Developing a Fijian Language Geographic Information System

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7. Developing a Fijian Language Geographic Information System

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Abstract

In this chapter, procedures as to how the Fijian Language Geographic Information System (GIS) database have been developed are described. Various decisions with regards to procedures used are described here. What are presented in this chapter are the kind of information typically not included in a scientific report, and meant to be a practical guide for those who are interested in starting a similar kind of project.

7.1. Introduction

The Fijian Language Geographical Information System (GIS) Project is a project where GIS is developed for visual display and analysis of linguistic data. This requires compiling a GIS database to store language data in relation to geographical locations as points or areas. Once the database is established, it is expected to become a valuable resource with which developmental paths of linguistic features are examined, by displaying geographical distributions of different sets of language data in different combinations, and by analyzing correlations between linguistic and non-linguistic information. In addition to these scientific operations, it will also be possible to produce maps or other visualizations of the distribution of languages for the general public. In order to meet these goals a well-developed GIS database with scientifically accurate data need to be established. In this chapter, the processes followed to develop a Fijian Language GIS are described. In the rest of this chapter, an overview of the flow of the procedures and the team members and their roles are introduced.

The development of the project along with the time frame is summarized in Figure 7-1.[1)] The processes for the development of the system we have processed so far can be broken down into the following 6 phases according to the nature of the tasks:

1. Preliminary Preparation
2. Preparing Base Map
3. Language Data
4. Pilot Analyses
5. Prototype Interface
6. Integrating Map Data

TASKS	1. PRELIMINARY PREPARATION	GIS COMPILATION 2. PREPARING BASE MAP	3. LANGUAGE DATA	4. PILOT ANALYSES	5. PROTOTYPE INTERFACE	6. INTEGRATING MAP DATA
CORE MEMBERS (+indicates outsourcing)	Kikusawa, Geraghty, Okamoto	Lowry, Kikusawa, Geraghty, Tamata, Okamoto, Sano	Geraghty, Lowry	Lowry, Murawaki	Lowry+	Kikusawa+, Lowry
DISCUSSED IN:	§7.1.2	§7.2	§7.3	§5.3.2, §6.3	-	§7.4

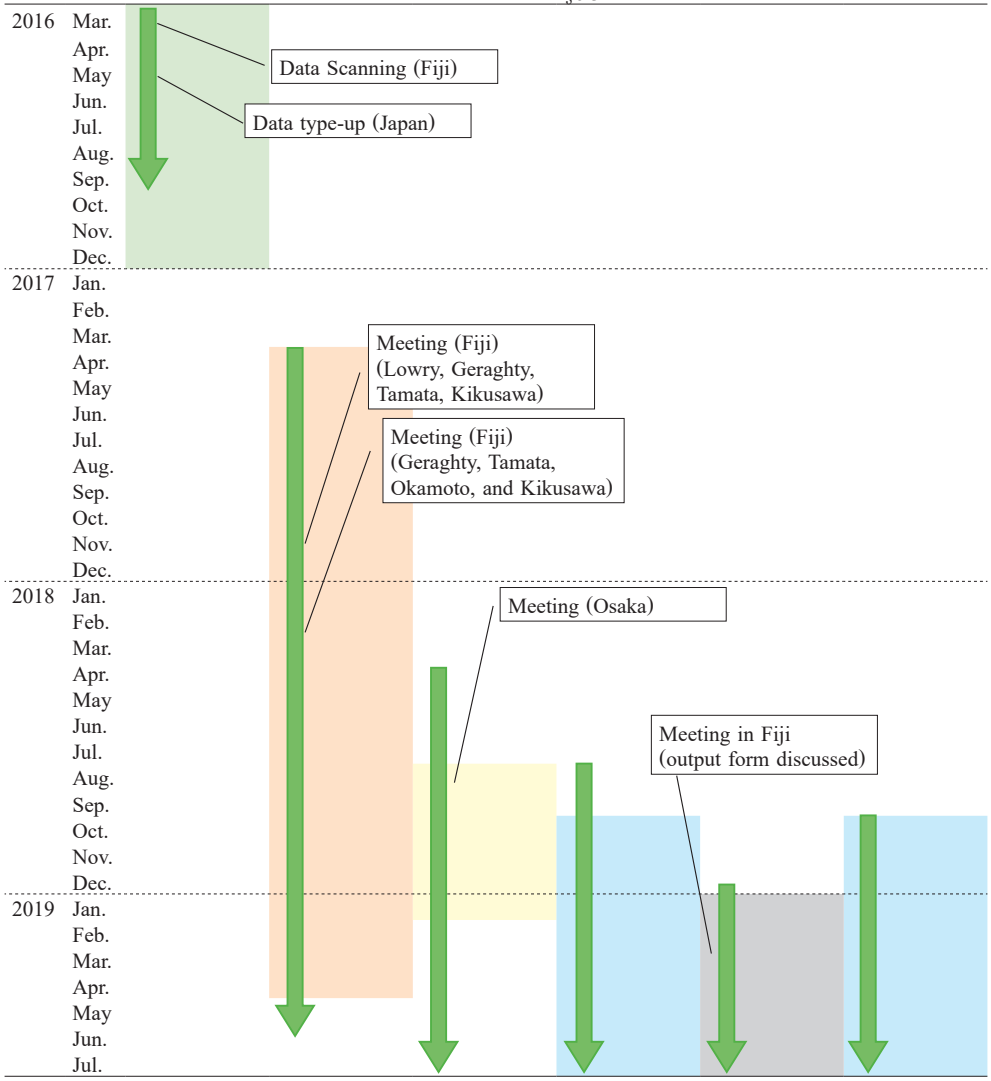


Figure 7-1 The development of the project organized according to the processes described in this chapter and the roles of the participating members (compiled by the authors)

The project has been funded by several different sources and the period of each funding is indicated in the figure with different colors.

