Lifemapper

Infrastructure and Web Services Enabling Biodiversity Research
Aimee Stewart, CJ Grady, Jeff Cavner, James Beach, Biodiversity Institute, University of Kansas, astewart@ku.edu

Tools for automated semantic reasoning over data and analyses services to identify potential workflows to answer particular scientific questions.

- Use Semantic Automated Data Integration framework (SADI) to submit Lifemapper experiments with Earth Data Analysis Center (EDAC) data inputs
- Can disease be predicted using species distribution modeling techniques?
- Is there a relationship between climate and rates of selected diseases?

Collaborators: University of Texas, El Paso, University of New Mexico
Funding: NASA ROSES-NNX12AF45A

ChangeThinking

Tools for high-school educators to foster complex conceptual thinking about climate change impacts on biodiversity.

- An online workbook links climate maps, species observations and predicted habitats to show the impact of climate change
- What visualization/modeling resources support Deep Thinking?
- What scaffolding and instructional activities support the development of deep thinking about the ecological impacts of climate change?

Collaborators: University of Michigan School of Education, UM Museum of Zoology
Funding: U.S. NSF Education Discovery Research K-12, NSF 0918590

Species Distribution Modeling: LmSDM

Lifemapper web services and applications for creating and exploring potential current and future species distributions.

- Predict potential species habitat based on conditions where they have been found
- Eleven modeling algorithms, each with parameters for fine-tuning
- Built as web services to allow programmatic access
- Plug-ins available for simpler access from: VisTrails workflow application, QGIS desktop GIS application

Collaborators: Kansas State University, Oklahoma State University, University Oklahoma
Funding: U.S. NSF EPSCoR Program, NSF 0919443

Range & Diversity: LmRAD

Lifemapper web services enabling cross-domain research on ecological systems.

- Builds on the LmSDM infrastructure
- Constructs multi-taxa grids for macro-ecological research
- Populates grid from user-specified data or LmSDM outputs
- Calculates site and species based biodiversity indices
- QGIS plugin allows macro-ecological data exploration and analysis within full GIS toolbox
- Displays analysis results within linked map, plot, and tree displays

Collaborators: Kansas State University, Oklahoma State University, University Oklahoma
Funding: U.S. NSF SAVI Division of Advanced Cyberinfrastructure NSF 1248493

CyberCommons for Ecological Forecasting

Tools and web services enabling cross-domain research on ecological systems.

- Infrastructure for Collaboration
- Expose CyberCommons analysis tools as Web Processing Services (WPS)
- Produce Ecological Metadata Language (EML) metadata for CyberCommons data
- Create extended EML to clearly document the Lifemapper services and parameters used in a workflow and ensure reproducibility
- Store, Query, Retrieve data and EML with DataONE APIs
- VisTrails scientific workflow interface to CyberCommons tools

Collaborators: Kansas State University, Oklahoma State University, University Oklahoma
Funding: U.S. NSF EPSCoR Program, NSF 0918166

Pacific Rim Applications and Management Assembly: PRAGMA

Proof of concept explorations of metadata-driven workflows and distributed compute resources tuned for particular analyses, data, or users (VBE). The explorations center on a Virtual Biodiversity Expedition focused on the biology of Mount Kinabalu, Sabah, Malaysia.

- The VBE requests an SDM experiment in Kansas using input PRAGMA data in Malaysia and Florida, returning the results to a catalog Indiana
- A new Virtual Cluster running Lifemapper software at UC, San Diego is created to run all PRAGMA VBE data and experiments

Collaborators: University of Indiana, University of Florida, University of California, San Diego, Universiti Teknologi, Malaysia
Funding: U.S. NSF SAVI Division of Advanced Cyberinfrastructure NSF 1248493