

Geospatial Conservation Assessment Tool (GeoCAT): User requirements for the visualization tool for Scratchpads

Javier de la Torre - Vizzuality (jatorre@vizzuality.com)

Most of Vizzuality participation on ViBRANT have to do with the development of the GeoCAT Tool. This tool is designed to produce rapid species level conservation assessments based on IUCN Red List Categories and Criteria (IUCN 2001). Through an easy to use interface with a familiar Google Map underlay you can upload primary occurrence data for a species and at the click of a button calculate values relating to the geographic range of a species.

The development of the tool has already started, but at the same time we started the process of gathering user requirements.

At the beginning of February we organized a meeting with different potential users of the tool to discuss what the tool could do and organize the development for the next months. Therefore there was a list of requirements described before the meeting and another list collected during the meeting.

In this document we will describe those requirements while giving a status of the current developments and the future directions.

Finally we include some of the wireframes and designs done prior to development and that are being tested with users to better understand their effectiveness.

Pre-meeting requirements and ideas for the tool

Working with Kew Gardens

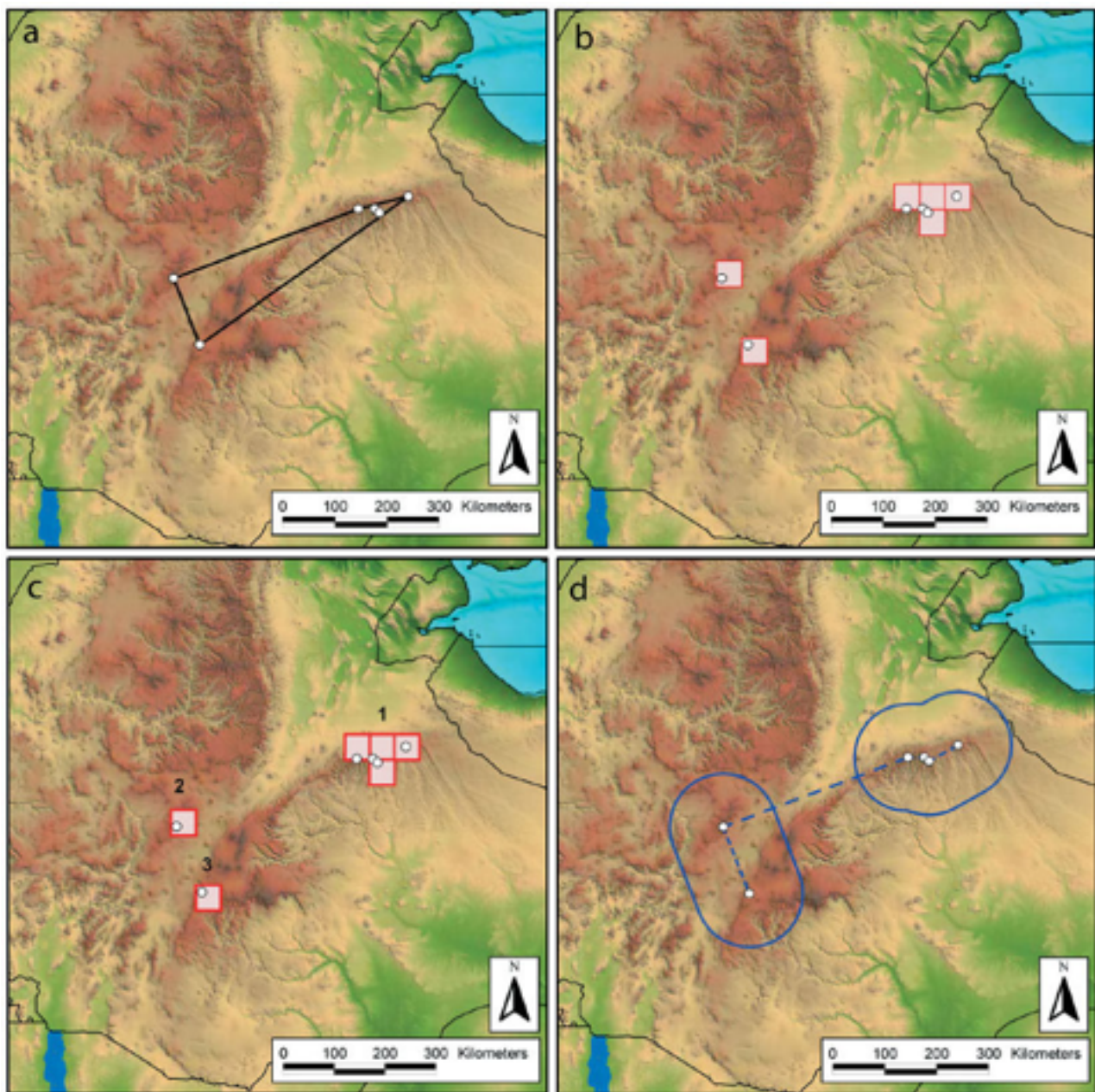
The work being done in ViBRANT is heavily based on the previous studies being done by the GIS Unit at Kew Gardens.