Phase 1 (green): "Why Are Languages Spoken in the World All Different?" Academist CrowdFunding Project (April 2016–March 2017, PI: Kikusawa)

Phases 2 and 3 (orange): "Linguistic History and Human Flow in Fiji Revealed through GIS Data" (abbreviated as "Fijian Language GIS Project") funded by The Resona Foundation for Asia and Oceania (April 2017–March 2019, PI: Kikusawa)

Phase 3 (yellow): "Hosting of an International Symposium: Fijian Languages and GIS Project, and Its Application to Museum Exhibits" National Museum of Ethnology Research Fund. (April 2018–March 2019, PI: Kikusawa)

Phases 4 and 6 (blue): "Integrating Language Change in Time and Space: Applying Geographical Information System (GIS) and Statistic Modelling to Historical Linguistics" Joint International Research (B), Grants-in-Aid for Scientific Research by the Japanese Society for the Promotion of Science (JSPS). (2019–2023, PI: Kikusawa)

Phase 5 (gray): "Web-GIS and Spatial Analysis of Fijian Language Communalects" Massey University Research Fund. (January 1, 2019–December 31, 2019. PI: Lowry)

"Preliminary Preparation" is the phase where Kikusawa and Geraghty discussed and agreed on the need for a Fijian language mapping project. Unpublished Fijian communalect data collected by Geraghty as well as published data by others were monitored, and it was decided that we had enough language data to start the project. One of the major criteria was whether there were enough language data available from geographically adjacent areas suitable for micro-comparison (Kikusawa 2015). Kikusawa and Kinugasa (2005) had conducted a map project on Malagasy dialects, but with limited data from 13 dialects covering 1,550 km from the north to south, possible analyses one could scientifically conduct was limited. Although some tendencies had been observed, the stretch between the dialects was too vast to be able to make any further claims, because the data was not continuous. In addition to assessing language data to be used in the project, the software for use had to be decided, and the availability of GIS data for the selected software had to be investigated (details will appear in 7.2). In this phase, Kikusawa had support from Teramura Hirofumi, a GIS specialist from her home institute, in her preparation for a grant application and the forming of a research team.

Once the project began, the compilation of a GIS database started under the initiation of Lowry, a geographer and GIS specialist. This consisted of two tasks, namely "GIS Data Creation" (7.3.1) and cleaning up of "Compiling Language Data" (7.3.2). This was the main

work that was directly related to the development of a Language GIS, and will be elaborated in Section 7.3.

"Pilot Analyses" were conducted as the database developed. A small portion of the completed part of the database, namely data for the Kadavu Province, was selected and GIS-based analyses were conducted. This helped researchers to learn what kind of analyses and data operation were possible using GIS and what would be involved in conducting such analyses. The outline of this pilot study is described in Sections 5.3.2 and 6.3 in this volume and are not repeated in this chapter. However, it should be mentioned here that these kinds of data analyses require calculations based on data in the system, and this was the point where two, Murawaki Yugo and Mochihashi Daichi, joined our team. These are computational linguists and statistics specialists. It turns out that it is not only that their language data processing skills helped our data analyses, but the data set prepared for the GIS, which were based on real language data compiled by linguists, can also be used as samples for research projects in their field.

Once the database is complete, the user interface system that will be required needs to be examined. In particular, it would be good to have a web-based data display system for both social dissemination and as a pilot project in preparation for developing some exhibits on Fijian languages. Various web-based language display systems have been looked at in order to decide the basic configuration. For scientific analyses, we may need to develop a separate interface from Esri ArcGIS software. If data processing is possible with the functions that are built into the software, it would be better for scientists to learn how to use it. On the other hand, if the process could be routinized and automated, it may help to process larger amounts of data than those that can be handled manually. These all depend on the specifics required, and as of the time of the compilation of this chapter they are yet to be examined and discussed.

There is another task after the completion of the database. This is for integrating information on maps that were hand-plotted by Geraghty. This is a totally different set of data from the one used for compiling the database, however, lexical and morphological data from 300 languages with 5,800 semantic sets would make a huge addition to the database. We take it an important task to find a way to incorporate the data from these hand-plotted maps into our Fijian Language GIS.

The current members on our project are as follows: 5 Linguists (Geraghty, Tamata, Kikusawa, Okamoto, Yoshioka), 1 Cultural Anthropologist (Sano), 1 Geography and GIS specialist (Lowry), 2 statistics specialists (Murawaki and Mochihashi). Kikusawa oversees the whole project as a PI, while Lowry initiates the compilation and utilization of GIS. Geraghty provided language data and Tamata and Kikusawa organized them. Two student project members, Okamoto and Sano, joined to take care of data input and compilation on the computer.

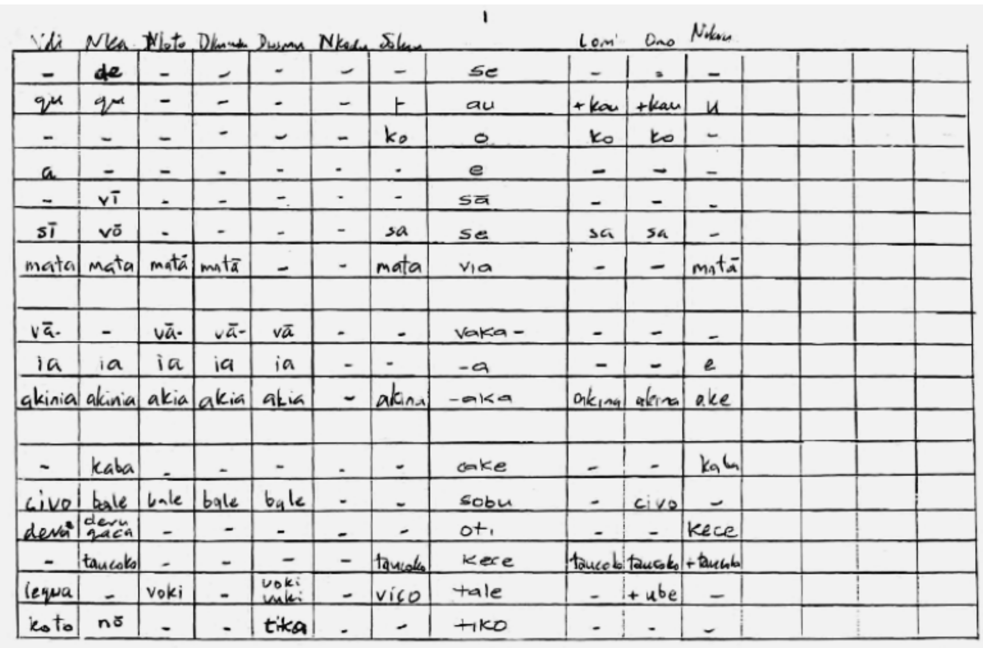
As an international interdisciplinary collaborative project, routine communication was taken care of by email, through a mailing list and Skype communication. A meeting is held with the members once a year, for sharing current progress of the project, to familiarize ourselves with one another's specialization and interests, and to discuss things that are more efficient and easier in person than on line.

