Towards a participatory WebGIS platform to support biodiversity inventory in the Geneva cross-border area

Stéphane Joost¹, Raphaël Baumann², Olivier Ertz², Jens Ingensand², Ivo Widmer¹, Daniel Rappo²

EPFL, Lausanne, Switzerland
HEIG-VD, Yverdon-les-Bains, Switzerland
Biodiversity conservation in urban areas

- Urbanization causes habitat fragmentation and destruction
- Biodiversity crisis in urban environments
- Strategy 2012 of the Swiss Federal Office for the Environment: promotion of biodiversity conservation in urban areas
Geneva urban area

• Geneva State service for urban planning is concerned about this issue and the related consequences on the quality of life for the citizens

• The Urbangene project wants to assess the impact of the urbanization process on biodiversity

• Do planned urban projects (horizon 2030) significantly impact biodiversity?
Analytical approach

- 3 species chosen (1 plant, 1 batrachian, 1 insect)
- Identify the potential habitat of these species
- Sample individuals at these locations (600 plants, 400 batracians, 400 butterflies)
- Extract DNA, sequence DNA and genotype them
- Calculate genetic diversity at sampling locations and determine gene flows between habitat patches
- Process simulations and measure the impact of the gene flows interrupted by urban projects on population species sustainability
Sampling points for *Plantago major*
A role for PPGIS and crowdsourcing

- Batracians: common toads
- Move between forests and ponds (reproduction place)
- Need to establish a list of ponds in the metropolitan area
- Ponds = sampling locations
- Geneva inhabitants know the locations, public and private
- Indicate these locations on a WebGIS platform
The recent evolution of the Internet has generalized crowd-sourcing approaches also in the field of geographic information through Public Participation Geographic Information Systems (PPGIS) initiatives (Merrick 2003; Elwood 2006).
A first experiment //urbangene.heig-vd.ch

91 ponds contributed between March 21 and May 31, 2014
Communication campaign

Launch: at spring 2014
Software architecture

- **Server-side:**
  - Database with PostGIS
  - Service API with PHP

- **Client-side:**
  - Web application with Leafletjs
  - Simple “backend”

- **External dependencies:**
  - Google Places API, Cloudmade, ...
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Towards a WebGIS platform

• Content Management Systems to publish maps, but what about collecting geodata?

• Build your own crowdsourcing platform by the assembly of several existing tools
  – e.g. CMS + Geofield plugin + Mapping plugin + Survey Maker + Social network dashboard ...

• The importance of a backend to manage the collected data (e.g. query API, ...)

• How to better involve the citizen who contributes (keep track, feedback, “staying alive”, ...)
Conclusion

• Implying citizens in biodiversity conservation
• Genomic process is on-going (sampling, DNA extraction ...)
• Communication campaign is key
  – http://www.facebook.com/urbangene
• Promising perspectives through a generic approach to favour reusability for future biodiversity PPGIS initiatives
• User-friendly front-end to facilitate the task of contributors when they input their data (Haklay & Tobon 2003)
• Open Source rationale: http://heig.ch/bekodi