Energy and Climate – Dynamic Decision Tools Catalogue and Community of Practice **[1]**

  Submitted by superadmin on Tue, 2012-01-31 13:28   Wednesday, January 4, 2012 - 14:00 to 15:30
Wednesday, January 4, 2012 - 16:00 to 17:30
Thursday, January 5, 2012 - 14:00 to 15:30
Thursday, January 5, 2012 - 16:00 to 17:30
Event: Winter Meeting 2012 [2]
Session Type: Breakout [3]
Collaboration Area: Energy and Climate [4]
Abstract/Agenda:
One of the challenges Federal agencies face when reviewing energy related projects (e.g. wind power site selection) is a method to assess risks associated with those projects. Project proponents and NGOs evaluating environmental impacts have similar concerns. There are a number of tools that can be used but they don't have the transparency in terms of the models used, and the data that went behind the tools. What could help is a dynamic decision tools catalog and community of practice to build transparency of the decision tool architecture, data, and functionality. This would aid the decision maker in tool selection and use appropriate to their planning goals and help identify gaps and improvements needed to the kit of decision tools.

ESIP can play a coordinating role by engaging universities and industry along with the Federal agencies and NGOs in a cross-sector understanding of the needs, maintaining such a catalog of decision tools, engaging the community in a dialog and discussion, and facilitating partnerships in further tool development and application. Some of the Federal agencies that could have interest in this project and have related initiatives are Fish and Wildlife Service, USGS, DoE, NREL, and Bureau of Land Management. The purpose of this workshop at the ESIP 2012 winter meeting is to bring government agencies, researchers, and developers together to identify what the stakeholder needs are and discuss an approach we could take (as a group participating within ESIP) to address this problem. One of the targeted outcomes is a framework for ESIP to undertake this project. A white paper will be generated to capture the results that could serve as a statement of needs for the Federal agencies to consider RFI/RFPs.

• Energy and Climate:Dynamic Decision Tools Catalogue and Community of Practice [5] Workshop Goals - Shailendra Kumar, Northrop Grumman

• USGS Ecological Land Use and Sustainability Requirements [6] – Ben Wheeler / Sky Bristol (TBD), USGS

• Wildlife and the Siting of Renewable Energy Facilities [7] Current tools and Gaps - Laurie Allen, USGS

Notes:

Kumar – Opening Remarks and Overview of Winter Meeting Breakout Sessions Agenda • Need for dynamic decisions tools catalogue – understand current status of these tools, how they are being used/applied today. Looked specifically at impact of wind power plants on wildlife. • Objectives from Last Meeting: Build transparency, aid decision maker in tool selection, suggest improvements to the kit of decision tools and facilitate partnerships in tool development and applications. • Dynamic Decision Tools Catalogue: List of features that could be provided in the catalogue • Workshop Goals: Understand what the current tools/systems are, identify and characterize the need and provide a framework for ESIPs role in implementation.

Sky Bristol (USGS) – Pursuit of Integrated Ecological and Energy Assessment Framework Contact: sbristol@usgs.gov [8]; Colleague: Ben Wheeler (bwheeler@usgs.gov [9])

- USGS Science Strategy: In 2007, USGS published 'Facing Tomorrow's Challenges', which helped focus the goals of USGS. In 2011, USGS reorganized its science programs to better address those challenges.
- Scientific Synthesis: The 2007 science strategy resulted in the formation of the John Wesley Powell Center for Scientific Analysis and Synthesis.
- Integrated Assessment Framework: One Powell Center working group is developing an integrated ecological and resource assessment framework.
- Two specific case studies for providing methodology for similar work:
- Wyoming Landscape Conservation Initiative (WLCI): Large area of world class resources (natural gas, wind turbines, wildlife). Role for USGS Science especially important in the creation of maps. Learned a lot about the importance of having people on the ground.
- Integrated Assessment Tool kit: Not yet released publicly. Creating an index that will help decisionmakers distinguish areas that are underdeveloped in terms of energy and would have very low impact on wildlife from areas that have high wildlife concentrations with low energy production potentials.
- Energy and Environment in the Rocky Mountain Area: Trying to bring together information and comprehensive tools that will help acertain tradeoffs between energy development and environment protection. Interactive Energy Atlas:
- All of these are powered by ScienceBase, a scientific data and information management and web services platform.
- Main Points:

1. Most important need is for comprehensive and sustainable frameworks, methods, and institutional will for decisio making stakeholders to be engaged throughout the "scientific knowledge lifecycle".
2. Need greater institutional commitment from data owners to keep data platforms and services as close to state of the art and open as possible.

