2010 EEN Forum Notes

Session Name: Data Visualization and Evaluation

Session Date/Time: June 7, 2010

Notetaker: Hedrick Strickland

Main Themes:

- GIS and other spatial analysis tools are fun and useful.
- Tons of data, and much of the software, is free.
- Case study of an innovative way to use GIS data to respond to climate change.

Detailed Notes:

Juan Paulo Ramirez

- Goal: to motivate everyone to use satellite images.
- What software do GIS users use? ArcGIS by ESRI accounts for 75% of GIS sales.
- ArcGIS is great software but there are many available that are underutilized including Idrisi, Erdas Imagine, and Intmaps (not available in the USA). Using only ArcGIS limits capabilities.
- Idrisi is one of best for picture and raster data.
- Imagine is good for remote sensing; ArcGIS doesn't have a lot of tools for analyzing remote sensing data.
- Remote sensing and satellite images are one of most important sources of info but they have historically had 2 primary limitations:
    - Atmospheric noise/clouds: The satellite signal passes through the atmosphere and can get distorted or may not pass through clouds at all. Atmospheric correction is incorporated into software but it can still be difficult to find good images in areas like the tropics where there is almost consistent cloud cover.
    - Cost: in the 1990's each satellite image cost $5,000-$6,000. Each measured spectral band (a small slice of the electromagnetic spectrum) of each image was recorded on a separate tape (a very big and heavy tape). As an example, each image from Landsat Thematic Mapper (a 7 band sensor that provides coverage of the entire globe every 2 weeks) consisted of 7 individual tapes. **NOW IT'S FREE AND DIGITAL!!!**
- Landsat isn't the only free data. You can have a wide range of data from whole world and across time for free.
    - MODIS vegetation data shows the vegetation index for each pixel over the whole world. The data goes back many years.
    - Diva-GIS has country, continental, and global level data. Data includes administrative boundaries, roads, railroads, altitude, land cover, population density, climate, species occurrence, and high resolution Landsat satellite images.
    - Census data at the county level can be found by Googling "ESRI census data."
    - GNIS includes geographic features such as parks, hospitals, schools, and airports and is available from http://geonames.usgs.gov.
    - GloVis has selected remote sensing data.
    - EarthExplorer has satellite images and aerial photographs. Data is free for US federal civil agency and US state and local government users.
    - Note: often the same data is available from multiple sites.
- Used deforestation rates in Brazil, New Zealand, Chile, and the USA to demonstrate dynamic charts. Dynamic charts create "trails" of moving dots to show how the forest cover changes over time for each country.
- Gapminder has stored data that you can download and show in dynamic charts. If you want to use your own data, you can input it into a Google documents worksheet, click on the gadgets

icon, and select the dynamic charts option. It will lead you through the process of creating your own dynamic chart.

- Google Earth is a geobrowser that allows you to view anywhere on the globe and add and share data. You can zoom in to a location and click the historical view icon (looks like a clock) on the toolbar which allows you to see older images. The newest image is always shown by default. We zoomed in on Rondonia, which has one of the highest rates of deforestation since the 1970's and viewed the change over time with the oldest image dating back to 1975 and the newest to 2009. Images can be morphed together to create a video:
    - Save all images that you want to include in the video as jpeg's.
    - Use Sqirlz Morph (free, of course) to morph all of the images together.
    - Upload the file to youtube and click the "embed" button that appears in youtube. This will show the html code for the video.
    - Back in Google Earth, click the polygon icon on the toolbar and draw a polygon around the area you are showing. A box will pop up where you paste the html code.
    - Google Earth supports 2 file types, kml and kmz. They are essentially the same except the kmz is compressed. Save the map as a kmz file and then you can send the map document via email.
    - You can also add an attribute database to polygons in Google Earth but it appears to require knowledge of kml scripting.
- Maps from other GIS software can be saved as a kml or a kmz and then opened in Google Earth by clicking on the file or by opening Google Earth and selecting File>Open and selecting the file.
- ESRI posts training sessions on YouTube.
- Tips and tricks in Google Earth are also on YouTube.
- Recommended Idrisi to start out. It offers good value for the money and is not too difficult to learn.

<u>Richard Gelb</u>

- Subject: Urban Forest Climate and Preparedness Response (CPR).
- CPR came to be because landowners in a rural part of King County, Washington contacted the Department of Natural Resources and Parks and wanted to know if they could do anything on their land to help.
- At the time, the Department of Natural Resources and Parks said they didn't have any guidance to offer but they started thinking about ways to provide guidance and incentives.
- They took GIS layers that were available on forest cover, invasive species, soils, elevation, aspect, slope etc. and created a program that allowed people to view these layers of their parcel and then offered education and guidelines based on their plot of land.
- There is a law that allows the county to reward land management actions that have public benefit, as determined by the Public Benefit Rating System (PBRS), with a reduction in property taxes.
- 4 elements of CPR
    - Policy: Public Benefit Rating System (PBRS) for forest protection or allowing trail or public access. For example, it corresponds with a 50-90% reduction of property taxes for allowing an equestrian trail. It also incorporates the idea that someone in a fragmented area with a lot of development pressure should be rewarded more than someone in very remote area with little development pressure.
    - Science: Determine how to reward different behaviors (i.e. invasive species control vs. forest conservation vs. soil amendments etc.).
    - Technology: GIS.
    - Outreach: Engaging stakeholders and at least educate them about measures that they can take to reduce climate change, even if they don't commit to the required 10 year maintenance period to receive the tax benefits.
- The program targets people with 1-5 acre parcels but some are larger or smaller.
- Using the tool, landowners can create a polygon where they are willing to undertake some action (remove invasive species, soil amendments, etc.). The tool will calculate the values of those actions and the area of the polygon and assign a PBRS score and show the resulting tax break if the landowner agrees to maintain that action for 10 years.