7.2. Preliminary Preparation

In this section, precursor activities toward the project are described in detail. The following were taken care of as preparation for the Fijian Language GIS Project.

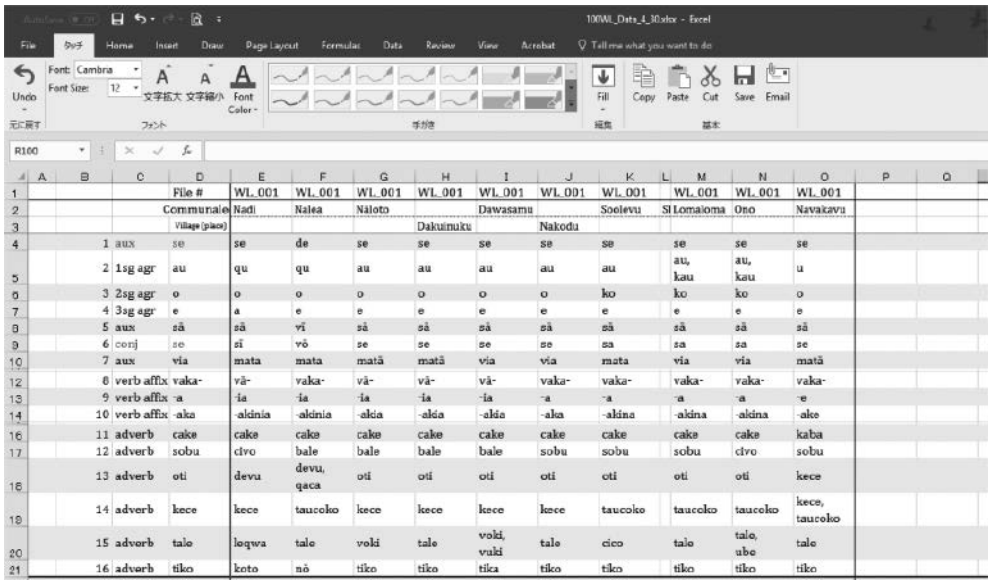
1) Language Data

To compile a language GIS, we need language data available and suitable to incorporate into the system. The case of Fijian GIS project was possible, it was 100 wordlist of 225 Fijian communalects compiled by Geraghty (Figure 7-2). The 100 items included in the wordlist were selected according to Geraghty's own criteria as a way to maximize the variety of language data. These are i) words that are known to have regional varieties in Fiji; ii) recognized by speakers for differentiating their language from others (see Appendix A of this volume for a full list of words). It should be noted that the list contains a different set of words from those in the commonly used Swadesh 100 wordlist. The data were hand written, provided in 22 sets, each of which consisted of 2 up to 15 communalects. A "communalect" is the smallest subdivision of a dialect and refers to a community of native-born speakers who share a common variety of speech (Pawley and Sayaba 1971). The abbreviations in the top line of Figure 7-2 indicate either the communalect or village name where the data comes from.



[illegible]	NKa	Nloto	[illegible]	[illegible]	[illegible]	[illegible]	1	Lomi	Ono	Nikau
-	de	-	-	-	-	-	se	-	-	-
qu	qu	-	-	-	-	t	au	+kau	+kau	u
-	-	-	-	-	-	ko	o	ko	ko	-
a	-	-	-	-	-	-	e	-	-	-
-	vī	-	-	-	-	-	sā	-	-	-
sī	vō	-	-	-	-	sa	se	sa	sa	-
mata	mata	matā	matā	-	-	mata	via	-	-	matā
vā-	-	vā-	vā-	vā	-	-	vaka-	-	-	-
ia	ia	ia	ia	ia	-	-	-a	-	-	e
akinia	akinia	akia	akia	akia	-	akina	-aka	akina	akina	ake
-	kaba	-	-	-	-	-	cake	-	-	kaba
civo	bale	bale	bale	bale	-	-	sobu	-	civo	-
deva	devu qaca	-	-	-	-	-	oti	-	-	kece
-	taucoko	-	-	-	-	taucoko	kere	taucoko	taucoko	+taucoko
lequa	-	voki	-	voki vaki	-	vico	tale	-	+ube	-
koto	nō	-	-	tika	-	-	tiko	-	-	-

Figure 7-2 A sample page of the 100 wordlist compiled by Geraghty. Standard Fijian forms are listed in the column in the middle, and corresponding forms from other communalects are documented in each column. A hyphen (-) indicates that the same form as the standard variety is used. (compiled by the authors)



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1				File #	WL_001	WL_001	WL_001	WL_001	WL_001	WL_001	WL_001		WL_001	WL_001	WL_001		
2				Communale	Nadi	Nalea	Naloto		Dawasamu		Soolevu		SI Lomaloma	Ono	Navakavu		
3				Village (place)				Dakuimuku		Nakodu							
4		1	aux	se	se	de	se	se	se	se	se		se	se	se		
5		2	1sg agr	au	qu	qu	au	au	au	au	au		au, kau	au, kau	u		
6		3	2sg agr	o	o	o	o	o	o	o	ko		ko	ko	o		
7		4	3sg agr	e	a	e	e	e	e	e	e		e	e	e		
8		5	aux	sâ	sâ	vi	sâ	sâ	sâ	sâ	sâ		sâ	sâ	sâ		
9		6	conj	se	sî	vô	se	se	se	se	sa		sa	sa	se		
10		7	aux	via	mata	mata	matâ	matâ	via	via	mata		via	via	matâ		
12		8	verb affix	vaka-	vâ-	vaka-	vâ-	vâ-	vâ-	vaka-	vaka-		vaka-	vaka-	vaka-		
13		9	verb affix	-a	-ia	-ia	-ia	-ia	-ia	-a	-a		-a	-a	-e		
14		10	verb affix	-aka	-akinia	-akinia	-akia	-akia	-akia	-aka	-akina		-akina	-akina	-ake		
16		11	adverb	cake	cake	cake	cake	cake	cake	cake	cake		cake	cake	kaba		
17		12	adverb	sobu	civo	bale	bale	bale	bale	sobu	sobu		sobu	civo	sobu		
18		13	adverb	oti	devu	devu, qaca	oti	oti	oti	oti	oti		oti	oti	kece		
19		14	adverb	kece	kece	taucoko	kece	kece	kece	kece	taucoko		taucoko	taucoko	kece, taucoko		
20		15	adverb	talo	loqwa	talo	voki	talo	voki, vuki	talo	cico		talo	talo, ube	talo		
21		16	adverb	tiko	koto	nô	tiko	tiko	tika	tiko	tiko		tiko	tiko	tiko		

