Bringing Indigenous Kamchatka to Google Earth:

Collaborative Digital Mapping with the Itelmen Peoples

Brian Thom, Benedict J. Colombi, and Tatiana Degai

(2016) *Sibirica* 15(3):1-30.

Abstract

Indigenous peoples in the Russian Far East are engaged in vibrant cultural and linguistic resurgence and revitalization through their community and regional organizations. Through the activities of one of these organizations, a computer-aided cultural mapping project was initiated in collaboration with indigenous villages along the Kamchatka Peninsula, working with youth and elders to map out the histories of special cultural places. The project utilized innovative participatory methodologies using Google Earth and related Google mapping tools, which are freely accessible and desired for use in the communities, providing an accessible, low-cost, easy-to-use computer application for detailed digital cultural mapping. This article elaborates on the use of these technologies to empower a community-based collaborative research project and reflects on critical issues in aligning community, corporate, and scholarly objectives in successful projects.

Keywords: collaborative methodologies, Google Earth, Indigenous language revitalization, Indigenous mapping, Itelmen (Kamchatka, Russia), Kamchatka, Russian Far East

This article is about a remarkable community-initiated cultural mapping project undertaken in collaboration with indigenous organizations in Kamchatka (in the Russian Far East), and anthropologists from the universities of Victoria and Arizona. Working with representatives from the Russian Association of Indigenous Peoples of the North (Kamchatskii Krai), the municipal government cultural institute House of Culture in Kovran, and the Russian Academy of Sciences, Kamchatka Branch of the Pacific Institute of Geography, we set about a project to train community members to use freely available, easy-to-use software (Google Earth) to create a digital atlas of indigenous language place names and accounts by the community of culturally significant places. While representatives of several indigenous communities in Kamchatka have participated in the training, the fieldwork has so far been mainly centered in Kovran, an Itelmen fishing community on the west coast of the Kamchatka Peninsula where the subsistence economy is vital for the community, and where many families are significantly involved (Koester 2012; Murashko 1997).

Like many indigenous peoples worldwide (Bryan and Wood 2015; Chapin et al. 2005; Eades 2015), Itelmen peoples have several goals in setting about to collaborate on a digital atlas with Indigenous-language place names and cultural sites detailed in text, video, and photos. One objective is to engage school-aged youth in conversations with elders about indigenous language, tradition, and cultural heritage. In turn, goals of documenting and celebrating indigenous cultural heritage knowledge for use in village schools and throughout the broader public benefits all Kamchatka residents, and most especially Kamchatka youth who are engaged in the contemporary resurgence of indigenous cultures.

Through documenting and making accessible indigenous peoples language, history, and places of significant cultural identity, the project seeks to benefit youth, elders, and local

educators/specialists in Kamchatka. The atlas materials highlight and celebrate indigenous language materials and history, they also have contextual information in Russian and English of interest to researchers and others more broadly. The digital atlas also has potential as an instrument for public policy that uniquely positions communities to communicate key values associated with particular locales in the spirit of cross-cultural collaboration.

The Present State of Indigenous-Itelmen Language Endangerment and Revitalization

Language endangerment and revitalization efforts are pressing concerns for indigenous peoples in Russia, including Kamchatka, which is home to six "small-numbering" indigenous groups (Itelmen, Koryak, Even, Alyutor, Chukchi, and Aleut). All of Kamchatkan indigenous languages are highly endangered and require urgent revitalization measures to be undertaken. Some languages are taught as subjects at school for only an hour or two a week, but they rather seldom occur in informal conversations. Most communities have only the elderly generation fluently speaking the language among themselves. Itelmen, like Koryak and Chukchi languages is a part of the Chukchi-Koryak language group, and the entire language group is severely endangered.

At present, Itelmen language speakers live mainly in four villages: Tigil, Kovran, Khairiuzovo, and Palana. All four villages are located along Kamchatka's western coast, near the Sea of Okhotsk and in Tigilskii District. The Itelmen people of this area are the Western Itelmen, with large numbers of Itelmens moving from these villages into Kamchatka's capital city of Petropavlovsk-Kamchatskii. Even with the relocation of Itelmen, mostly during the Soviet and post-Soviet eras, Itelmen people in general take some interest, whether passive or active, in language revitalization.

The negative impacts that indigenous cultures and languages suffered from Soviet

politics is evident in post-Soviet Kamchatka today. However, it is important to mention that despite these cultural and economic transformations the Soviet Union provided strong support for academic research. For example, the Russian scholars Elizaveta Orlova and Aleksandr Volodin had an opportunity to conduct linguistic and cultural research among Itelmens during the late Soviet period. Soviet planners also aimed to bring the "light of education" to indigenous peoples in the Russian North and Far East, thus raising a generation of indigenous "intelligentsia." The youthful period during the 1960s of current Itelmen scholars stems from the Soviet policy of developing an indigenous "intelligentsia." One example is the Itelmen scholar, Nadezhda K. Starkova (1976), and her important work *Itel'meny: Material'naia kul'tura*. Although language investigation was not Starkova's main focus, she produced several recordings of language speakers and composed a small dictionary of Itelmen words and associated vocabulary (Degai 2016).

Another example is the work of Klavdia N. Khaloimova, a professor of pedagogy who dedicated her life's work to the revitalization of the Itelmen language. Khaloimova worked closely with linguists, and with Volodin she developed a Cyrillic based alphabet for Itelmen. Khaloimova published an immense number of methodological papers (over 60) as well as a textbook for schools. Her most prominent work is the Russian-Itelmen dictionary that she coauthored with Volodin (1988).