- Are we creating the catalogue/tools for scientists? Or a catalogue that is available to decisionmakers? Who is the audience for this kind of catalogue and what information is relevant to this audience.
- Tech Thoughts:

1. Need consistent national grid for assessment criteria.
2. Need to look at taking software engineering development out of government an into the global open source software marketplace.
3. Make some of the application development work published so that it can be carried forward.

Comments:

- Steve Young – Data.gov has an energy community (energy.data.gov).

Laurie Allen (USGS): Wildlife and the Siting of Renewable Energy Facilities: Current Tools and Ongoing Challenges

- Wind energy and solar energy impact ecosystems in many different ways.
- Tool Development and Availability OSTP Ad Hoc Committee (2011): Learned that there are a lot of tools available in many different sectors; realized that they need to work on quality control issues of the information available in the tools; collaboration is essential.
- There are a few things already happening: e.g. Siting of Golden Eagles... a lot of compilation of available wildlife and habitat assessment data is occurring but more coordination is needed.
- Data Compilation Examples

1. Land Conservation Cooperatives (LCCs)
2. BLM Rapid Ecological Assessments
3. Crosswalk for Renewables Assessment – provide a kind of 'rosetta stone' to learn how to use

the different assessment tools.
4. American Wind and Institute's landscape Assessment Tool (LAT): Gives much more information- more information about certain species of concern
5. Rapid Assessment Methodology (RAM): method for assessing site suitability for wind energy development (BCR 11 pilot). Pilot project. Idea is to develop a quick assessment method. Primary objectives are to idenfity the most improtant natural resources

  - Working with management agencies early on in the collaboration to develop a longer-tmer strategies with an adaptive management process.

- Summary:
  - A lot of basic and applied research and data compilation.
  - We need a consistent framework – can't just be a lits of things
  - USGS can make a similiar tool but can't get the necessary funding.
- In private sector: AWWI Landscape Assessment Tool, Transmission Siting Decision Support

January 4, 2012 Wednesday 4:00 – 5:30 PM

- Convener: Eckman, Kumar
- Attendees: * WebEx: Alison LaBonte, Madeleine West, Robin Bectel, cclavin?
- Richard Eckman (NASA), Shailendra Kumar (NGC), Yasmin Zaerpoor (ESIP Student Fellow), Ben Wheeler (USGS), Steve Young (EPA), Rob, Gary Foley (EPA), Erica, James, Laurie Allen

Robert Bectel (DoE): Dynamic Decision Tools Catalog and Community of Practice

- Found that in many cases departments have created software/tools that aren't actually open source. Open source should entail free redistribution – those tools should be distributed everywhere.
- Mobile: 70% of the world are mobile subscribers. 1.2 million apps were downloaded in the last week of Dec 2011. 1/3 people have a smart phone. Let's put our app on the smart phone, not a website.
- Emphasized the impact of creating apps for Facebook.
- OpenEI: Only provide apps that offer data – don't allow you to play with the data.
- DoE is making apps for solar siting app, geothermal, considering making an app for wind siting app. App for solar, for example, will give information on how much energy solar panels would generate and what sort of federal/state rebates and incentives are available for installing panels.
- Will have a developed beta solar app by March 2012.
- One of the biggest challenges they have is data. **ESIP can help by providing channels to data that can then be used to make apps.**

Madeleine West (Western Governors' Wildlife Council): Crucial Habitat Assessment Tool