- To receive the tax benefits, the landowner must sign a 10 year contract. Field verification will be performed to ensure that the agreement is being upheld.
- Many likely won't make the commitment but the tool will still be educational for them.
- Key layers are either parcel specific or context specific (i.e. where is the property located relative to other stuff):
    - Parcel Specific: tree cover, shrub cover, grass cover, water/wetlands, soils, slope, aspect, and elevation.
    - Context Specific: development pressure, proximity to wildlife networks (intact forest canopy of >100 acres), proximity to Central Puget Sound protected lands (i.e. where is their property relative to other stuff)
- Vegetation and soil productivity are considered because of Carbon storage potential.
- Slope, elevation, and aspect are considered because these factors affect the proper way to manage the land.
- The program is currently in the process of ground truthing the system with 6 test plots.
- Algorithms: baseline characteristics x modifiers x improved management actions = outcomes/relative valuation.
- Hoping to get online with beta version by September of this year (2010).

<u>Questions</u>

- How do you incorporate risk into this analogy? The Department of Natural Resources and Parks are engaging a national level technical advisory committee to guide the valuation scheme and to determine what climate factors they should plan for. A lot of monitoring will be done remotely so the department can check to see if landowners have fulfilled their obligations (removed invasive species, plantings have been done, etc.) Some actions will be verified by viewing delivery receipts for items like biosolids, woodchips, or soil amendments.
- In reference to revenues for the municipality, how much of this has been presented to political leadership and how have they reacted? Little information has been provided to the council but this is of no concern because the county will not take a hit. The distribution of the tax burden simply shifts from those participating to those who are not. It is revenue neutral except for administrative and verification activities.
- What's the cost model of the upper limit that can be shifted to non participants? Currently everyone who enrolls gets a 50-90% property tax reduction. It's a very lucrative program. One caveat is that if you bail then you pay all back taxes plus a penalty. They anticipate that many will use as an education tool but won't make the 10 year commitment.
- If many people sign up, where's the capacity to verify coming from? They're worried about this. There are constraints on the ability to administer but verification will be set up so that most monitoring can be done remotely. Situations that require field verification will be done through sampling rather than every one.
- Is this a service and will you be selling it on the basis of scenic value or water quality? The touted benefits are mostly around biodiversity conservation and secondarily around carbon sequestration. They have found that 4 acres of Douglas fir sequesters the carbon output of a typical household in King County. Also, soils are degraded and the land deforested so there is lots of room for improvements in carbon sequestration. Could this be applied to a carbon offset market? Not in short term. It would require too much hoop jumping. Maybe in the future the county or landowners could take credit for the total of the carbon sequestration.
- By the nature of program, not all landowners have same opportunity for savings. Has that caused controversy? Yes, it's a concern. The system already been gamed by the equestrian community that advocates for trails. They got the council to allot 30 points for trails. The Department of Natural Resources and Parks is trying to make case that climate benefits are at least as valuable as horse or bicycle access.
- If you have a small parcel and you put a horse trail through it and get tax credit? Yes, but only if you partner with neighbors so that the total allowance is 1 acre.
- Do you link with existing conservation easement programs so there's no double dipping? No. They don't care about double dipping. If they make 10 yr commitment, it doesn't matter if they

already have a prior commitment with another program. Also, there is greater value if surrounding areas are protected so there is peer pressure for neighbors to commit.

- How long lived is PBRS system and what kind of evaluation has been conducted on it? It's been in place 20 years and he doesn't know what evaluation has been done. It is a state law that allows counties to use the tool.
- How does it work if you sell the property? The commitment is on the deed and if the new owners back out, they pay the penalties.
- Are you measuring property improvements for people who use tool but don't commit? There will be a follow up that asks what actions were learned and which were implemented.
- Is it possible that property values of those that participate will increase? Doesn't know but there is a liability because the property is committed to 10 years which could offset gains.
- How do you look at public versus private land right of ways? All public land has open access so rights of way don't apply. Public lands managers could also use the tool though to learn how to better manage public land for climate change.
- What are goals for the program and how do they compare with the economic goals for the county? The goal is to bring increased carbon sequestration and more robust resiliency to the landscape. The money is a wash. It's all about driving biodiversity conservation into the landscape in the face of climate variability.
- Are there GIS maps available that have population data available and the distribution of population and chronic disease? Yes, Arc server is an online GIS system to retrieve info. Also, BatchGeo allows you to put in whatever location data you have and use it to make a Google Earth map. You can create multiple layers this way.
- How compatible are Idrisi and GIS? Interchangeable, just Idrisi uses only raster data.