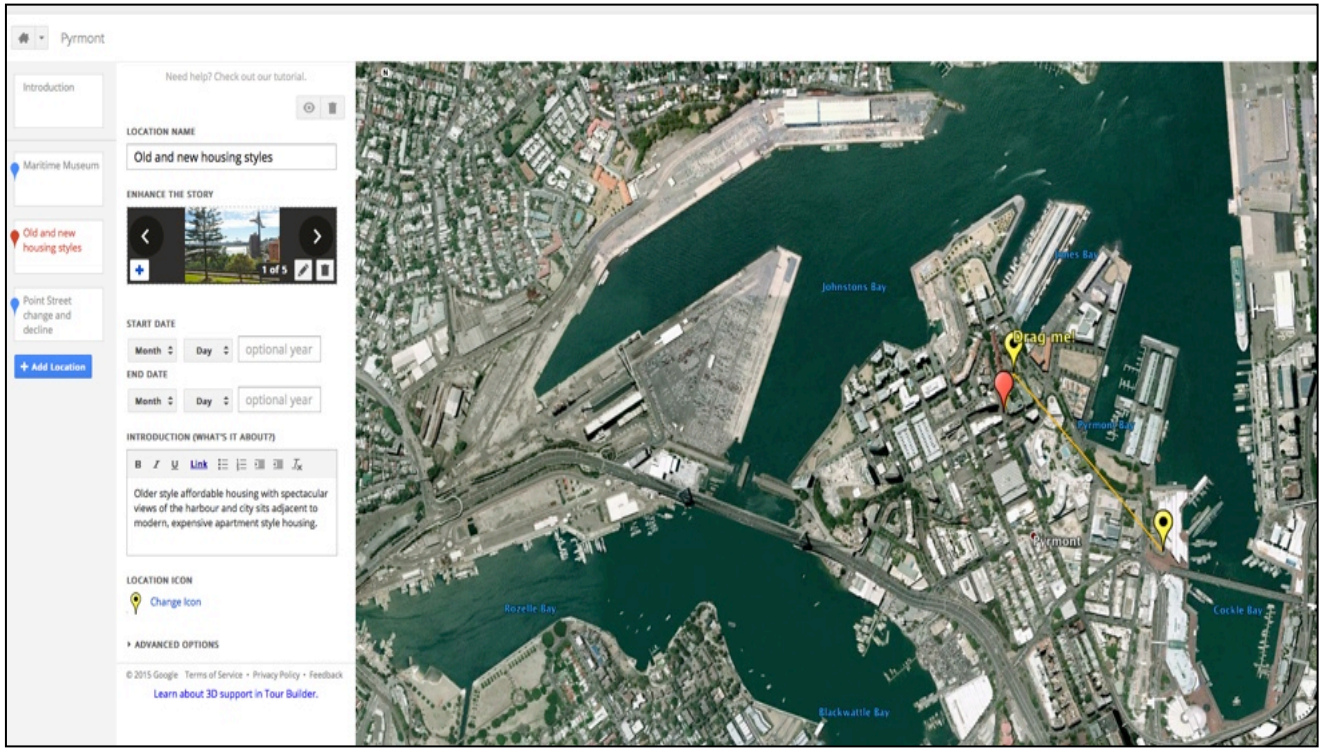




Topo Profiler – elevation graph viewer

https://itunes.apple.com/us/app/topo-profiler-elevation-graph-viewer/id478596308?mt=8

3. Google tour builder



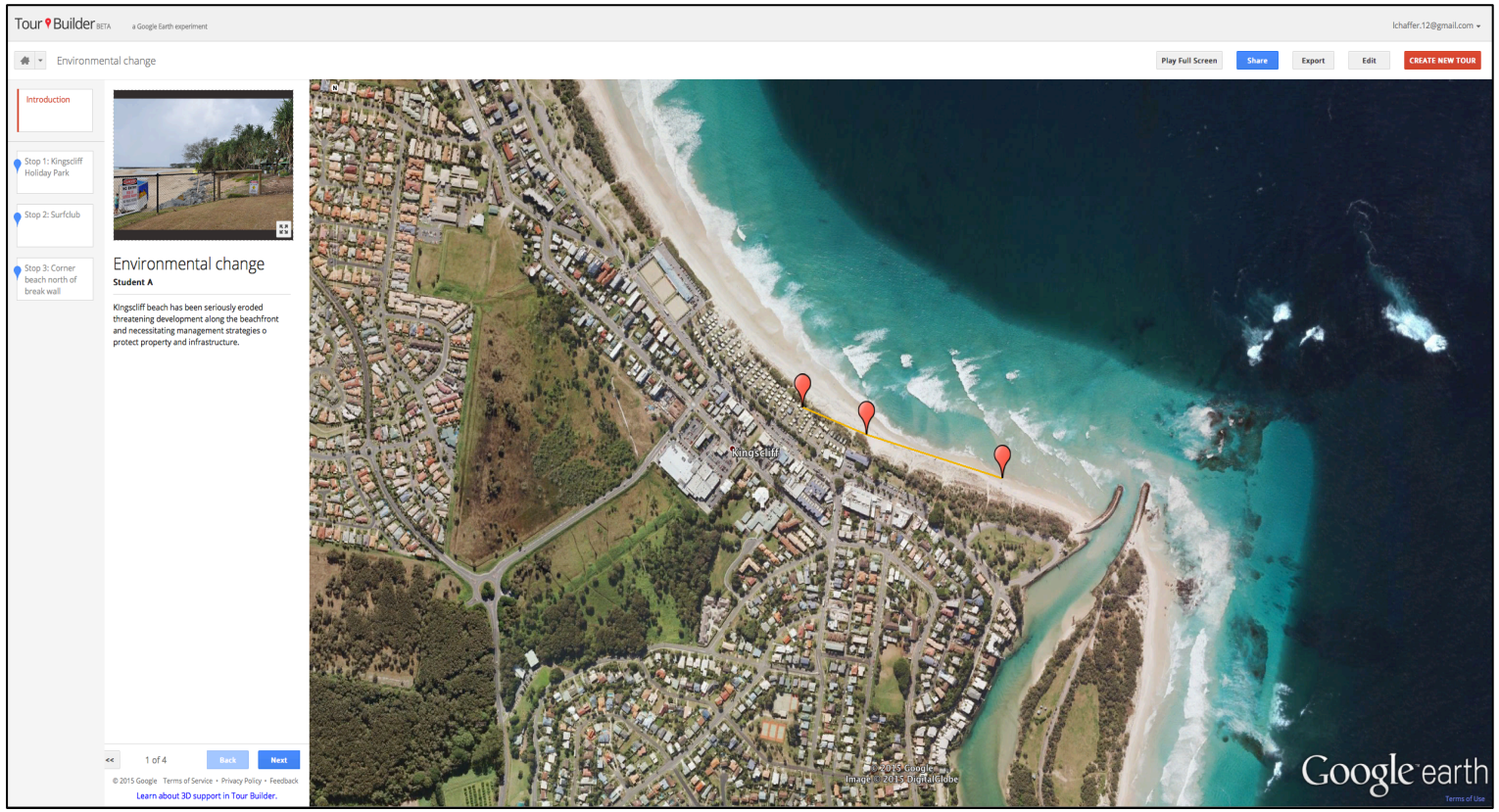
How / where could this be used?