Kew is a world-leading institution with regard to plant species conservation assessments (it is a global custodian of plant conservation assessments), both in terms of numbers of plants assessed and in developing the techniques to carry out these assessments (equally applicable to other major groups e.g. mammals and birds). Therefore it made a lot of sense to work with them on the elaboration of requirements for the ViBRANT developments.

The proposal is to produce a tool that will allow conservation assessments to be produced in Google Maps from plant locality point data or primary occurrence data (see image below). The tool will automatically calculate measures associated with the IUCN Red List categories and criteria (IUCN 2001) - the most respected and globally used system for assessing extinction risk.

The tool will calculate Extent of Occurrence (EOO), Area of Occupancy (AOO), number of localities and number of subpopulations for any species, from a database of geo-referenced specimens, and assesses these measures against the thresholds of the IUCN Red List Categories (IUCN 2001).

Traditionally this analysis have been done using proprietary GIS software such as ArcGIS. The tool developed at ViBRANT will be Free and Open Source. By making them available as an online tool anyone interested in conservation and with access to the internet will have ease of access to a quick, quantifiable and repeatable species conservation assessment tool without the overheads of a full GIS with its associated learning curve and costs.



Preliminary GIS analysis of *Aloe pubescens* Reynolds from the highlands of Ethiopia using georeferenced specimens from the herbarium at the Royal Botanic Gardens, Kew, showing (a) the extent of occurrence, measured as a convex hull; (b) the area of occupancy, measured with a cell width of 48 km; (c) the number of subpopulations using the cell-adjacency method of Schatz et al. (2000); and (d) the number of subpopulations using Rapoport's principle of mean propinquity (Rapoport 1982; see also Willis et al. 2003)

Function list

The list of functions to be included on the tool was managed on an Excel Spreadsheet and is included here as reference.

We have defined 4 level of prioritization.

Priority 1 = we must have this in place

Priority 2 = very useful, but not core functionality

Priority 3 = optional functionality that will enhance the tool

Priority 4 = Could be useful

Function	Prio rity	Notes/Comments	Difficulty	complex for users
Core measures: AOO - scaling	1	Investigate scaling options according to IUCN equations	Easy	basic
Core measures: AOO - sliding scale	1	Kew method for adjusting AOO cell size according to range size - may need some more justification on this.	Easy	basic
Core measures: AOO - standard cell size	1	2x2 km grid (4 km area) defined as IUCN standard	Easy	basic
Core measures: AOO - user defined cell size	1		Easy	advance
Core measures: EOO - convex hull	1	Needs to be tested over the 180 line	?	basic
Core measures: EOO diameter	1		Easy	"advance
"				
Core measures: Number of localities	1	localities = occurrences with same lat long. IUCN Location/locality issue again	Easy	basic
Core measures: Number of occurrences	1		Easy	basic
Integration with Google maps	1		Easy	basic
Results/reports of measures	1	Basic report is core requirement - could be made more detailed if required	Easy	Basic/ Advanced
User point and click to add points	1	User defined points using point and click	Easy	basic
User can turn points on or off	1		Easy	basic
Realtime calculations	1	i.e not the press of a button, but interactive. Will need to see where performance drop off is (i.e too many points) Presently working	Easy	basic

Download occurrence data used in assessment	1	Formats could be CSV, TXT, KML	med	basic
Occurrence data harvest	1	GBIF primarily, but investigate other options e.g. Flickr	Easy/ Med	basic
Upload user occurrence data	1	Need to decide on formats and fields	Easy/ Med	basic
User able to edit data (move and remove, re-introduce)	1	Need to be able exclude/induct occurrences e.g. GBIF records, flickr etc. may contain incorrect geo-referencing. Probably check boxes with locality	Easy	basic
Export map as part of report	1	depends on google licensing - other base maps could be used	Easy	basic
Site registration	3	Not compulsory, but good for updates etc.	Easy	Admin
View uncertainty of occurrence data e.g. buffer points to georef precision. Would allow the viewer to see min and max EOO etc.	2	Would be nice to add this if we are asking for georef precision	Easy/ Med	Advance
Export map	2	depends on google licensing - other base maps could be used	?	basic
Use of polygons	2	Users may want to define range by drawing polygon(s). This would be convex hull of polygon as well as all other functions listed under points	Very Difficult	Advance
User tracking	2	Monitor usage and numbers to report usefulness of tool.	Easy	Admin
Users able to serve their data up	2	i.e user can dump their files in shared space for others to view (i.e dump kml) else where, too much hassle for us to store google doc etc	Easy	Advance
Additional measure: AOO - subpopulations	2	Cell adjacency	easy	
Dealing with large numbers, with clustering	2	Users/taxa with large numbers could have their point data passed through a cluster algorithm, this would then be used to collect metrics.	Med	Basic
Additional measure: density value	3		easy	
Additional measure: EOO - alpha hull	4		Difficult	Advance
Additional measure: Rapoport Sub pop	4		Med	Advance

