



# Methods and applications of GIS in mapping linguistic data



Carleton  
UNIVERSITY

Canada's Capital University

# Why maps?

Maps can make large amounts of complicated data easy to understand.

The amount of information does not change, but is more *accessible*.

Almost everyone already has experience with maps in some form.

Maps can elicit emotions and perceptions in ways text alone cannot.

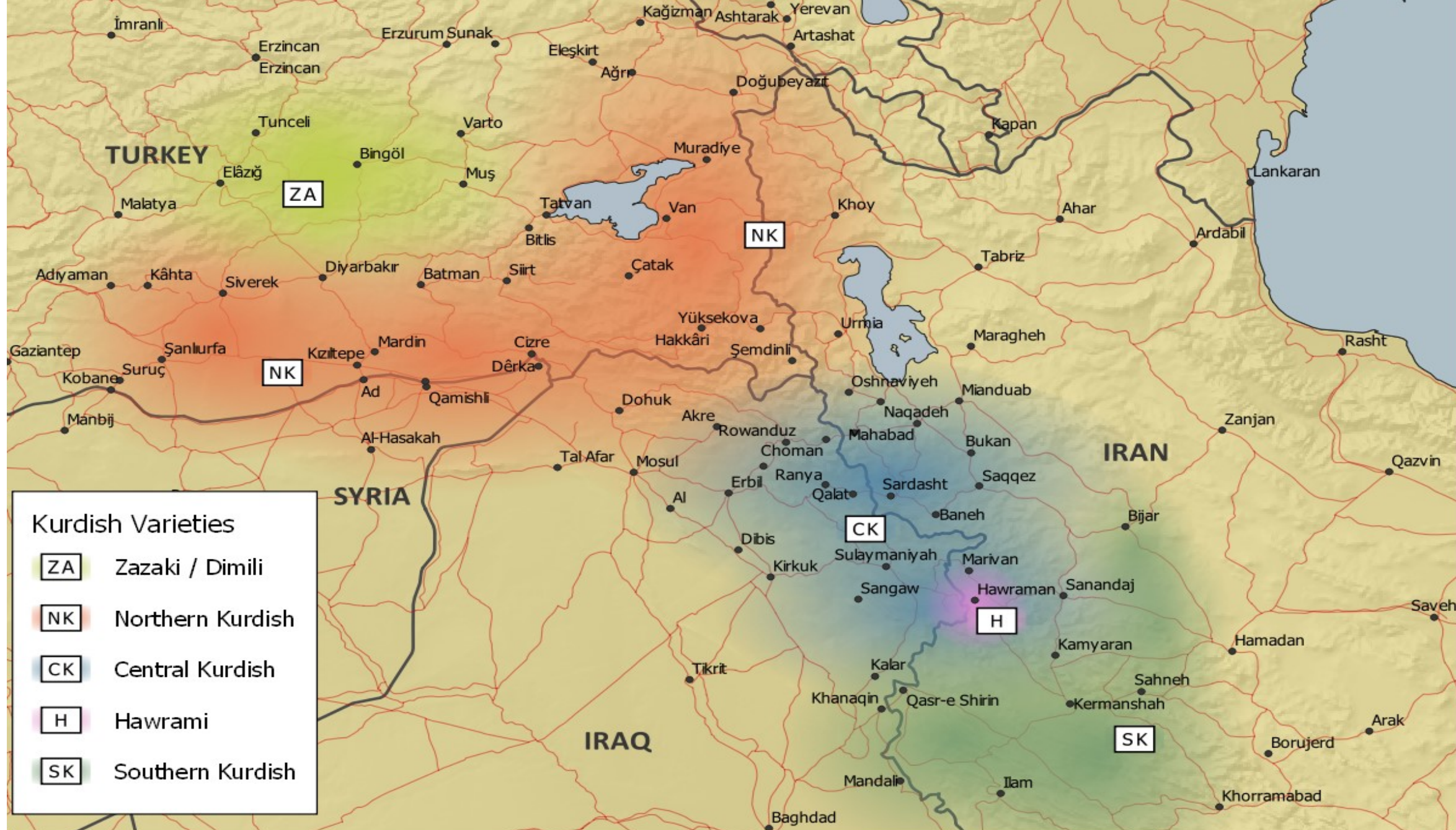
Maps acknowledge the relationships between language and space.

# Language mapping

*The symbolic arrangement of information about languages onto maps of (parts of) the physical world to understand relationships between languages, people, and space.*

Thematic mapping: human information on top of physical geography





# Digital mapping

The production or adaption of linguistic maps electronically.