Communicate inquiry findings

Inquiry & concepts

Map created by L Chaffer using Google Tour Builder
http://www.google.com.au/earth/outreach/tutorials/tourbuilder.html

Communicating fieldwork findings

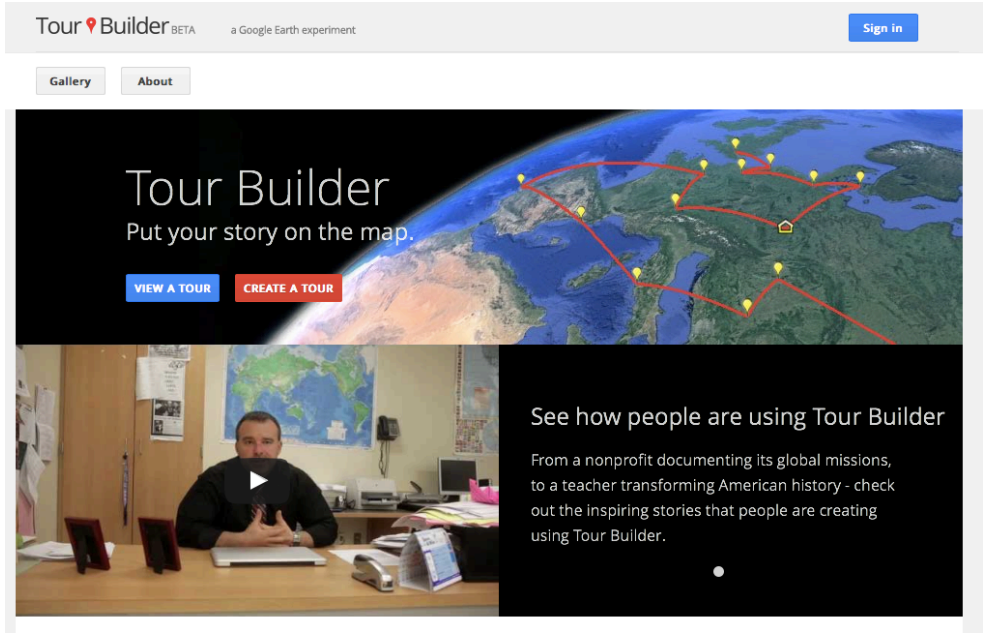


Be geographical

Map created by L Chaffer using Google Tour Builder
http://www.google.com.au/earth/outreach/tutorials/tourbuilder.html