Figure 7-3 Example of typed up wordlist. The first version was formed to reflect the hand-drawn lists for easy reference to the original document. The format was subsequently changed to make it more suitable for incorporating into GIS (the data correspond to those in Figure 7-2). (compiled by the authors)

To make this data able to be processed on a computer, the forms were typed in the form of Excel spread sheets, as in Figure 7-3. The form was chosen for easy handling for linguists and easy incorporation into GIS data. To make it easy to check the typed-up data against the original, each spread sheet corresponds to one set of the original data. The results were 22 spread sheets where 100 words are listed on the vertical axis and the language/village names are listed on the horizontal axis. The data was eventually combined into a single spread sheet.

2) Choice of Software

Esri ArcGIS was chosen based on the fact that Kikusawa had had some experience using it and it is one of the most commonly used software for compiling maps. It should be noted that although the software was decided at an earlier stage, licenses were not purchased till a later stage (January 2017) when actual work using the software started with two student project members.

3) Obtaining Existing GIS Data

Base map information (shape data) of Fiji for ArcGIS was obtained from the Ministry of Land of the Fijian Government. The data was released under the condition that it would be used only for the purpose of scientific research and not to be distributed to other parties (see Appendix of this paper for the letter of request). The kinds of base map information were chosen according to the potential relevance to people's movements.

Boundaries (new district, old district, provincial)
Coastline
Rivers and Creeks (major and minor creeks, rivers)
Roads
Settlements
Trigs
Village boundaries

7.3. The Compilation of Language GIS

This section provides an overview of the procedure for establishing a Language GIS database. The general procedure for the compilation of a Language GIS is summarized in Figure 7-4. As can be seen in the figure, the process consists of two sets of work flows, namely, i) the development of the GIS base map (indicated in green in the figure) and ii) compiling language data (indicated in orange). The former will be described in detail in 7.3.1, and the latter in 7.3.2.

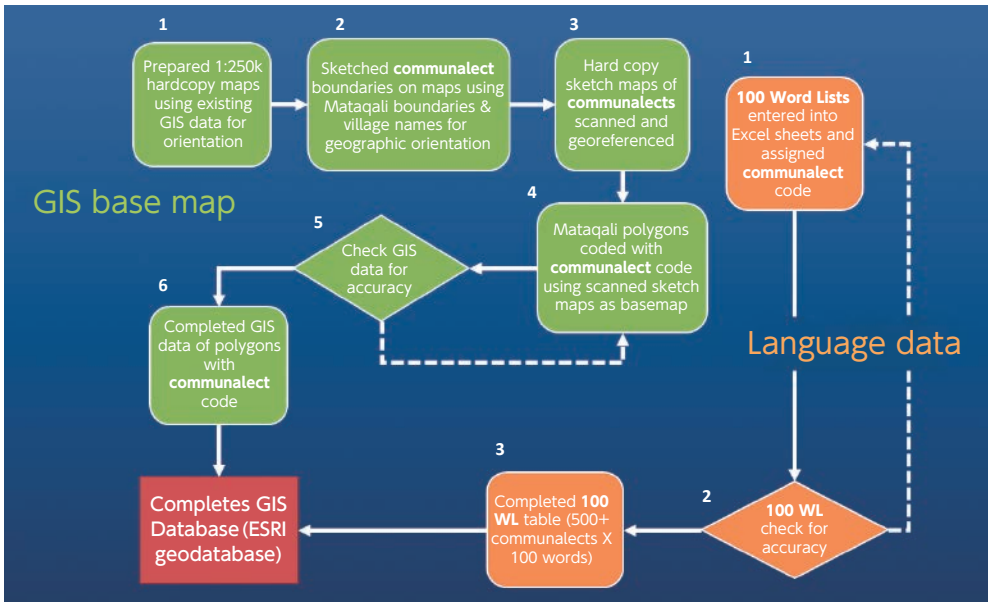


Figure 7-4 Procedure for developing a GIS database (compiled by the authors)

7.3.1. GIS Data Creation

The GIS data were compiled under the initiation of the GIS specialist Lowry. Initially communalects were digitized as areas, and then after determining that in some cases communalects are more appropriately associated with villages, GIS data were created as point features. The end result was a GIS layer of communalects as polygons and a GIS layer of communalects as points.

The process for digitizing communalect boundaries as areas involved the following.

1. Prepare 1:250k hard copy GIS Maps
2. Sketch communalect boundaries
3. Scanning and georeferencing the Maps
4. Digitise *Mataqali* (land owner units associated with clans) coded with communalect code (ArcGIS Pro)
5. Check GIS data for accuracy
6. Completed GIS with communalect codes

1. Prepare 1:250k Hard Copy GIS Maps

First, 1:250k hardcopy maps (see Figure 7-5: An example map (Viti Levu southeast) for locating communalect boundaries. A standard map with *tikina makawa* boundaries (black), *mataqali* boundaries (grey) rivers, roads and coast lines) were prepared in the form of PDF using existing GIS data for orientation by Lowry. The whole of Fiji was covered with 14 maps, namely Kadavu, Viti Levu (Northeast, Northwest, Southwest and Southeast), Vanua Levu (Northeast, Central, Southeast and Southwest), Taveuni, Rewa and Ovalau, Lau and Lomaiviti, Mamanusa and Yasawa. These were printed out on A0 papers by Kikusawa and carried to Fiji.