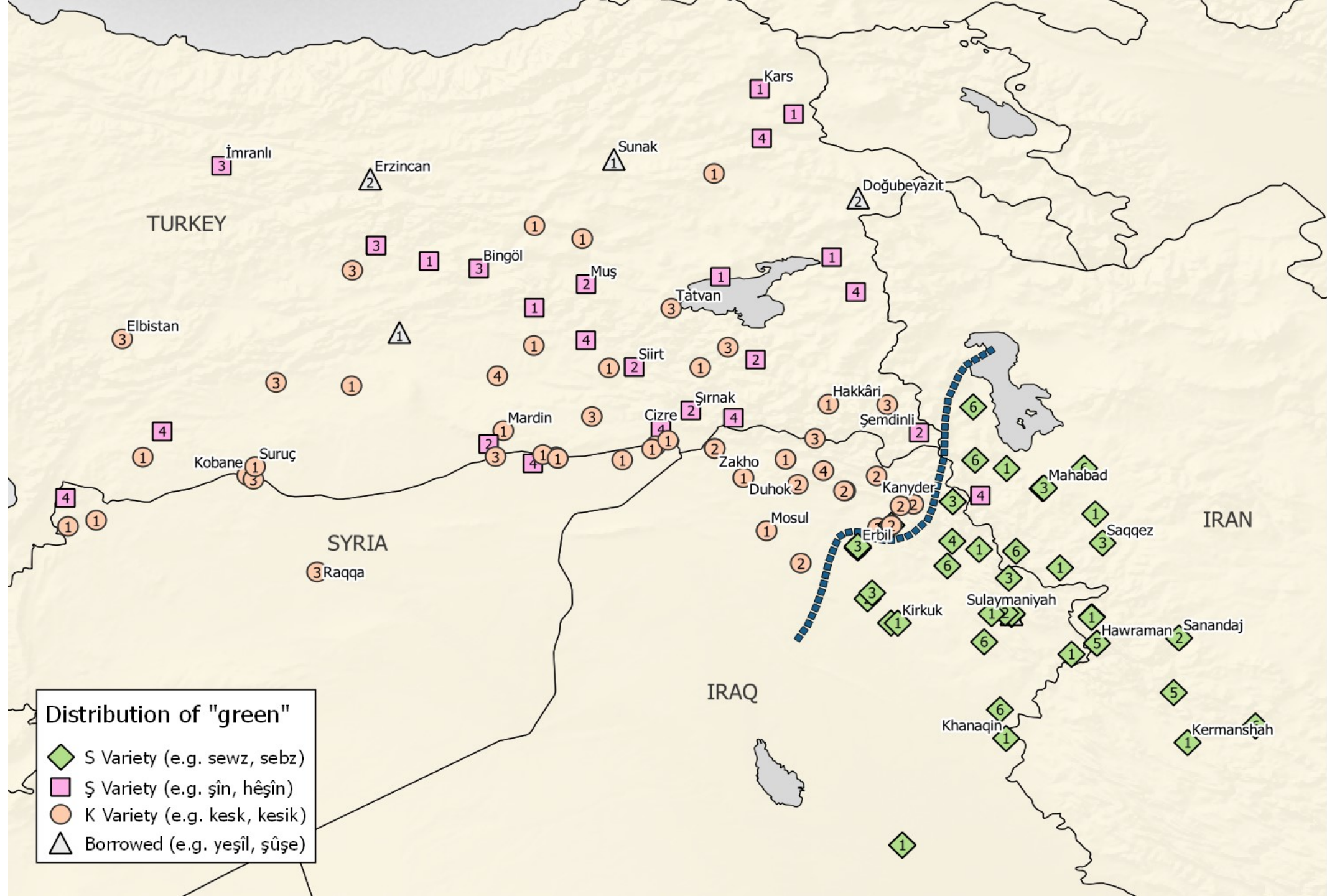
Digital maps are *static* (nonmoving) or *dynamic* (moving or interactive).

Digitally available maps are accessible to wider audiences.

They can be updated, altered, and changed as necessary.

Interactive maps can present multimedia and engaging information.