- Wildlife Council has been tasked with developing the **Crucial Habitat Assessment Tool (CHAT)**: geospatial tool that highlights habitats that are crucial to wildlife, including habitat corridors.
- Wildlife Council Vision: To identify key wildlife corridors and crucial habitats and provide a user friendly online tool for parties to access consistent wildlife information.
- Formation of Western Governors' Wildlife Council in 2008. Wildlife mapping started in 2010.
- Crucial Habitat and Corridors Identification: (3 steps) 1. Data Development, 2. Prioritization of Crucial Habitats, 3. Develop Public Planning Tool
- Benefits to Planners: Hear from industry and conservation planners that it will better equip them to review energy projects they are considering themselves.
- Governors' have given deadline of 2013 for CHAT to be developed.
- Technical Work: Working on collecting and compiling west-wide data, accomodating state specific needs, putting together different options for developing west-wide applications of

CHAT
- Ensuring Use of CHAT: A lot of effort and resources go into building the geospatial tools. The real challenge in this initiative has been to make the western states build something that's a benefit in the long term and frequently used. Hired a Denver-based PR firm to help develop concrete marketing messages for what CHAT is intended to be.
- Available State CHATs: Don't have a product developed at this point. Can look at the following tools to get a sense of what CHAT will look like: Montana Crucial Areas Planning System (CAPS), Washington Priority Habitat Species (PHS On Line), Arizona HabiMap, Southern Great Plains CHAT (used by utility companies and wind developer in Kansas and Oklahoma, also used by the Natural Resource Conservation Service to give compensation to areas to deter development that would have a profound impact on wildlife).
- There will be 2 new state-specific CHATs in 2012: Wyoming Interagency Spatial Database and Online Management System (WISDOM) and California Areas of Conservation Emphasis (ACE)

- Kumar: **How can ESIP help?**
- Madeleine: Having GIS experts has been really helpful to provide western view of this information however deadline of 2013 is coming up soon. Need help developing all the key data layers for each state. Also, how do we develop a geospatial tool that will do everything we say it will do – that will involve a lot of learning about the technology but also the applications of the technology to the public. Would help to get insight from ESIP community about how the public might use this tool. Struggling to develop proper outreach strategy to the public (ie when/how to do the outreach to design the GIS systems to be used the right way).

January 5, 2012 Wednesday 2:00 – 3:30 PM

Energy: Dynamic Decision Tools Catalog and Community Practice

- **Attendees**:
    - WebEx: Laurie Allen
    - At conference: Richard Eckman (NASA), Shailendra Kumar (NGC), Yasmin Zaerpoor (ESIP Student Fellow), Ben Wheeler (USGS), Stefan Falke (NGC), Karl Benedict (UNM), Christine White (esri), Brian Wee (NEON, Inc), Robert Bectel (DoE), Peter Fox (RPI)

Christine White – Esri Decision Tools for Energy & Climate

- User stories describing the use of GIS spatial analysis:
    - Eg 1: Overlayed data on renewable energy siting and collocating wind energy and ethanol production in Kansas
    - Eg 2: Nature Conservancy mapped areas in Eastern Washington where wind power development appears to pose the least risk to biodiversity
    - Eg 3: Aerowest used 3D analyst to do a roof classification project to identify optimum location for solar panels.
    - Eg 4: District of North Vancouver's Solar Application shows residents the optimal location for installing a solar water-heating system on their rooftops. (web application: www.geoweb.dnv.org/applications/solarapp/ [10])
- ArcGIS online: arcgis.com/home : reviewed different services and data sets, can filter by maps, applications and tools that are of interest.
    - Can download the model from ArcGIS onto your desktop. Description and instructions for the model are provided. Can use a spatial analyst in the model- output is the raster file.
    - Can create an account and share contact with others. Some resources are rated so you can get a feel for how helpful the resources are.
- ArcGIS.com: Less metadata centric.
- GeoPortal server: Open-source product that supports formal metadata. Strongly suited for

federating searches to other catalogues.
- ArcGIS GeoPortal: Like ArcGIS.com except it's only for your own organization and within your own organization. Not open-source.
- GeoPortal server: gptogc.esri.com/geoportal/
  - Powerful tool for federated search.
  - Search: climate
  - Content type: Live Map Services
  - Searches the index- all results are live data results.

Peter Fox (cluster chair for Semantic Web Cluster) – Semantic Web Cluster and Energy and Climate Cluster Have a telecon on the 4th Tuesday every month at 3:00 pm ET.