POST FIELDWORK / Communicate inquiry findings

Tour builder tutorial



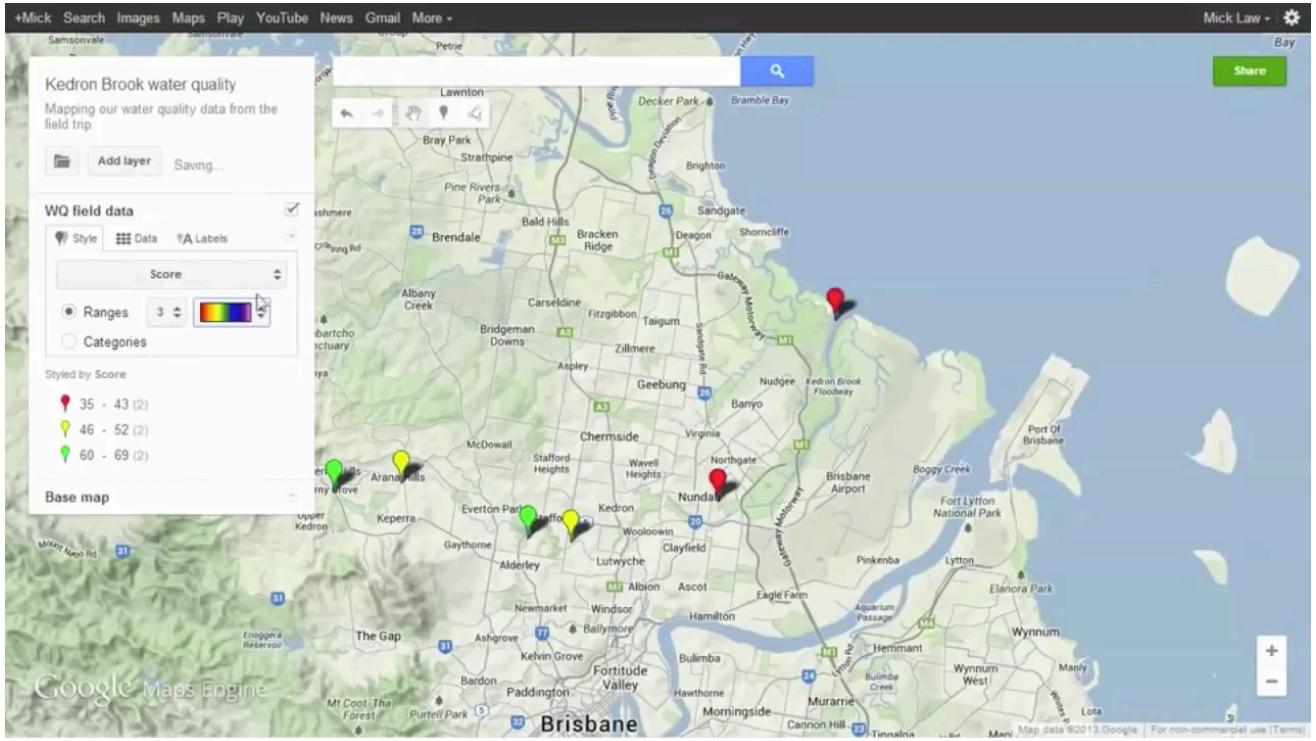
Be geographical

Inquiry focus?