Map Satellite

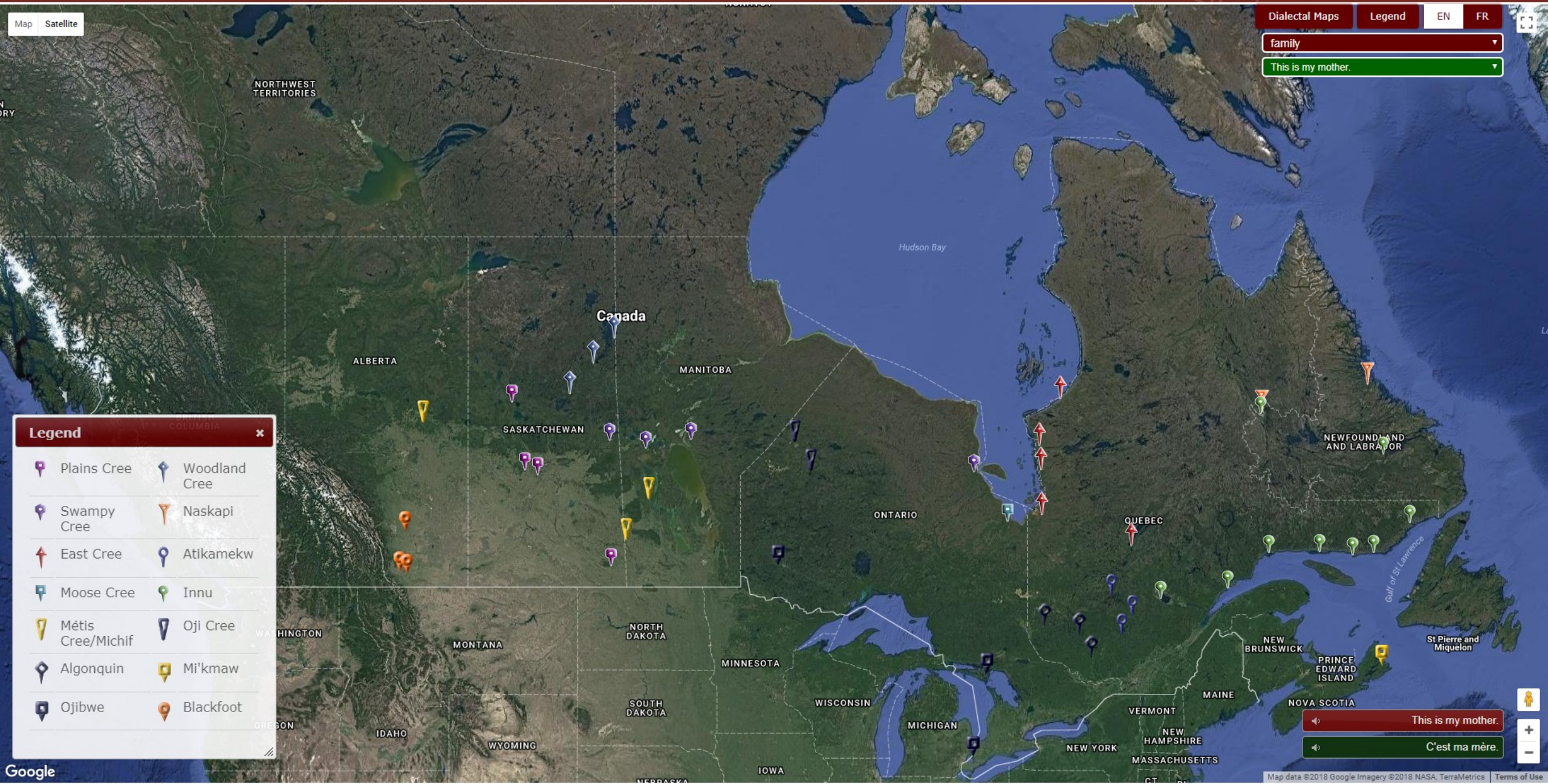
Dialectal Maps Legend EN FR

family

This is my mother.

Legend

Plains Cree	Woodland Cree
Swampy Cree	Naskapi
East Cree	Atikamekw
Moose Cree	Innu
Métis Cree/Michif	Oji Cree
Algonquin	Mi'kmaw
Ojibwe	Blackfoot



This is my mother.

C'est ma mère.