Additional measure: Rapoport's Area	4		Med	Advance
Analysis with protected areas	3	Further analysis with protected areas data (WDPA) e.g. percentage of points in protected area, percentage of convex hull in protected area.	Difficult?	Advance
Batch process for multiple species	4	Need to keep in mind when programming, but not sure how this can be a	Difficult	Advance
Change analysis	3	Basic changes in EOO/AOO if points are excluded Could have simple button to record eoo in graph or text. Difficult to know how to report final assessment, Worried about about user interface clutter!	Easy/ Med	Advance
Intergration with Bing maps	5	Can be useful for some areas, where bling gives better aerial photos. Not sure of possibility of this?	?	Basic
Query polygons from world checklist	3	Would be nice, but dependent on World checklist apps	Med	Advance
Slow/Roberts algorithms	4	sighting rate equations to determine probability species is extant - based primarily on date of collection	Easy	Advance
Viewable in Google earth and pluggin	3	Plugin yes. Google earth only for exported KML	Med	basic
Error feedback - moving points	4	see here: http://data.gbif.org/feedback/occurrence/126173888?feedbackOnURL=http://data.gbif.org/occurrences/126173888 we could direct user to this if they want to move points Record that localities have been edited with.	?	Advance
User to define polygons within EOO i.e forest	3		Very	Advance
Add in other base layers	4	e.g. GLCC 2000 forest cover, forest change, elevation. rainfall, background collection effort..... Basic display easy, interaction difficult	Med	Advance
Automated processing of ranges drawn from online sources	5	A bit like Lifemapper - where the preliminary measures are calculated on randomly chosen species based on GBIF or other online material. User could download this as screen saver or to process in background - or on machines not being used for anything useful. Ranges and results would be stored - would slowly work through all plant species.	?Difficult	Basic
Dealing with larges numbers, with clustering	2	Users/taxa with large numbers could have there point data passed throught a cluster algorithm, this would then be used to collect metrics.	Med	Basic



1st User requirement meetings

On the 3th of March of 2011 we organized the first GeoCAT meeting sponsored by ViBRANT. The event was hosted by the IUCN Red List Unit in the IUCN UK Office in Cambridge.

Participants:

Jim Ragle, IUCN
Javier de la Torre, Vizzuality
Vineet Katariya, IUCN
Steven Bachman, Kew Gardens
Justin Moat, Kew Gardens
Craig Hilton-Taylor, IUCN

Objectives of the meeting:

One of the first issues to discuss on the meeting was to establish some kind of structure for a committee of stakeholders interested on the tool and that could provide feedback to the development. This will ensure that the development is well aligned with real user needs and coordinated with important initiatives like the official Red List.

On the meeting there was people from Kew Gardens with all their knowledge on the topic and the experience they have running more than a thousand Red List Assessments over the past years.

The Red List unit at IUCN is a critical partner as the result of a Red List Assessment is fundamentally to be published through their system.

Finally Vizzuality was present to gather requirements and coordinate the developments done through ViBRANT on the tool.

Following is a list of issues that were discussed on the meeting and finally a list of requirements gathered for the development.

Communication of the project:

At the beginning of the project we started calling the project Red List Assessment Tool. This created some controversy. The tool is not a tool to Red List Assessments, is a Tool to do analysis, for now EOO and AOO and the future other ones. This can be useful on the process of the Red List Assessment.

At the end we agreed on a new name: **Geospatial Conservation Assessment Tool GeoCAT**.

**Where to host the tool:**

Considering that ViBRANT will be running for at least 4 years and have packages specially designated for infrastructure, we delayed the decision on where to host the tool until a new meeting with the other ViBRANT partners will be held.

Feedback system:

We agreed on the use of User Voice to gather feedback from users.

Standards:

It was discussed the benefit of promoting the creation of a standard for Red List Assessment Reports. This format could then be used to transfer between different tools performing the same analysis and gathering the same kind of data.

This was also considered a good idea for integrating with the SIS system within the IUCN Red List.

Integration with the SIS System:

IUCN proposed the further integration of the tool with their system to manage submissions to the Red List, the SIS system.