- Quick introduction to semantic web: Semantics as they exist today are identified as a triple set of assertions: subject – predicate – object. The idea is that you treat it as a collective set of statements. (xml type) Namespaces can be different vocabularies or dictionaries (eg. Rc, foaf, dbpedia).
- Best practice: put semantics between/in your interfaces.
- Much of the existing web is based on XML infrastructure. Semantic web provides layering capabilities on the XML infrastructure.
- On the semantic web, there is a spectrum of what is encoded. Liked open data (URI/http/RDF) all the way through encoded ontology.
- Ontology spectrum: 'ontology' means a lot of things to different people. Intended to mean any one of these things listed on the slide: from catalog, terms/glossary, thesauri... all the way to general logical constraints. Before the red line is where people have to do the reasoning; past the line is where the computers do the computational reasoning.
- Semantic Web Standards: there's no real set of standards for semantic web.
- OWL (ontology web language): can capture classes, properties, data types, various associative properties, etc.
- The query language is nice because SPARQL is much like SEQL
- Rule Interchange Format (RIF): Has been standardized, tools are just now starting to emerge but there are a large number of ways to encode tools. (http://www.w3.org/2005/rules/wiki/RIF_FAQ [11])
- Semantics requires domain expertise, a (or many) use case(s), a methodology to proceed with knowledge extraction. Can visit Semantics Cluster webpage (link listed on slide).
- Semantic web has a very important characteristic of being open world. Has an evaluation process at the center to help guide what you do.
- Use Case example slide: Want to plot neutral temperature form a particular thing, at a particular time in a particular way. The things in bold (second bullet point) are the semantics that define it.
- Elements of KR in Semantic Web: Describes the statements as triples (subject-predicate-object)
- Information Modeling: Use a three-layer modeling approach: conceptual, logical, physical
- Semantics Cluster works with ESIP as a whole (ESIP network, FUNding Friday project, IT&I committee), Internally, Information Quality cluster, **Preservation Stewardship Cluster and the Discovery Cluster.**
- What has been produced? Tutorials, Ontologies, [some] Technical infrastructure, Applications and Demonstrations.
- SWEET: Semantic Web for Earth and Environment Technology suite: http://sweet.jpl.nasa.gov/ [12]
- Drivers Pressure State Impact Response (DPSIR): decisions making framework. It has a semantics coding for energy management in Europe.
- Related work coming from Europe: Climate Science Markup Language (CSML) and Metadata Objects for Linking Environmental Sciences (MOLES)

Karl Benedict (Univ of New Mexico): Architecture Model for OGC Service Integration

- Overview: Summary of OGC services and then discuss Open Information architecture

- Open Geospatial Consortium Services- Common Elements: All are executed over http using two common request types (Get and/or Post), GetCapabilites Request (essentially the key to unlocking the information about that service), Standard error reporting model, OGC Web Services Common specification (OWS,http://www.opengeospatial.org/standards/common [13]).
- Web Map Service (WMS): delivers web-friendly map images (ie pictures of data) which can then be delivered in some of the most narrow data pipelines. Separate Earth Observation profile and separate Web Map Tile Service specification. Requests that can be submitted include GetMap (map image), GetFeatureInfo (attribute information for specific location in map), Current version is 1.3.0
- KML: Started as a Keyhole Markup language. Used by Google for GoogleEarth. Later released as an OGC standard. Combination of being able to code time, location, attributes and even view information. Two types of KML files: files that end in KML (XML document) or a KMZ file (a compressed, zipped file that contains at least a KML document). Used as a model for encoding 2- and 3-dimensional geometries. Current version is 2.2.0. Handy way for packaging raster, imagery, geometries, attributes, etc. Increasingly useful way to deliver content.
- Web Feature Service (WFS): feature service typically used for delivering features or attributes, usually in GML and other formats. Includes a filter language for feature selection/extraction. Have many different request types (see slide- DescribeFeatureType, GetFeature, etc).
- Web Coverage Service (WCS): Delivers data in a variety of formats, Request model is basically DescribeCoverage (provides more detailed layer metadata) and GetCoverage (retrieves that specified coverage).
- Web Processing Service (WPS): standard for defining machine interfaces to geospatial processes, models and operations. Services may be wrapped in SOAP web services for combined functionality.
- Those are some of the key standards but there are many other OGC Services of potential applicability: Sensor Web Enablement, Catalogue Service, Geography Markup Language (GML) and Network Common Data Form (NetCDF).
- OGC Standards Summary and Remarks: May want to look at tools and services that are wrappers and middleware because we're not talking about capabilities that are limited to this particular community... we're really talking about resources that are on the internet and looking at an architecture that is build from the ground up. My recommendation: We understand that we have a wide variety of resources that we potentially want to tap into as part of this catalogue. If we can, as a community, move towards interoperability standards, we will be in a better position in leveraging the investments by other communities. We can think about what capabilities we need to develop to make use of community developed resources to produce end-user applications.

