Overview

• Tools for Conservation Planning Projects
• Platform for Conservation Systems
Tools for Conservation Planning Projects

- Predictive Range Mapping
- NatureServe Vista

Example Project:
Integrated Conservation Assessment in the Andean Watershed of Peru and Bolivia
Objective:
Model and map endemic species and ecological systems to identify conservation priorities in the upper Amazon watershed in Peru and Bolivia.

Eleutherodactylus mercedesae
© Steffen Reichle

Brunelia, sp
© Field Museum
Project components

• Endemic species distribution modeling
• Ecological systems mapping
• Predicting new areas of endemism
• Vista application; regional and local scale
• Ensure long-term availability of project data

Project end date: December 2006

Bejaria sp. © Field Museum
## In Country Meetings and Symposia

<table>
<thead>
<tr>
<th>Bi National Meetings and Workshops</th>
<th>Invitees</th>
<th>Date</th>
<th>Country</th>
<th>No. participants</th>
<th>NS staff</th>
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<tr>
<td>Technical Workshop; Ecological Systems Mapping and Endemic Species Modeling</td>
<td>Contractors and experts</td>
<td>23 – 25 Feb-05</td>
<td>Peru</td>
<td>28</td>
<td>7</td>
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<td>Official presentation of project</td>
<td>Conservation and political contacts</td>
<td>15 Mar-05</td>
<td>Bolivia</td>
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<td>Official presentation of project</td>
<td>Conservation and political contacts</td>
<td>17-Mar-05</td>
<td>Peru</td>
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<td>Ecological Systems Mapping workshop</td>
<td>Contractors vegetation experts</td>
<td>5 – 7 May-05</td>
<td>Peru</td>
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<td>Endemic Species Modeling Symposium</td>
<td>6 experts presenting to 70 invitees</td>
<td>26-Sep-05</td>
<td>Peru</td>
<td>70</td>
<td>5</td>
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<td>Endemic Species Modeling Hands-on Workshop</td>
<td>Contractors and experts</td>
<td>27 - 29 Sept-05</td>
<td>Peru</td>
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<tr>
<td>Meeting for installation of Biotics and server</td>
<td>Centro de Biodiversidad y Genética</td>
<td>3 – 7 Oct-05</td>
<td>Bolivia</td>
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<td>Ecological Systems Mapping Meeting</td>
<td>Contractors from Peru and Bolivia</td>
<td>1-Dec-05</td>
<td>Peru</td>
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<td>San Martin Regional Visit</td>
<td>Local Government and Planning Organizations</td>
<td>6-8 Feb-06</td>
<td>Peru</td>
<td>5-25</td>
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<td>Predicting New Area of Endemism; Symposium and Workshop*</td>
<td>Researchers specializing in South American endemics and spatial modeling</td>
<td>June-06</td>
<td>Bolivia</td>
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Project Outcomes

Conservation Products
- ~600 modeled endemic species distribution maps
- Areas of high endemism
- Ecological systems map
- Priority areas for regional conservation
- Local conservation planning

Training
- Species distribution modeling
- Ecological systems classification and mapping
- Conservation planning methodology
- Biotics

Publications
- Peer reviewed journals
- Conference presentations
- NatureServe publications
- 4 project bulletins

Cyanolyca viridicyanus
© Vireo Jay Dunning

Pilar Hernandez at CDC-Peru
Element Properties - Bosque Inundable de la llanura aluvial de los ríos aguas ne...

General | Spatial | Categories | Compatibility
--------|---------|------------|-----------------
Name: Bosque Inundable de la llanura aluvial de los ríos aguas ne...
Alternate Name: 408.536
URL: Restricted
Description:

Measured by:
- Area (hectares)
- Occurrences

Has a minimum size for viability:
- Min Size: 200 hectares
Conservation Value Summary

- Endemic Species
- Ecosystems
Manage the list of conservation elements.
Or enter “Andes Amazon” into natureserve.org search box
Building Conservation Systems

Lessons Learned

• Importance of Local Utility
  - Where the data lives
  - Cost of ownership
  - Language
  - Simplicity $\rightarrow$ Fitness

• Synthesis at Scale
  - Connectivity
  - Standards:
    • Deep standards $\rightarrow$ less usable
    • Shallow standards $\rightarrow$ less useful
  - Security

• Adaptive Systems
  - Conservation technology under-funded
  - Evolving science, technology and user needs
Platform for Conservation Systems

• Data accessibility
  - Standards
  - XML Web Services

• Application Accessibility
  - Web-based
  - Localized

• Extensibility: embrace variation

• Let us not start over … again!
Observations DMS

• Example of new approach
• Shares challenges common to Conservation Apps
  - Cost of ownership
  - Data sensitivity
  - Variability in data model
  - Social & institutional barriers to sharing
Background

• Moore foundation sponsored survey of conservation information users
  - Respondents ranked management of observations data #1 need
• Observations are “Primary productivity” for eco-informatics
• Compatibility in obs systems and data would pay significant dividends
Observations DMS Architecture

- Observations DMS Web User Interface
- Observations XML Web Service
- Oracle Database
- Internet
- HTML
- XML
- Browser
- Desktop Application
- Field Device
- Aggregation Portal

NatureServe
Web-based Application Framework

- Species Data Mgmt Application
- Occ’s & Distributions Mgmt Application
- NatureServe Vista
- Protected Areas Data Mgmt Application?