**The Indigenous People of Western North America and their many languages**

**ALGONIC**

1. PLENUM CME
2. SIBET
3. TURKIC

**ALUTIC**

4. ALUTIC
5. YAGUNA

**CHIMIKADNAN**

6. CHIMIKADNAN
7. SOLENTA

**CHINOOKAN**

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Microsoft Word

KERMĀNShĀH HAMADĀN MARKAZI QOM SEMNĀN

LORESTĀN ILĀM ESFAHĀN

Dorud Aligudārz

Chelgerd Shahr-e Kord

CHAHĀR MAHĀL VA BAKHTIĀRI

Masjed Soleyman Izeh Haftgel

KHUZESTĀN KOHGILUYEH VA BOYERAHMAD

BUSHEHR FĀRS

Iranian province names  
**ILĀM**

Bakhtiari dialect centres  
*Haftgel* •

Bakhtiari language area

50 km

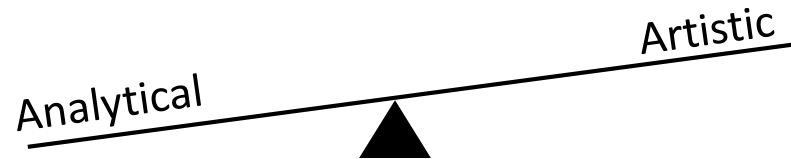
© Erik Anonby 2014, 2017



# GIS: Geographic Information Systems

Scientific approach to understanding spatial phenomena (Mark, 2003).

Any variety of thematic data that has geographic co-ordinates.



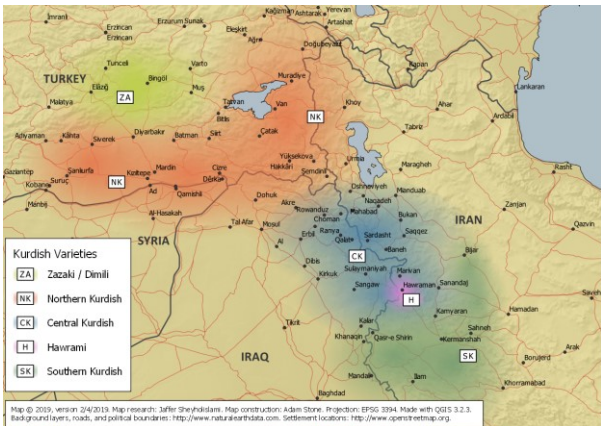
Large amounts of spatial data are created, modeled, archived, and disseminated using software packages with a variety of functions.

FileHomeInsertPage LayoutFormulasDataReviewViewDeveloperHelpTell me what you want to do

Calibri11A^A^

General











Considered in the GIS field to be the most professional / authoritative.

#### Strengths

Many different programs: ArcMap, ArcReader, ArcGISPro, etc.

Also includes large databases of geographic information and tutorials.

Contains a wide variety of tools and functions for data manipulation.

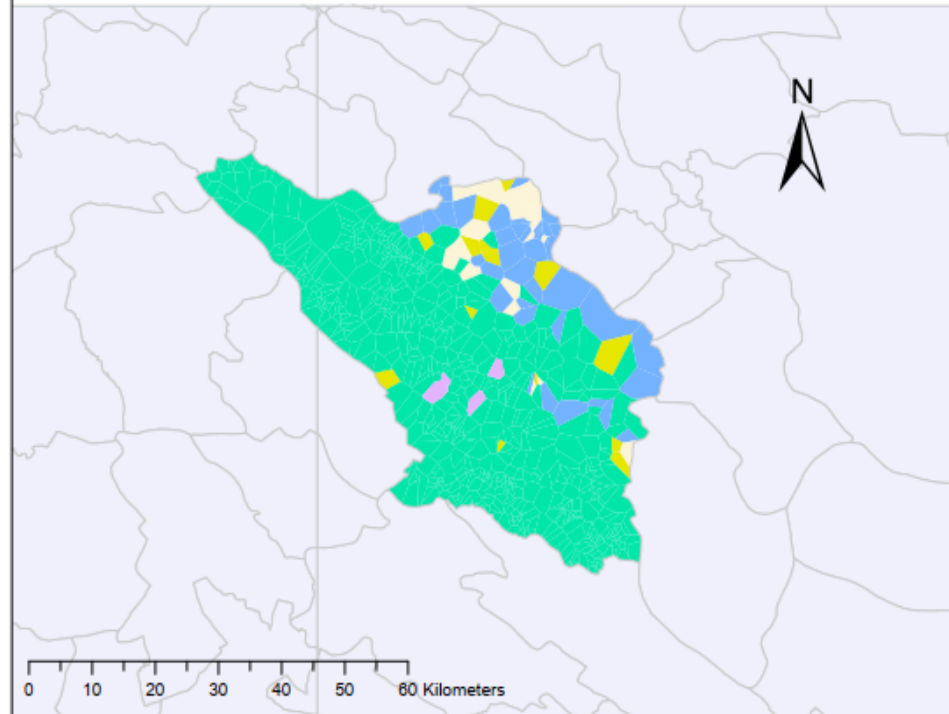
#### Weaknesses

Most programs are prohibitively expensive for individuals (\$1500/year)