https://tourbuilder.withgoogle.com

SOMETHING SIMILAR

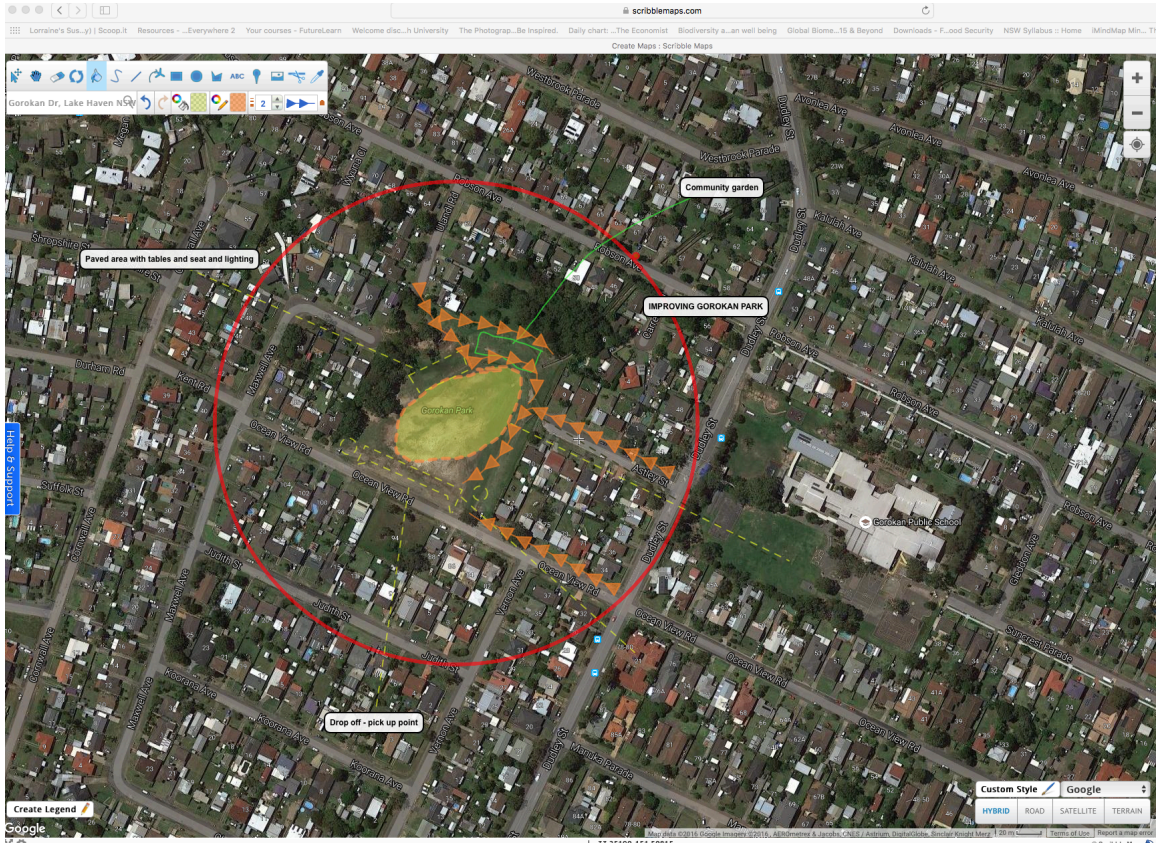
Google Maps



Tutorial

http://www.contoureducation.com/resources

4. Scribble maps

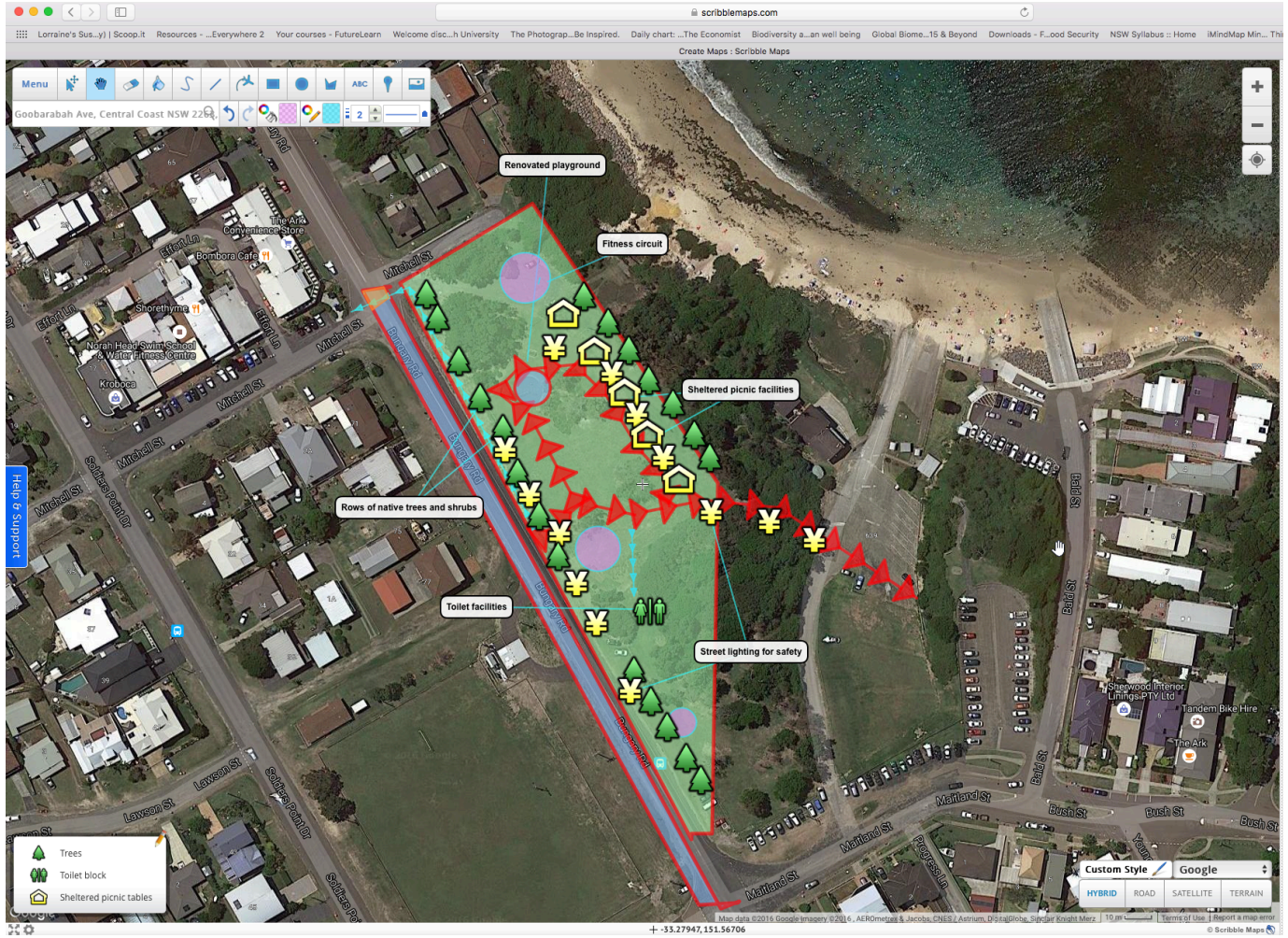


https://www.scribblemaps.com

Liveability

Landscape / environmental management and protection

Authentic task – A proposal to improve the liveability of a local place



Enhance the liveability of a place

Design a protected area

https://www.scribblemaps.com

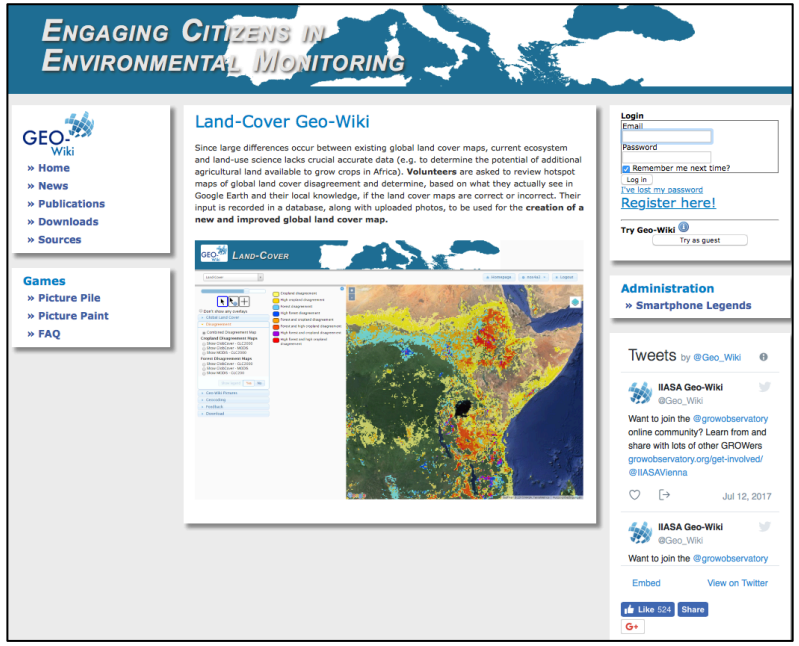
Screen captures L Chaffer

Google Street view / Fieldwork photos

Skitch

Open maps / real world

Citizenship



Citizen science

Royal National Park Education Centre / Aussie Backyard Bird Count

Magpie attack

Map Kibera

ArcGis in Schools FREE

Many different tools in one software package

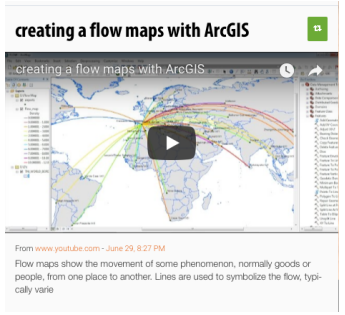
GIS for schools ESRI Australia http://esriaustralia.com.au/gis-for-schools