January 5, 2012 Wednesday 3:30 – 5:00 PM

- **Attendees**: Richard Eckman (NASA), Shailendra Kumar (NGC), Yasmin Zaerpoor (ESIP Student Fellow), Ben Wheeler (USGS), Stefan Falke (NGC), Karl Benedict (UNM), Rahul Ramachandran (UAH), Robert Bectel (DoE), Manil Maskey (UAH), Chocka Chidambaram (GSFC), Ethan McMahon (EPA), Jeanne Behnke (NASA)

Action Items

- **Richard and Kumar will put together an initial white paper for this tools catalogue proposal. Will send out to different agencies to receive feedback and finalize to review before the next summer meeting.**

Presentations

Stefan Falke – Systems Architecture and Implementation

- From Sensors to Decisions: We want to take the relevant information, add value and then feed decisions and policies into the societal benefits realm.The data flow is represented by the arrows.
- An Approach for Connecting Information Projects: Observations and models are at the top and feed through the GEO information systems and are then disseminated to inform different policies. Arrows represent information flows. Community coordination and collaboration (ie where ESIP fits in) is necessary to building the best practices and standards. Can do this on a project-by-project basis.
- Each of these scenarios feeds architecture implementation (see slide)
- Proposing to build networked components incrementally: we can identify different groups involved (ie one has data and another has use application) and figure out what would be involved with attaining interoperability between them.
- A key aspect for groups like this cluster is to figure out how to implement the standards. You won't achieve interoperability otherwise. (eg netCDF)
- Community Collaboration Portals (ie wikis) can help with that coordination.

Rahul Ramachandran (IT and Systems Center, Univ of Alabama Hunstville) – Drupal based Implementation

- Overview: Intro to Drupal, Implementation required for this to happen, Synergistic activities within ESIP
- Intro to Drupal: A popular open source Web Content Management System (CMS), two versions (D6 and D7).
- Key features: For content management it has admin user interface, custom content types (especially relevant to this cluster), versioning, taxonomy support, search support. Also has a template and theme system which allows you to change the look/feel without having to change the html. Also has a very nice user management system that allows you to make very fine grain changes.
- Drupal Concepts: extensive administration interface, everything in Drupal starts with a node – comments are listed under nodes, can have themes and blocks; making the tool very customizable, modules provide functionality, can attach files to nodes, and views (allow you to attach a smart quary builder)
- How it Works (see slide): Simplistic view
- The other nice thing about Drupal is that the software stack is very minimal, it'll provide with you at least capabilities of PHP, MySQL and Apache.
- Drupal has been used for many different things: eg document/data/metadata management, more handy for community based frameworks, etc.
- Examples of implementation in Drupal: NASA JPL DAAC, Bioenergy KDF (has a tools & apps catalog)
- Some Modules available in Drupal (D6): Content Construction Kit, Open ID, GIS visualization capability, etc.
- Drupal 7- Whats New: Tried to make it more user friendly, better security, packaged certain things with the core (such as CCK, RDF)
- Drawbacks of Drupal: There is a learning curve involved and a training cost (there's too many features and many ways of doing the same thing), migration issues from going from an existing system to Drupal, major version upgrades (from version 6 to 7) may be a nightmare
- Catalog Implementation Requirements- what do we want to store in our catalog? We need to define who the tool authors are, the data used for them, the publications and what other friells we need describing how these tools have been used by others (ie do we need links to published papers, or ratings, drawbacks, or list advantages?)
- Social Curation Requirements: How do you allow people to review the tool and to have conversations about the advantages/disadvantages about each of the tools? Who do you allow to add an entry to the catalog?
- Leverage other ESIP activities: There's a product and Services testbed that we coudl use to host a Drupal based catalog.