Many ArcGIS files cannot be transferred to other programs

## The languages of Chaharmahal va Bakhtiari Province, Iran

A distribution created using Voronoi (Thiessen) Polygons



### Language

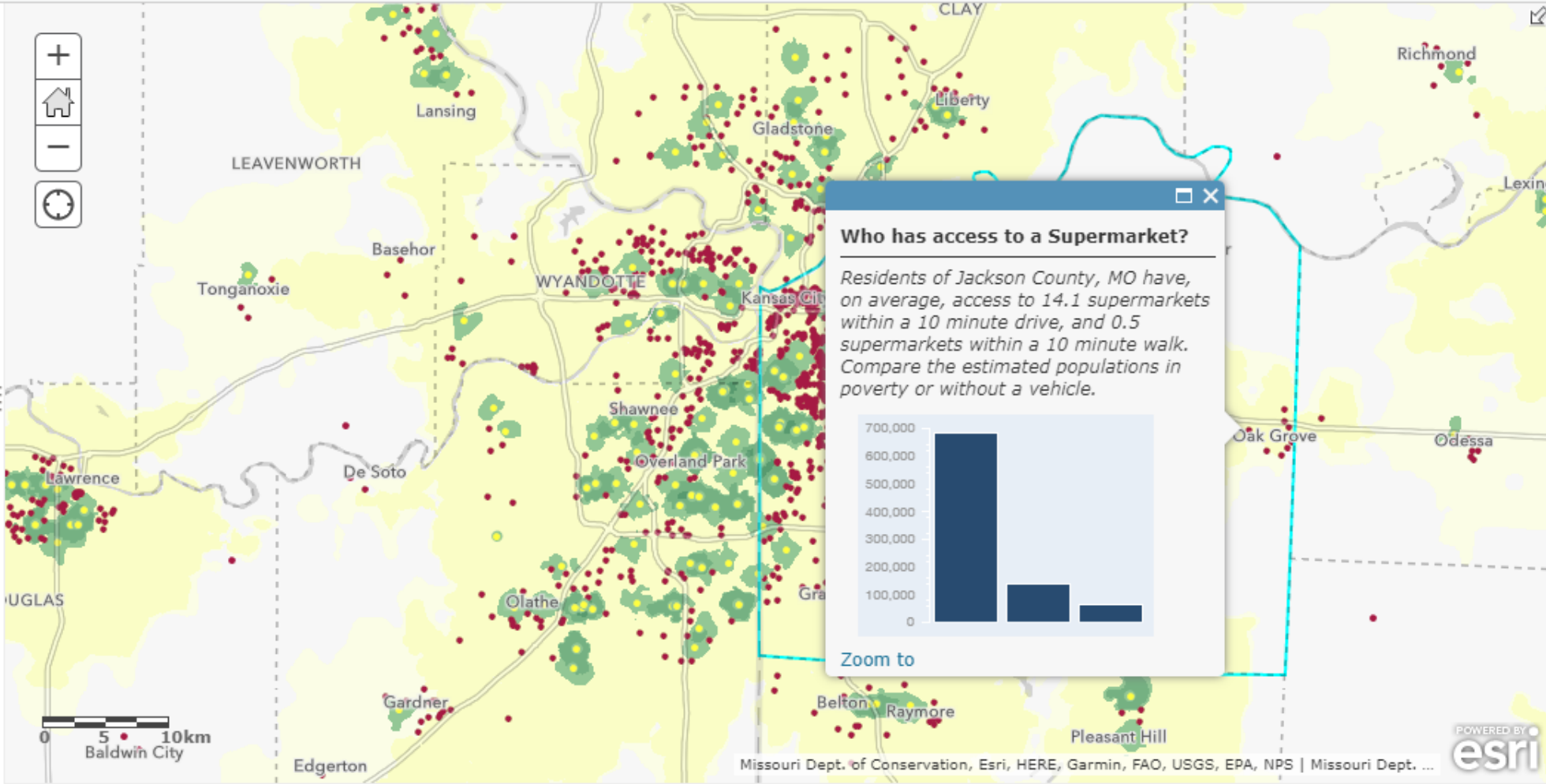
- Bakhtiari
- Turkic
- Chaharmahali
- Mixed
- No data

The sparsely-populated Chaharmahal va Bakhtiari Province is located in Western Iran and is home to a wide variety of languages. Languages such as Chaharmahali and Bakhtiari are Indo-Iranic (and are related to Persian, and distantly English) while Turkic is unsurprisingly related to languages such as Turkish. This map shows a simplistic distribution of such languages in the small province, and is an example of Iran's linguistic diversity.