Existing layers to investigate and analyse

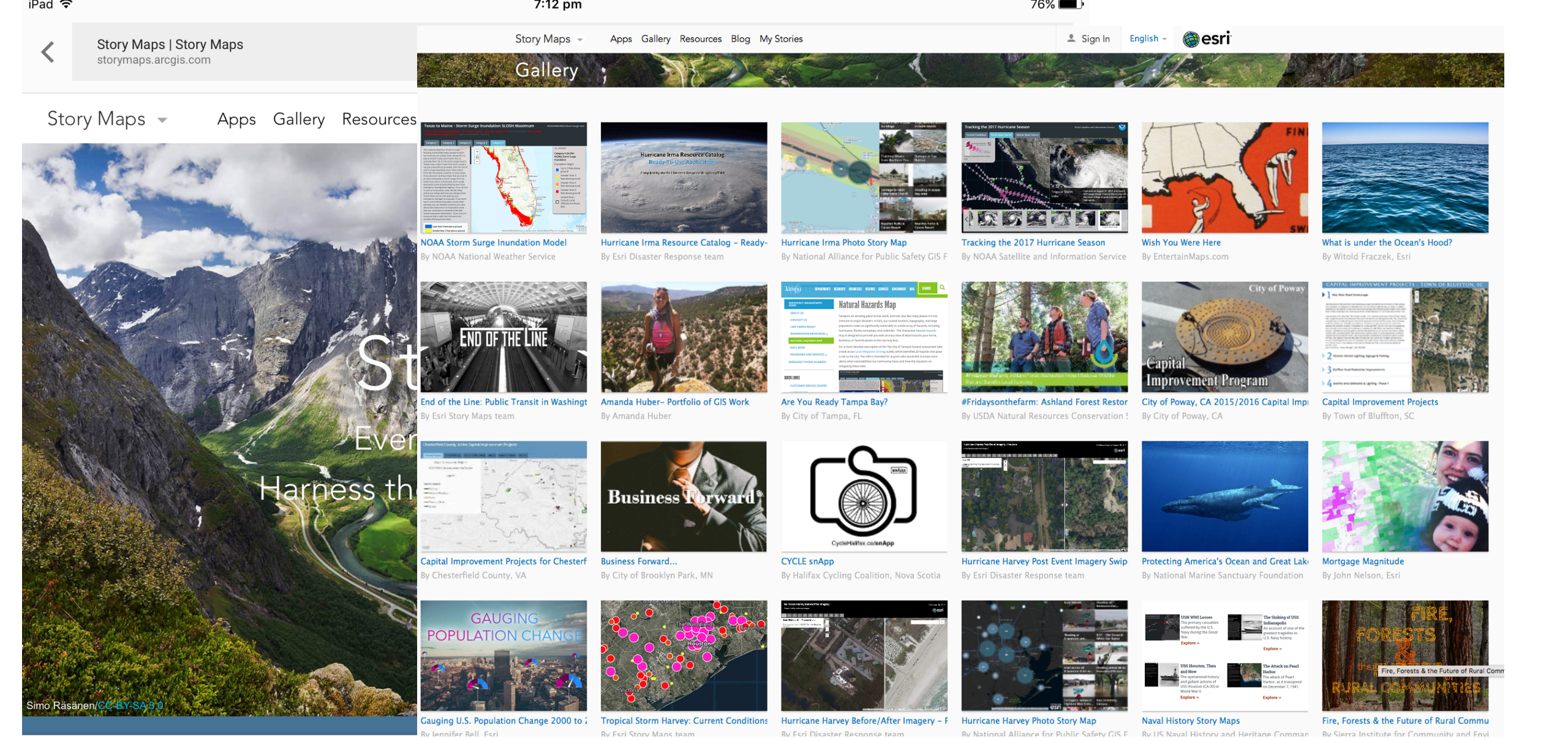
Import data to create maps

Story maps

Fieldwork



STAY TUNED : GTA NSW / ESRI DAY WORKSHOPS … Term 4 and 2018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Story Maps | Story Maps
storymaps.arcgis.com
Story Maps
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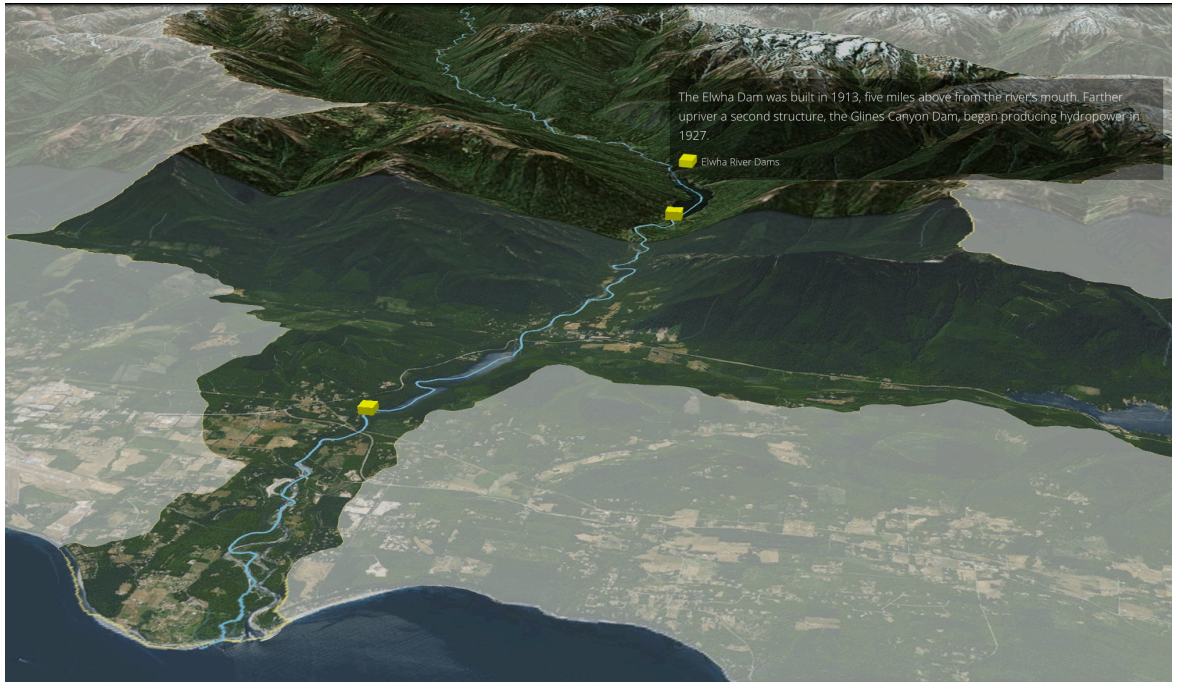
Blog
My Stories
Sign In
English
esri
Gallery
Story Maps
Apps
Gallery
Resources
Simo Räsänen/CC-BY-SA 3.0
NOAA Storm Surge Inundation Model
By NOAA National Weather Service
Hurricane Irma Resource Catalog – Ready-
By Esri Disaster Response team
Hurricane Irma Photo Story Map
By National Alliance for Public Safety GIS F
Tracking the 2017 Hurricane Season
By NOAA Satellite and Information Service
Wish You Were Here
By EntertainMaps.com
What is under the Ocean's Hood?
By Witold Fraczek, Esri
END OF THE LINE
End of the Line: Public Transit in Washingt
By Esri Story Maps team
Amanda Huber– Portfolio of GIS Work
By Amanda Huber
Natural Hazards Map
Are You Ready Tampa Bay?
By City of Tampa, FL
#Fridaysonthefarm: Ashland Forest Restor
By USDA Natural Resources Conservation S
City of Poway
Capital Improvement Program
City of Poway, CA 2015/2016 Capital Impı
By City of Poway, CA
Capital Improvement Projects
By Town of Bluffton, SC
Capital Improvement Projects for Chesterf
By Chesterfield County, VA
Business Forward
Business Forward...
By City of Brooklyn Park, MN
CycleHalifax.ca/snApp
CYCLE snApp
By Halifax Cycling Coalition, Nova Scotia
Hurricane Harvey Post Event Imagery Swip
By Esri Disaster Response team
Protecting America's Ocean and Great Lak
By National Marine Sanctuary Foundation
Mortgage Magnitude
By John Nelson, Esri
GAUGING POPULATION CHANGE
Gauging U.S. Population Change 2000 to 2
Houston
Tropical Storm Harvey: Current Conditions
Hurricane Harvey Before/After Imagery – F
Hurricane Harvey Photo Story Map
Naval History Story Maps
By US Naval History and Heritage Comman
FIRE, FORESTS & RURAL COMMUNITIES
Fire, Forests & the Future of Rural Commu
By Sierra Institute for Community and Envi
Acquire, process, create
https://storymaps.arcgis.com/en/gallery/#s=30