Kumar: Review of Dynamic Decision Tools Catalogue slides (from Jan 4)

- We've seen interest from DoE, USGS and several others for this kind of catalogue.

Richard Eckman: Next Steps- What will do as an ESIP community in the initial implementation?

- Sky talked about a number of activities with wildlife impacts decision support systems. He highlighted that 'stakeholders need to be engaged throughout the entire lifecycle of the project'. Laurie talked about a crosswalk for renewable assessment and made the comment about a 'rosetta stone' for assessment activities. Something for this group to aspire too.
- Madeleine West (WGA) highlighted the data gaps and the priority data needs for these wildlife assessment decision tools that they were developing. Also made the comment that there's a need to maximize application of technology to the public.
- Robert Bectel (DoE) highlighted the increasing relevance of mobile apps- this may be beyond current ESIP cluster capabilities but a direction to aspire towards.
- Today's discussions were much more related to the available decision support and discovery tools (arcGIS, Geoportal server, etc).

Notes: Open Discussion

- Robert Bectel suggested talking to Planetary Skin Institute (PSI) (FRED : creating decision support tools for local policymakers to determine what the likely outcomes are of local energy policies).
- Kumar: Would like to hear feedback from agencies:
  - Bectel (DoE): Would like to see this catalogue but not sure whether or not to limit it to renewables. DoE is already building siting applications – having a catalogue is crucial.
  - Wheeler (USGS): Would like to get other agencies involved (BLN?, Fish & Wildlife Service, NASA, NOAA). Would like to have additional discussions on funding and scoping. Some portions may be developed by specific agencies based on their specific needs but it is unlikely that one agency funds all parts.
  - Kumar: This catalogue would provide a forum for how these tools are being used. An opportunity to providing structure and a review of the tools used. There's pockets of tools with different functions in different places but no overview of what's available and where these tools overlap or where the gaps are.
- Kumar: How do we implement? We were thinking about sending out white papers to different agencies. By the next summer meeting, we would like to get some guidance from different agencies to identify how ESIP can coordinate this activity?
  - Bectel (DoE): Wants to make sure it fits with DoE objectives before working on it.
  - Kumar: From a logistics point of view, Richard and Kumar can write a first draft and send out to the speakers to get their comments and feedback.
  - Karl: This would provide a very concrete concept for the cluster for providing a clearer definition for where the points of contact in terms of ESIP capabilities and resources and to identify any gaps where support from external sources may fill.
  - Kumar: We would like to turn this into a working group and expand this into a scope. This could be a really useful tool – especially to National Climate Assessment. Would like to have someone from the NCA at the next summer meeting.
- Ethan (EPA): We had an 'Apps for Environment' competition. Have tagged apps and ideas for apps with environmental taxonomy. This may be helpful for the inventory and may complement the energy.data.gov.
- Kumar: Robert, what do you see that this group could provide that would complement what energy.data.gov will provide?
  - Robert (DoE): Give me a taxonomy for this catalogue that will apply to the different destinations. Would like to expand KDF beyond biorenewables.
  - Kumar: Would there be interest for this work from an EPA perspective?
  - Ethan (EPA): At the minimum, EPA could be a data provider (ie emissions data). Will also be encouraging the development community to use this data to create more apps. Would like to see the white paper.

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Participants:
WebEx: Alison LaBonte, Sky Bristol (USGS)

Present at Meeting: Richard Eckman (NASA), Shailendra Kumar (NGC), Yasmin Zaerpoor (ESIP Student Fellow), Ben Wheeler (USGS), Steve Young (EPA), Rob, Gary Foley (EPA), Erica, James, Laurie Allen

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