- Legend
- USA Supermarket Access**
- Supermarkets included in analysis
- T = Supermarket, included
- People in Poverty with Low Access
- 30 or more people
- Supermarkets within 1 Mile Walk
- 11 or more supermarkets
  - 3 to 10 supermarkets
  - 2 supermarkets
  - 1 supermarket
  - No supermarkets with 1 mile walk
- Supermarkets within 10 Minute Drive
- 2 or more supermarkets
  - 1 supermarket
  - No supermarkets with 1 mile walk





Open source GIS program available on multiple platforms (e.g. MacOS).

#### Strengths

Supported by a large community of programmers and geographers.

Contains most of the tools also available in ArcGIS.

High degree of flexibility surrounding the presentation aspect of maps.

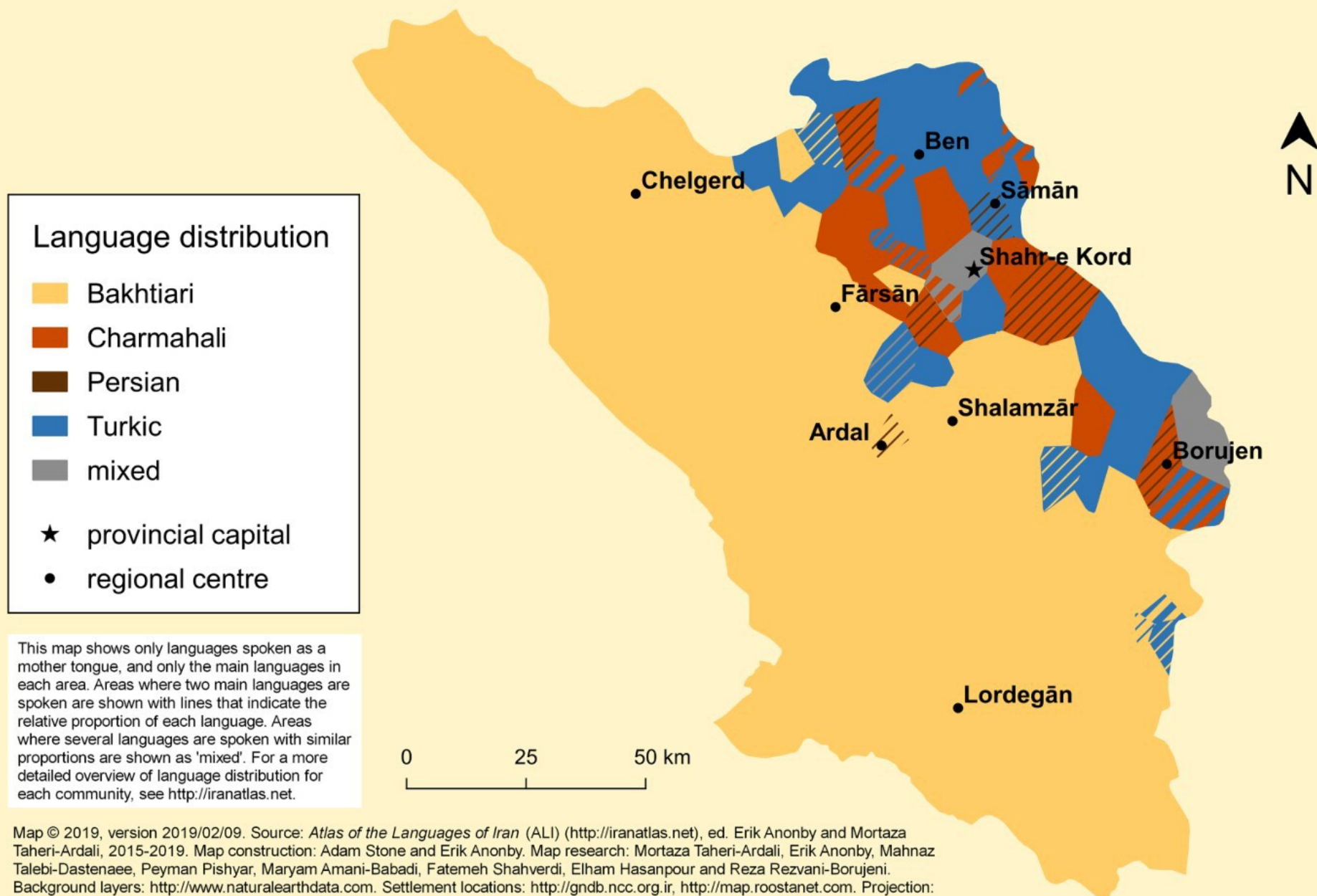
#### Weaknesses

Each new release has its own set of bugs (becoming harder to find).