- Biotics (Species & Occ’s) Web Service
- Observations Web Service
- Security XML Web Service
- ArcGIS Server XML Web Service

- Biotics
- Observations
- Security
Observation DMS

Benefits

Enable Local Capacity

- Web-based data entry, reporting, analysis
- Localizable, Secure

Complete, usable

- Import/Export to Excel, shape file
- Rich Reporting
- Mapping & SA via ArcGIS Server & Geoprocessing
Observation Standard Support

• Core Attributes
  - Who, what, where, when
  - Managed as relational fields

• Extended Attributes
  - Managed as XML
Survey: CR Bat Diversity

Species: White Bat

Location: Costa Rica

Date: 10/10/2002

Primary Observer: Joe Bob

**Observation type:** Nesting

Nest Height: 4.55

Egg Count: 2

Comment: Second visit with female circling.
Kestrel Technology: Attribute Extensibility

- Individual Attributes defined in XML
- Help to describe observation or survey
- Non-trivial effort
- Signed by author, optionally by organization
Example Attribute:
Observation Type

```xml
<AttributeDefinition name="observationType" namespaceURI="SARINV.attributes.pc.gc.ca">
  <DataType>
    <CoreType>
      <PickList>
        <ListValue value="basicSighting">Basic sighting</ListValue>
        <ListValue value="singingMale">Singing male</ListValue>
        <ListValue value="nesting">Nesting</ListValue>
        <ListValue value="breeding">Breeding</ListValue>
        <ListValue value="nonBreeding">Non-breeding</ListValue>
        <ListValue value="foraging">Foraging</ListValue>
        <ListValue value="observation">Observation</ListValue>
        <ListValue value="herbarium">Herbarium</ListValue>
        <ListValue value="historical">Historical</ListValue>
      </PickList>
    </CoreType>
  </DataType>
  <LabelText>
    <Text lang="en-US">Observation type</Text>
    <Text lang="fr">Type de l'observation</Text>
  </LabelText>
  <HelpText>
    <Text lang="en-US">Type of the observation</Text>
    <Text lang="fr">Type de l'observation</Text>
  </HelpText>
</AttributeDefinition>
```
Example Attribute: Acidity

- <AttributeDefinition name="acidity" namespaceURI="attributes.natureserve.org">
  - <DataType>
    - <CoreType>
      <ValueType>float</ValueTye>
    </CoreType>
  - <TypeInfo>
    - <RangeFloat min="0.0" max="14.0">
      - <ErrorText>
        <Text lang="en-US">Acidity value must be between 0.0 and 14.0.</Text>
        <Text lang="fr">(In French) Acidity value must be between 0.0 and 14.0.</Text>
        <Text lang="es">(In Spanish) Acidity value must be between 0.0 and 14.0.</Text>
      </ErrorText>
    </RangeFloat>
  </TypeInfo>
</DataType>
- <LabelText>
  <Text lang="en-US">pH</Text>
  <Text lang="fr">pH [TODO: fr]</Text>
  <Text lang="es">pH [TODO: es]</Text>
</LabelText>
- <HelpText>
  <Text lang="en-US">Acidity help</Text>
  <Text lang="fr">Acidity help in French [TODO]</Text>
  <Text lang="es">Acidity help in Spanish [TODO]</Text>
</HelpText>
- <DefaultValue>0.0</DefaultValue>
- <Comment>Acidity comment</Comment>
</AttributeDefinition>
Templates

• Group of Extended Attributes
  - Strongly associated with observation or survey
  - Attributes work together to support a type of observation or survey

• Enables protocol support, e.g.
  - Heritage Methodology
  - Invasive species
  - CI Rapid Assessment
  - Citizen Bird Survey

• Signed by author/organization
  - Enables usage tracking and enhancement requests
Kestrel Attribute Library

• Premise: people are lazy

• Shared Community Resource
  – Attributes and Attribute Collections
  – Rich UI for defining and editing attributes and collections
  – Rich UI for search and browse of library holdings

• “Open Source” social arrangements
  – Roles: owner, contributor, user
  – Bug and enhancement tracking
  – Community forums
  – New: reporting on usage → esteem authors
  – Good behaviors like mapping to predecessors

• Benefits
  – Saves time: reuse over reinvention
  – Reuse directly enables aggregation and downstream analysis
Kestrel Attribute Library

Observations
Web User Interface

Kestrel
XML Web Service

Oracle
Database

Attribute Library
XML Web Service

Attribute Library
Database

Web User Interface
Kestrel Attribute Library: Community Resource

Observations Web Application

Internet

Species Web Application

Protected Areas Web Application

Attribute Library XML Web Service

Attribute Library Database

NatureServe
Implications for Eco-Informatics

- Concepts apply to other eco-informatics entities
- Species, Ecosystems, Plots
- Protected Areas
- Directly supports other standardization and aggregation initiatives
  - TDWG data standards
  - EcoGrid from NCEAS
Contact:
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kristin_barker@natureserve.org

Questions?