https://gctrust.maps.arcgis.com/apps/Cascade/index.html?appid=55584ca0e7f94a9b9473cc28dd6272cf

http://storymaps.esri.com/stories/2015/river-reborn/

Return to overview

South Sudan in Crisis

7.5

million people in need.

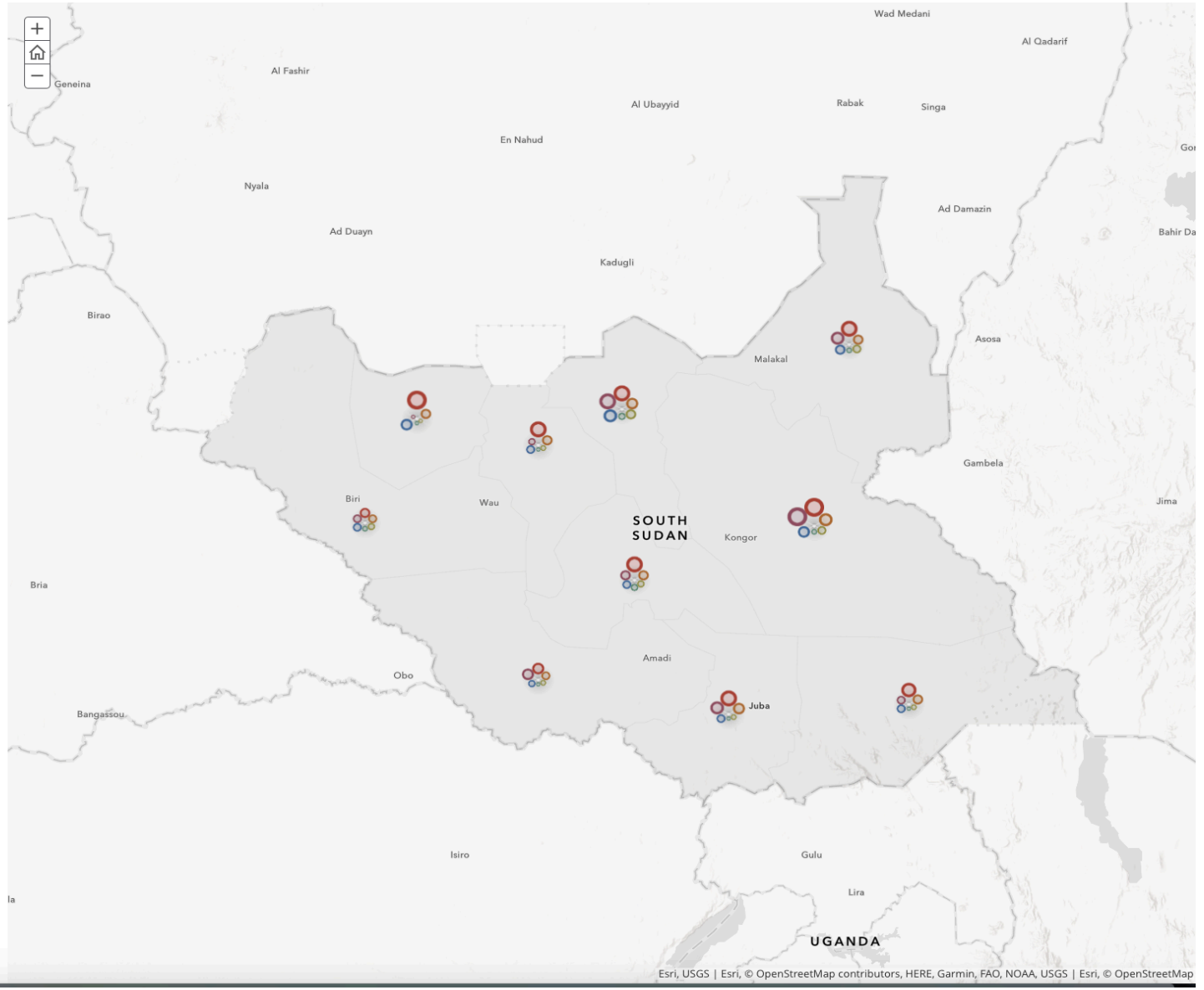
In July 2011, South Sudan declared independence from Sudan, after a long and bloody civil war that left over two million civilians dead and twice as many displaced. Although the country's leaders expressed optimism for a fresh start, South Sudan relapsed into civil war in 2013, after just two years of independence.