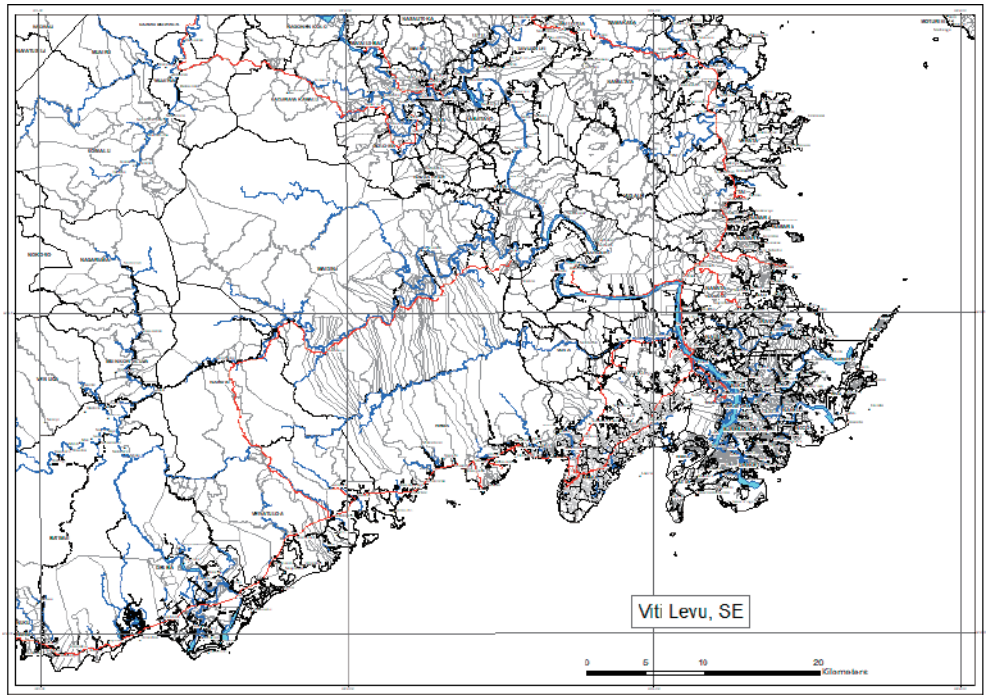


Figure 7-5 An example map (Viti Levu southeast) for locating communalect boundaries. A standard map with *tikina makawa* boundaries (black), *mataqali* boundaries (grey) rivers, roads and coast lines (compiled by the authors)

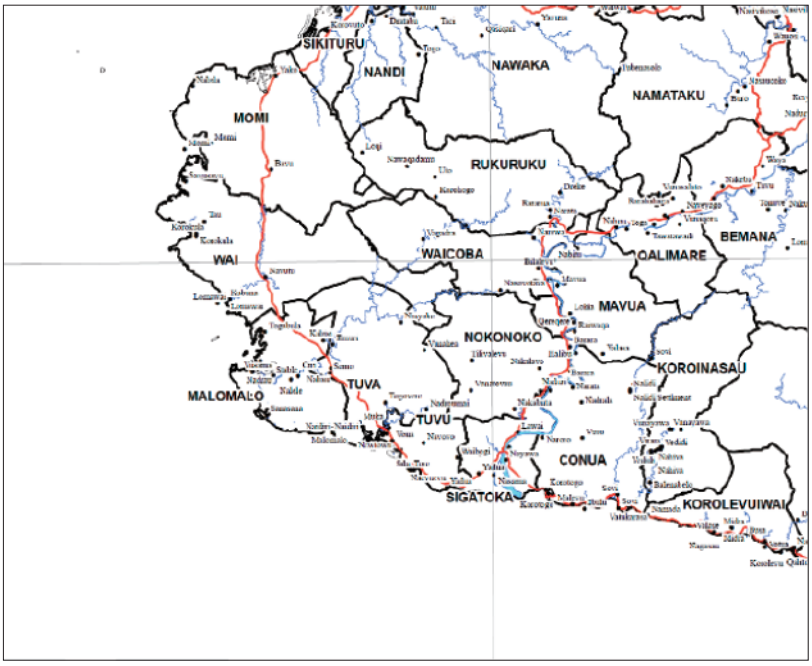


Figure 7-6 A standard map with *tikina makawa* boundaries (black), rivers, roads and coast lines (compiled by the authors)

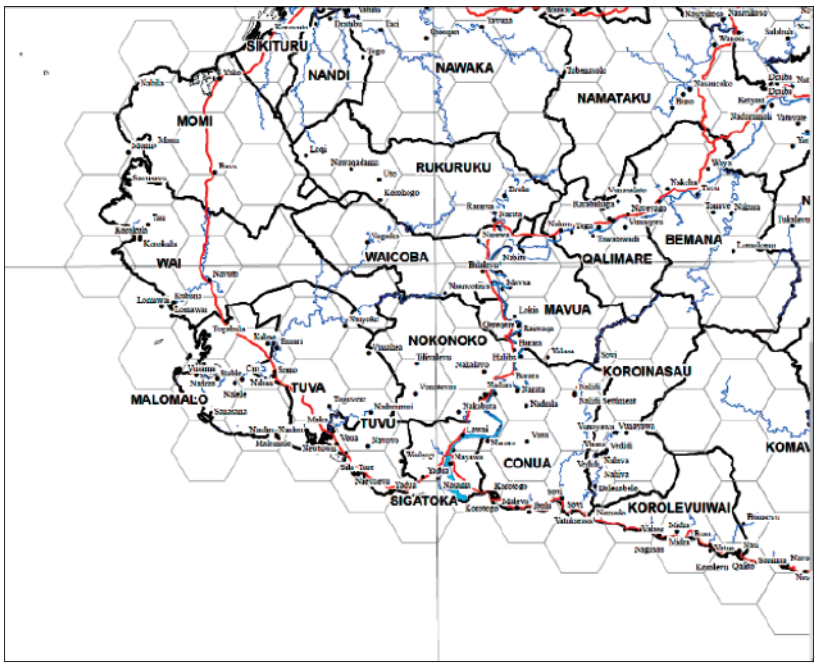


Figure 7-7 The same map as in Figure 7-6 with hexagons (this idea was abandoned) (compiled by the authors)