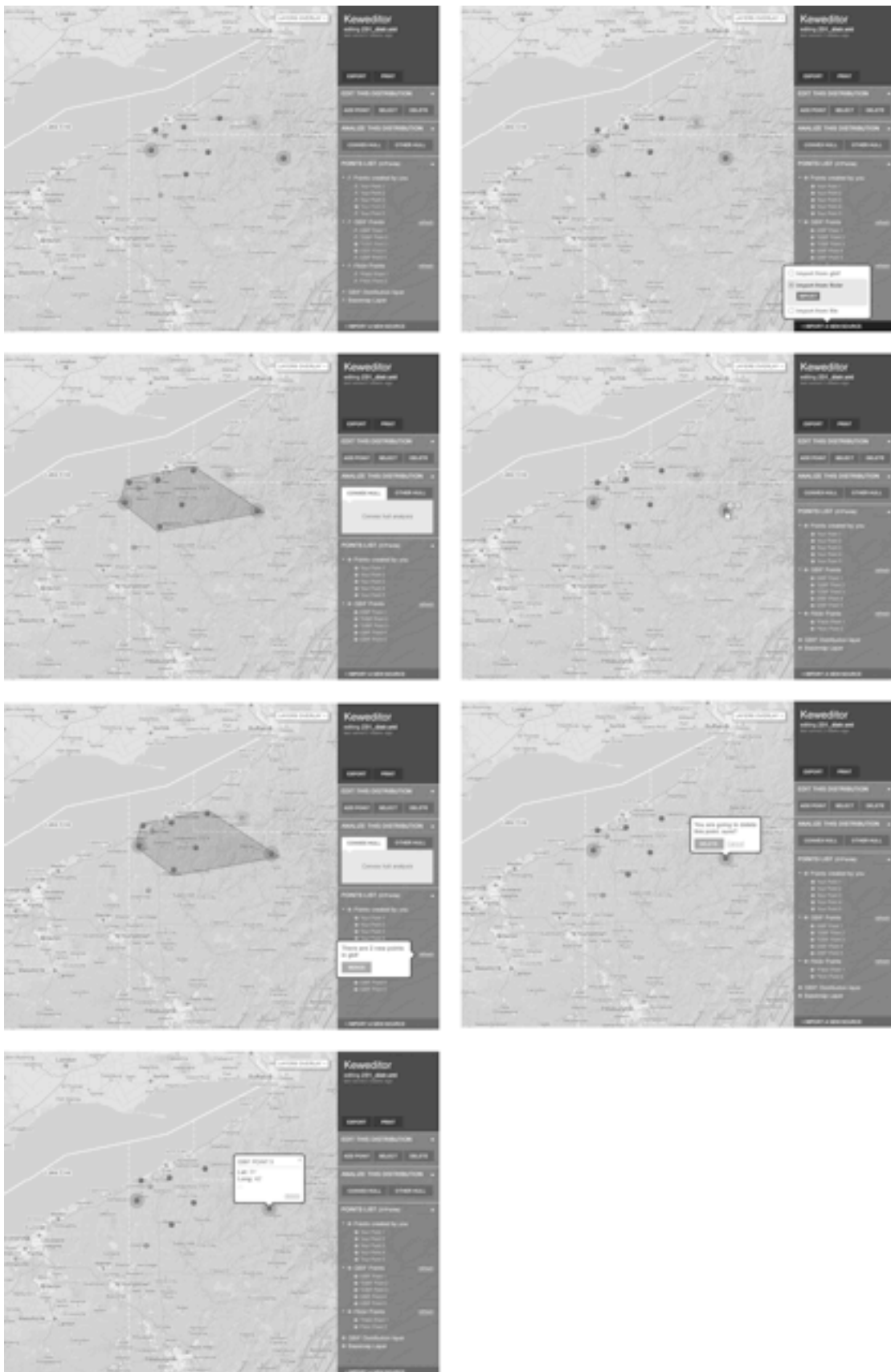
Functionality desirable:

- Read Primary data from scratchpads
- Visualize other layers like Protected Areas, Range maps...
- Overlay Niche models
- Visualization of the temporal component
- Be able to visualize results from other tasks within WP5



Wireframes and designs for the tool

Following is a list of wireframes and early designs done for the tool.



Keyword

Insert the name of the specie that will be analyzed

Import a previous version of a report

Featured datasets

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213_suzuka_StreakSloach.rdl [download]

TOOLS

ANALYSIS AND SOURCES

ANALYSIS ALGORITHMS

Convex Hull [APPLY](#)

Alpha Hull [APPLY](#)

SOURCES 13 POINTS

Your Points (11)

Points from GBIF (7)

Points from Flickr (5)

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ID	LAT	LONG	ACCURACY (m)	COLLECTOR
23	40.3787	-3.45471	4000	12910-Lutule rec...
25	42.7630	-3.45371	10000	12910-Lutule rec...

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