The heaviest fighting has occurred in the Greater Upper Nile region, where most of the country's sorghum is produced. Consequently, food production has declined precipitously, and in February 2017, the United Nations declared a famine in several embattled districts. The fighting has displaced over 3.6 million people, and left an estimated 7.5 million people in need of humanitarian assistance, out of an overall population of just 12 million.

Map: people in need by sector

The Conflict

7.3



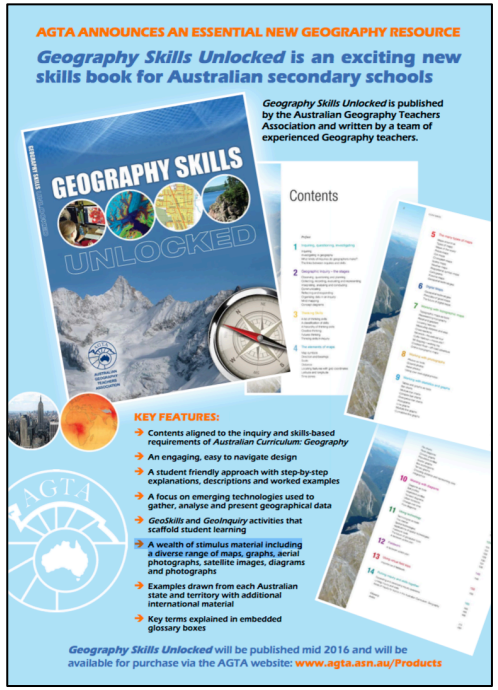
http://storymaps.esri.com/stories/2017/dashboard-south-sudan/

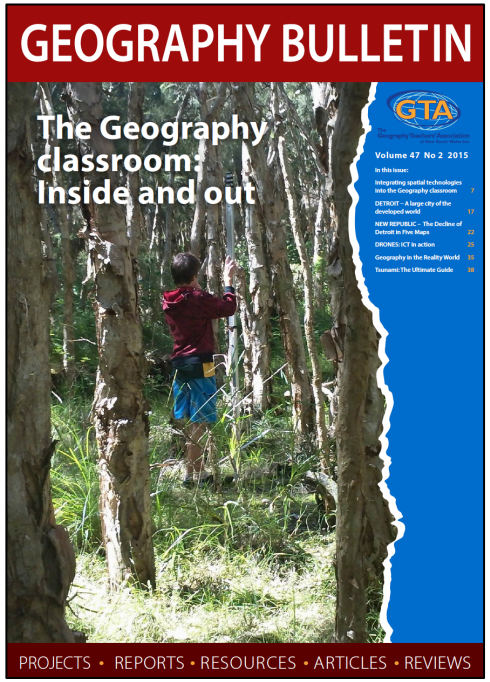
Why spatial technologies / GIS

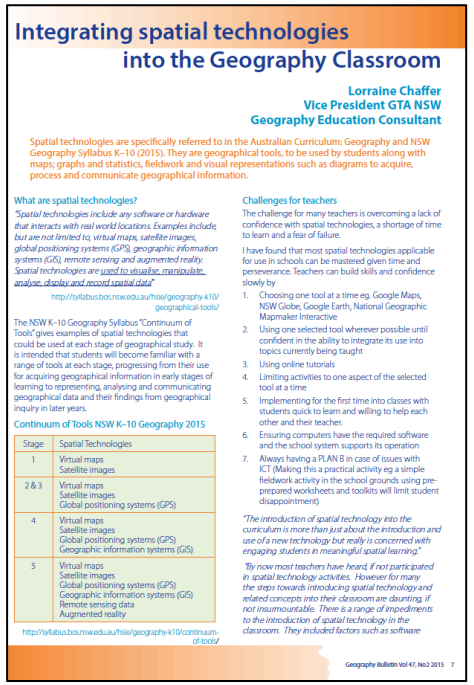
Employment / career links

Management and protection
Law Enforcement
Planning

Further reading







Geography Skills Unlocked

Chapter 5 : Geospatial technologies pp 67-73

Chapter 11: Spatial technologies : pp 143-149

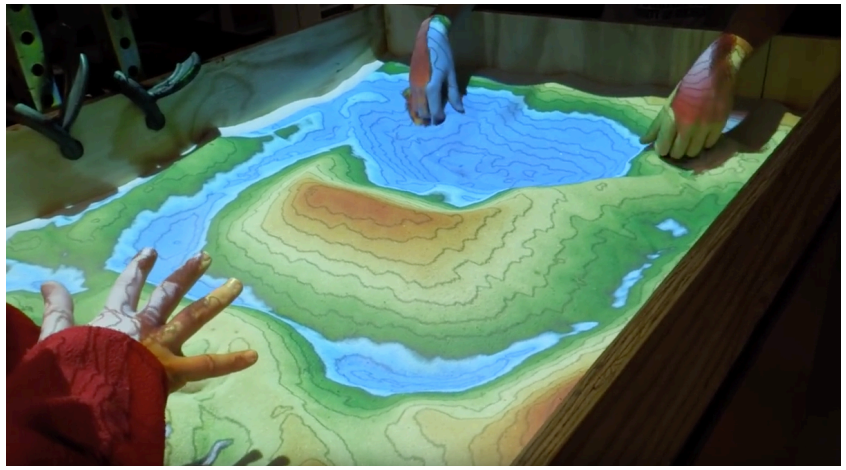
GTA NSW Geography Bulletin (copy on USB)