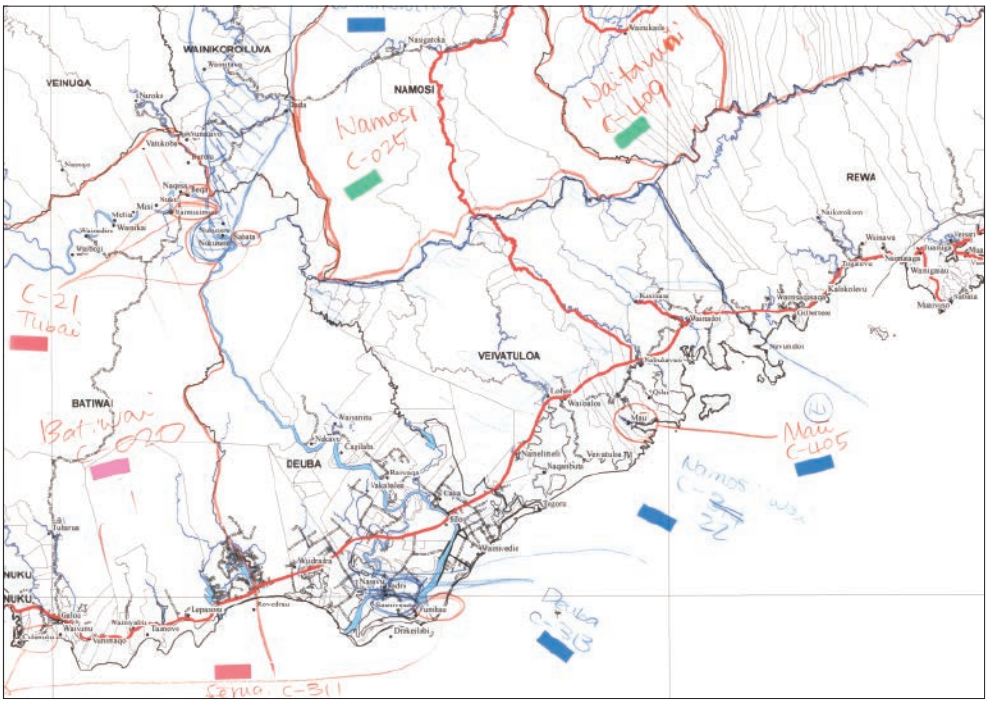


Figure 7-8 Examples of a map with hand-drawn communalect boundaries. Each communalect is numbered (referred to as communalect codes) and related to the map. (compiled by the authors)

An important decision to be made was how the locations of communalects are related to geography. Three choices were either by areas, by points, or by logically set up units, such as the hexagons shown in Figure 7-7 (cf. Figure 7-6). This needed to be discussed at a meeting where the geographer (Lowry) and linguists met in person. The decision was to associate communalects with *mataqali* boundaries. *Mataqali* are ethnic Fijian land units associated with landowning clans. Geographically, *mataqali* typically nest within *tikina makawa* (or "old *tikina*") boundaries. The old *tikina* boundaries are thought to have been established by the Cakobau government prior to colonization (Walsh quotes Geraghty (Walsh 2006)). Newer *tikina* boundaries have been established ("*tikina vou*") but are not considered as representative of cultural and linguistic divisions as the *tikina makawa* (Walsh 2006).

2. Sketching Communalect Boundaries

The location where each communalect is spoken had to be provided by linguists by drawing boundaries on the printed out A0 sized maps. Figure 7-8 is an example of one such map. It can be seen that red pencil was used to mark the boundaries, and the name of the communalect and a number for each communalect have also been scribbled in. It was decided that the communalect boundaries would be identified in association with *mataqali* boundaries. Geraghty considers that the interpretation of areas where each communalect is

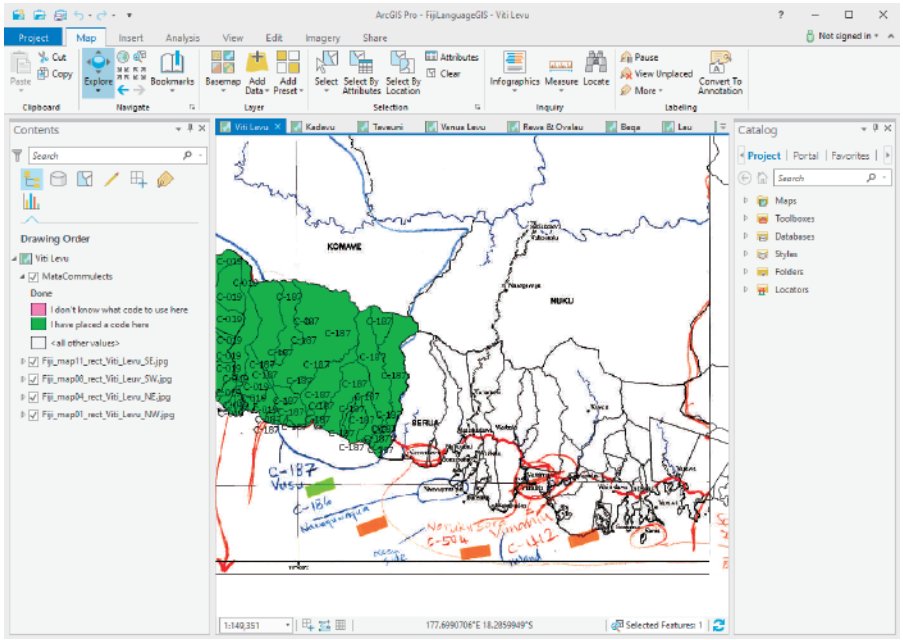


Figure 7-9 Examples of a map in the process of relating to the geographical information in ArcGIS. Parts filled with green have already been digitized, while the white parts are yet to be worked on. (compiled by the authors)

spoken best goes with the boundaries of land ownership and thus the *mataqali* boundary. If we follow this criterion for defining a communalect, the boundaries of fishing rights in the Ocean (*qoliqoli* boundaries) where speakers go to fish, could also be taken into consideration. However, we were not able to obtain *qoliqoli* boundary base map data, and therefore *qoliqoli* were not taken into consideration as of July 2019.