Versions on different operating systems have different features.



# Languages of Chahar Mahal va Bakhtiari Province, Iran





Couples GIS data with satellite imagery and aerial photography.

Most features are designed for interacting with and viewing spatial data.

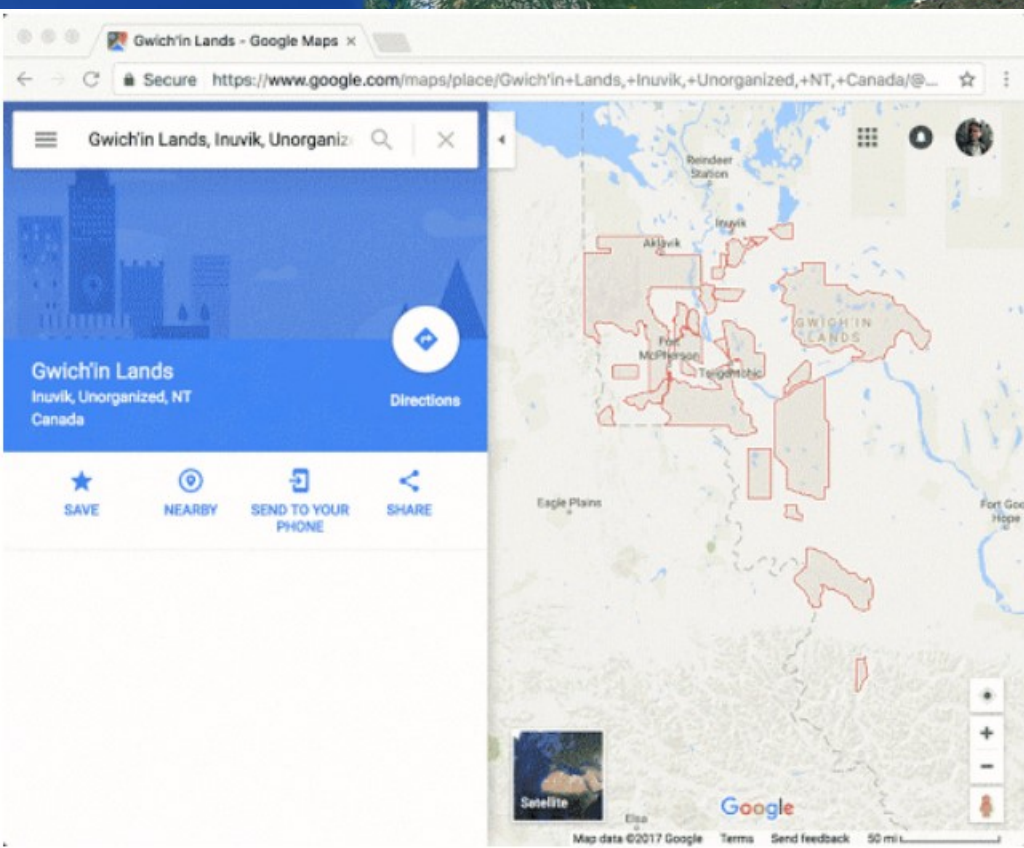
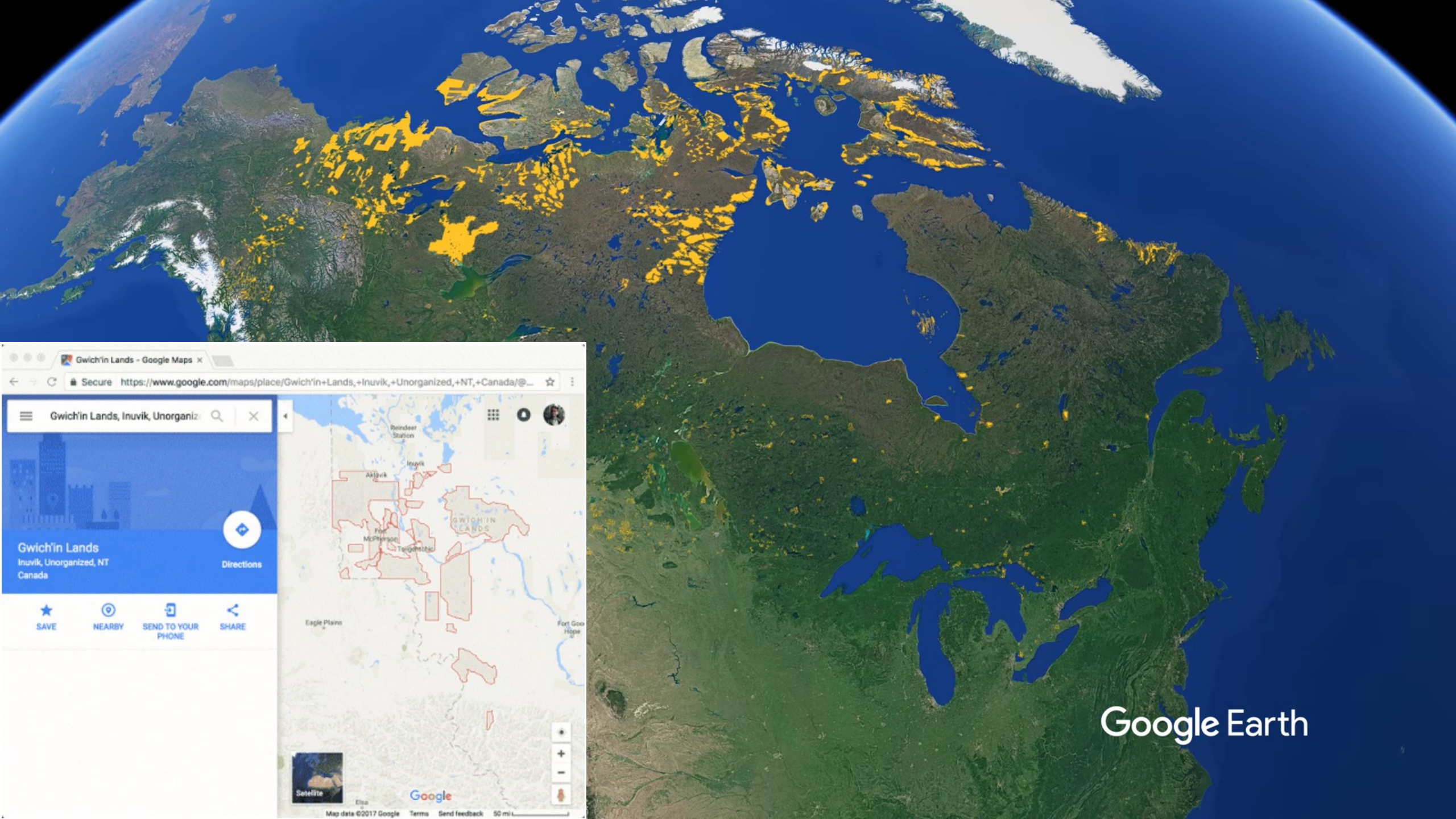
Users can upload their own information, but options are limited.