Vol 47 No 2 2015

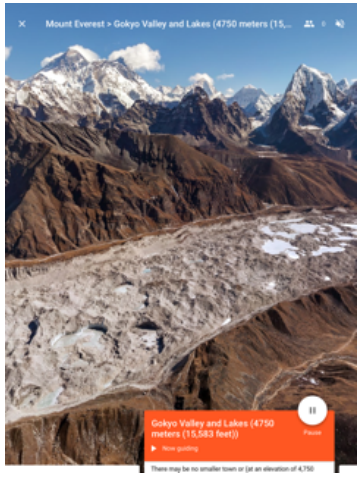
Integrating spatial technologies into the Geography Classroom

Thank you: Questions

Augmented Reality & virtual reality



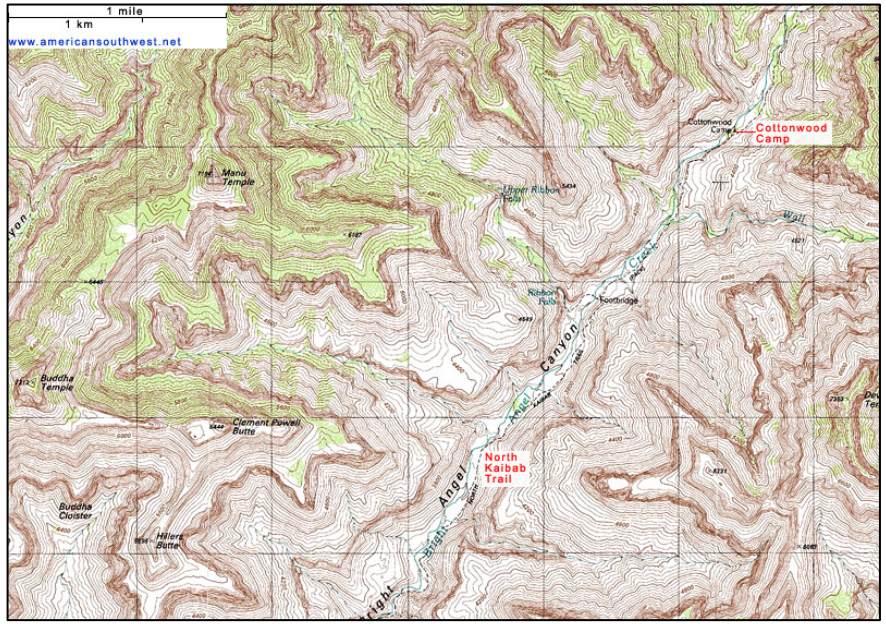
https://www.youtube.com/watch?v=Ki8UXSJmrJE

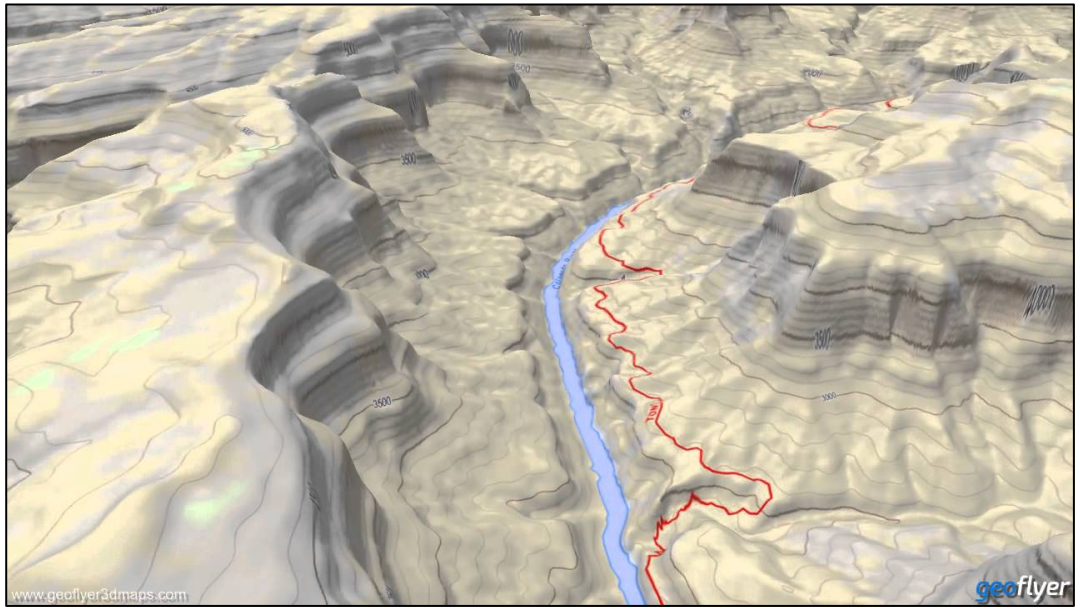


Example: Google expeditions

https://www.theguardian.com/technology/2016/jun/13/best-virtual-reality-apps-smartphone-iphone-android-vr
https://edtech4beginners.com/2016/11/14/a-fantastic-virtual-reality-app-fulldive/

Flyover & streetview: visualising place & space





Google Earth flyover
Google Earth 3D layer

https://www.youtube.com/watch?v=eTzj7yyha_M

http://www.americansouthwest.net/topo-maps/north-kaibab-trail2.jpg

360 degree photographs / drone footage

http://www.airpano.com https://www.airpano.com/files/the-twelve-apostles-australia/2-2 Screen capture

AIRPANO

https://www.airpano.com/files/the-twelve-apostles-australia/2-2

Screen capture http://www.airpano.com

Interactive games / Apps

(Must have a spatial component / link to real world places)

Run the River (MDBA / Water / Environmental management)

Run that Town (Urban / Liveability) (ABS)

ABS Spotlight (Liveability / urban)

Stop disasters (Landforms / water)

Catchment detox (Water)

Ayiti Cost of a Life (Wellbeing)

www.stopdisastersgame.org
www.mdba.gov.au
www.runthattown.abs.gov.au
www.abc.net.au/science/catchmentdetox/files/home.htm
https://ayiti.globalkids.org/game/
http://spotlight.abs.gov.au
http://www.stopdisastersgame.org/en/home.html