3. Scanning and Georeferencing the Maps

The maps with communalect boundary information then were scanned and georeferenced using ArcGIS. The maps were carried back to Japan and then were sent to a photocopy shop which processes scanning of oversized (A0) materials. The scanned maps were georeferenced for the purpose of copying the geographical information into the system. For this, the position of the map was first adjusted, and then the boundaries were drawn by tracing the hand-drawn boundaries. Figure 7-9 shows a screen shot where this is being taken care of on ArcGIS. The parts that are filled with green are the ones that have been traced, and one can see that communalect codes (numbers starting with C-) appear in the area where the boundaries have been traced. The areas where there is no green are the ones that have yet to be taken into the system.

In our project, tracing the map on ArcGIS was taken care of by two graduate student members in Japan. Lowry, based in New Zealand, compiled a video showing the process as to how the software should be used for this purpose to remotely instruct them with their

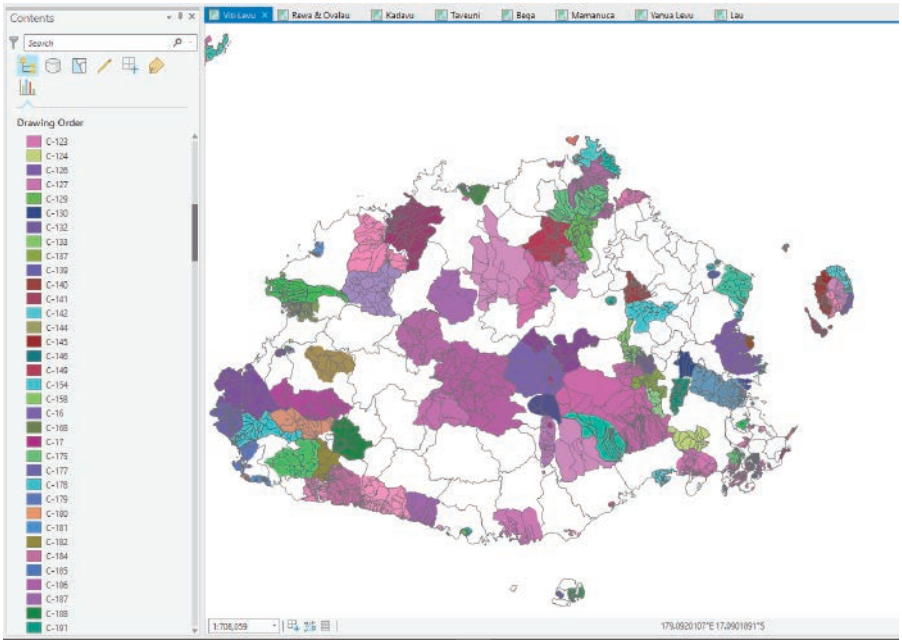


Figure 7-10 Examples of a GIS map of Viti Levu in about 2/3 way of registering communalects (July 2018). Communalects are colour-coded differently and the white parts are yet to be filled. (compiled by the authors)

tasks.

Figure 7-10 shows a map where the georeferencing and the tracing process mentioned above was partly done on Viti Levu island data.

4. Digitise *Mataqali* Coded with Communalect Codes (ArcGIS Pro)

Once the base map with communalect boundaries was scanned and georeferenced, ArcGIS Pro was used to digitize the communalect boundaries. This was done by using the *mataqali* boundaries where they coincided with the communalect boundary or digitizing a new boundary line if the communalect did not coincide with the *mataqali*. Each communalect polygon was attributed with an alpha-numeric communalect code that could be joined to the linguistic data table.

5. Check GIS Data for Accuracy

The processes from 1 through 4 above are not error-free. There may be also amendments that are required by looking at the information reflected in the GIS. Therefore, accuracy checking processes are necessary to eventually assure that the information incorporated in the GIS is as accurate as possible. This “cleaning up” process required some time, for the names of villages and the name of some *mataqali* had to be corrected, and missing villages and missing communalects had to be defined and incorporated. These processes of quality control were taken care of in multiple ways. One was through visually projecting the GIS

Figure 7-11 Checking accuracy of the registered information in Fiji (February 2018, in Suva, Fiji). Originally it was suggested that the GIS data be projected on the screen for checking, however the method was soon switched to editing of data on spread sheets, rather than doing it on maps. This was for ease of handling by linguists.

data on a screen with the linguists present to make recommendations to changes in the GIS database (Figure 7-11).

6. Completing GIS with Communalect Codes
The final GIS database is not complete until all the "cleaning up" or quality control procedures have been carried out. This is an ongoing and iterative process. It should be emphasized that the GIS database that is being created is highly complex as it deals with over 1,000 villages, an equal number of mataqali, and a few hundred communalects.

7.3.2. Compiling Language Data

The other half of compiling GIS involves the compilation of language data to be incorporated into the GIS system. As described in 7.3.1, the information that joins the language data to the GIS is the communalect codes. Therefore, the various 100 wordlists were also given an alpha-numeric communalect code (and communalect names) associated with each set. The processes can be summarized as follows:

1. Enter data in the 100 wordlists into a single Excel sheet and assign the communalect code to each data set
2. Check data (word form, communalect assignment) for accuracy