Advanced data manipulation and calculations are more difficult to do.

Google can use the information you upload for their own purposes.

(See the *Your Content in our Services* section of Google's Privacy Policy)





Google Earth



# GIS and linguistic/cultural empowerment

Mapping has historically been *top-down*.

Top-down: a small group imparts information on passive viewers.

Indigenous/minority groups are at the mercy of others' decisions.

Those who control maps control much of the public's knowledge.

GIS can make mapping a *bottom-up* process by communities, groups.

Knowledge can be mapped in culturally appropriate ways.

This is still an imperfect process: *it takes time to learn GIS*.

# Some applications of GIS in language support

Engaging and meaningful education:

Interactive/multimedia maps can teach words and phrases.

Educating others about one's land and language:

Maps communicate the presence of people and language(s).

Fostering pride and knowledge of traditional and historical space.

Maps can reveal relationships between language and space.

# Which GIS programs work best for you?

Your/the language's history, current vitality, and status.

Attitudes toward language use and support.

Your/the community's relations with majority societies.

The community's access to computers, funding, and training.

Community members' willingness to work with GIS projects.

Other related projects in community empowerment.

The intended audience (community members, public, government, etc.)



# Final remarks

GIS can foster communities' knowledge and interest in language information, and make this information more accessible.

Many different software packages address different needs and goals.

GIS requires specific training, skills, experience, and often funding.

There are alternatives that may incorporate GIS elements, such as cybercartography (later talks).

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