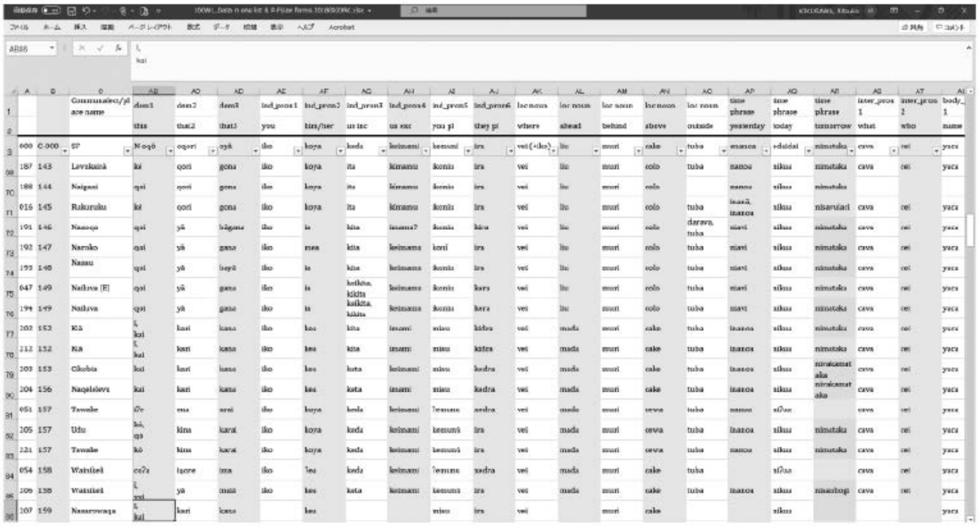


Figure 7-12 Combined 100 wordlist file. All the data appear in one table, with the communalect list appearing in the second column from the left and the standard Fijian form of the 100 words appears in the third raw (communalect code C-000). The definition (English gloss) of each form, the forms of the words in different communalects have been checked and corrected. It can be seen that there are still some communalect codes missing in the second left column and this needs to be amended before the data goes into the system. (compiled by the authors)

3. The completed 100 wordlist table contains over 200 communalects x 100 words

The Excel spread sheet with 100 wordlist data has been already shown in Figure 7-3. For this purpose, data were entered following the original documents' format, but they have to be in a single table to be incorporated into GIS. Thus, all the data were combined into a single file for this purpose. The combined data appears as shown as Figure 7-12.

7.4. Additional Data for Future Incorporation

In addition to the communalect 100 wordlist data described thus far, there are approximately 5,800 hand-plotted maps compiled by Geraghty that we intend to incorporate into the GIS database (Figure 7-13). As can be seen in Figure 7-13, each map has symbols that need to be read and points have to be identified as to which communalect is intended, for each plot on the map. To digitize these data into the GIS tracing has to be done manually on the computer. For this purpose, all the maps have been georeferenced so that the image can be seen on the screen in our Fijian Language GIS. We are currently investigating a way to have a system set up so that when the position of a symbol is clicked, it registers all of the communalects that the position is part of.

Figure 7-13 Example of the hand-plotted map where the distribution of variations indicating the same semantic features is presented. This sample map shows the distribution of four different forms (*duna*, *tuna*, *vonu*, *rewai*) referring to 'Anguillidae, freshwater eel (general).' (compiled by the authors)

7.5. Challenges in Processing Language Data in the GIS

In this chapter, the processes were illustrated as to how a GIS was developed for incorporating language data and ultimately developed for linguistic analysis. What is described above are the options that our team chose to follow. We hope the general information provides help for more linguists in this kind of work.

As we proceeded, we found that there are often some aspects that we needed to be aware of for a smooth operation. For example, as in any inter-disciplinary research, to conduct a GIS project with linguists, a geographer, anthropologists, and statistics specialists, it has been necessary that basic ideas and terminology in each discipline be shared with each of the members of the team. It is also necessary to come up with common terms which are understandable for everyone on the team. Sometimes, it was noted that different preferences were suggested for processing data. For example, the accuracy checking of the base map information was originally suggested to be done on the projected maps, however, the method had to be changed so that linguists could check data on computers in front of them, rather than checking the map on the wall. In addition, each person's experience with web presentation, exhibiting the development and computer processing of data differed

considerably among team members. Information sharing was required before we could start discussing our needs and wishes.

Dealing with base map data, the possibility of inaccuracy of the GIS base data obtained from Fijian government was one factor that needed to be technically dealt with. This not only required us to correct or fill in data based on information obtained from other sources, but also to take care when something is subcontracted for processing of our data in developed countries. Even when they are told that GIS data would be provided by us, it happened that they did not realize that information from the local government's website may contain errors and proceeded with the wrong data. It was necessary that we explained until the subcontractor understood the problem.

Another problem we faced was the local government's restriction on releasing data. After we started to process data for building a GIS, we realized that we needed GIS data of the boundary of ocean spaces related to the fishing-rights of local communities (*qoliqoli* boundary). However, the request was made after the initial set of data were obtained and our request for more information never seems to have been processed by the local government. For the moment, we are proceeding therefore without the information hoping that in the future, we will be able to incorporate the information in our analysis.

There are also more scientific questions and problems to solve as well. For example, the nature of the language data and how they should be reflected on the maps (either areas or points) are still something we have to investigate. However, as long as we have accurate information stored in a GIS, the display format could be easily switched. This may be one of the things that we could come to a conclusion by trial and error, and having this possibility is one of the big differences between processing data in a GIS database from compiling paper based maps.

Although we have faced various questions, both practical and scientific, the development of Fijian Language GIS has been generally speaking successful. We hope that what are described in this chapter will be useful for those who are interested in conducting a similar kind of project.

Note

1) A summary of expected future tasks and their timeframe (October 2018–March 2023) appears in Figure 1 in Appendix B of this volume.

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Appendix: Sample Letter to the Local Authority Requesting GIS Data

(Date)

Ms. XXXX XXXX
Director
Geospatial Information Management

Dear Ms. XXXX,

Following up our conversation this morning, I hereby request a set of GIS data (as specified below) for academic research purposes.

I am a linguist from Japan currently visiting The University of the South Pacific. The purpose of my visit is to establish a database of Fijian languages in collaboration with Professor Paul Geraghty in the School of Language, Arts and Media. The project includes the compilation of maps, where words and other expressions used in various Fijian languages appear according to where they are used. This we expect would facilitate the better understanding of the classification of the Fijian languages and the history of the languages.

Each language in our data has been recorded in association with a village name and therefore I need information about the locations of villages in Fiji. In addition, information about topographical information (mountains, rivers, altitudes, etc.), roads and other compositions, and political boundaries (such as Provincial boundaries), which are likely to affect people's movement, would be appreciated. I plan to process the data using ArcGIS.

I understand that the data will be exclusively for my use, and will not be distributed to other individuals or groups.

Thank you very much for your kind assistance, and I would appreciate it if you could notify me when I could come and pick up the data.

With best regards,

(signature)
Affiliation and title
Address