A team composed of present-day Itelmen scholars (Tatiana Degai, PhD candidate in American Indian Studies and Linguistics at the University of Arizona, and Victoria Petrasheva, PhD in ethnography from Moscow State University) and Itelmen elder speakers (Liudmila Egorovna, Nadezhda Ivanovna Chatkina, and Tat'iana Danilova) and international scholars (Jonathan Bobaljik, David Koester, and Chikako Ono) are actively working under a National

Science Foundation grant to develop the first comprehensive Itelmen dictionary. Jonathan Bobaljik, the lead scholar on the project, has produced several works about the Itelmen language, including a book of Itelmen tales in both Itelmen and in Russian with audio recordings of those tales told by Itelmen language speakers and a number of linguistic theoretical articles where he uses examples from Itelmen (Bobaljik 2005; 2006).

The Itelmen language work, described above, largely responds to the pressing concerns that the Itelmen language is critically endangered (UNESCO 2016). For context, in 2011 there were seven fluent Itelmen language speakers, and by 2016 only five fluent speakers remain. All five speakers are over 70 years of age. In terms of passive speakers, there are 10 to 15 individuals; these are middle-aged Itelmens who were raised hearing the language spoken and in their home villages but they do not consider themselves fluent speakers (Degai 2016).

Year	**Number of Itelmens**	**Number of Speakers**	**Source**
1897 census	2,779	1,175	Volodin 1976
1926/1927 census	834	742	Orlova 1999
1959 census	1,100	396	Volodin 1976
2011		approx. 20 total, 8 fluent	Tatiana Degai, personal observations
2016		approx. 10 total, 5 fluent	Tatiana Degai, personal observations

Table 1: Number of Itelmen Speakers, 1897-2016 (source: Degai 2016)

The origins of the Itelmen language, however, remain unclear. Geographically the

language belongs to the Northeastern Paleoasiatic group, and according to one hypothesis, Itelmen, together with other Chukchi-Kamchatkan languages, developed from one common language and over time absorbed other languages not related to the Chukchi-Kamchatkan language group. Another hypothesis holds that Itelmen is a language isolate. In terms of being an isolate, archeological and ethnographic findings support Volodin's claim that the Itelmen peoples were the first to settle the Kamchatka Peninsula and that throughout much of history the Itelmen have continuously inhabited a considerable portion of the Kamchatka Peninsula (approximately one half).

However, the Russian presence beginning in the early seventeenth century brought dramatic change to Kamchatka. Tsar Peter I financed Vitus Bering with the First Kamchatka Expedition in 1724, which was followed in 1732 by Bering's Second Kamchatka Expedition. Each wave of Russian influence resulted in greater impact on the Itelmen language. With early researchers such as Stepan Krasheninnikov (1972), who spent ten years (1732–1742) conducting extensive research with the Itelmen during the Second Kamchatka Expedition, as well as Georg Wilhelm Steller who also joined Bering's Second Kamchatka Expedition. Steller documented Itelmen lifeways, and to a lesser extent their language while crossing the peninsula by dog sled in the winter of 1740–1741 (Steller 2003).

By the 1920s, Russian scholar Elizaveta Orlova (1999) identified three dialects of the Itelmen language surviving into the twentieth century: (1) southern dialect (Sopochnoe, Moroshechnoe villages); (2) northern dialect (Kovran, Utkholok, Napana villages); and (3) northeastern dialect (Sedanka village). Orlova also identified a mixture of the southern and northern dialects in the villages of Khairiuzovo and Belogolovoe. Of the five remaining Itelmen speakers, two of the speakers are from the Moroshechnoe, one is from Sopochnoye, and two are

from Sedanka. There are a number of passive speakers from Kovran and Napana. Even though each dialect is significantly different from the others, speakers can understand one another. This history of scholarship provides an important backdrop for the current study.

The Indigenous-Kamchatka Digital Atlas Project

The Indigenous-Kamchatka Digital Atlas Project works to compile and collate expressions from the endangered indigenous Itelmen language spoken by elders living mostly in small villages on the western coast of Kamchatka and relating to significant places located on traditional indigenous lands. By showcasing and translating places like historic and contemporary villages, fishing camps, hunting and gathering areas, reindeer migration paths, sacred sites, and place names, we show how indigenous practices are anchored to the land. Moreover, it is well established that emplaced language practices can serve an important mnemonic function in reinvigorating and revitalizing indigenous language and cultural practice (Afable and Beeler 1996; Moore and Tlen 2007).

In spite of living in fly-in communities, many with no running water, limited communications infrastructure, and modest living conditions, many young people are enthusiastic about mobile and computing technologies, with community leaders and educators seeing value in linking a digital atlas project to youths' sense of cultural identity. There is an active interest among several of the older people in marking the history of village relocation that happened under the Soviets starting in the 1950s, when whole indigenous villages were closed as communities were collectivized and industrialized around activities of fishing, reindeer herding, hunting, and other economic activities (Slezkine 1994). In turn, Soviet planners' attempts to improve economic conditions in indigenous villages by consolidating labor in administrative

centers proved to be in vain (King 2011; Koester 2003). Our colleague David Koester (2003: 276) goes on to describe life in Kovran in these "new villages" by stating:

> During the 1950s and 1960s, the Soviet government orchestrated the construction of new villages for Native people in Kamchatka consisting of small wooden houses that required firewood for heating or larger apartment buildings that required coal in the winter. As electrification came, in the form of fuel-dependent diesel generator stations, all households became equipped with stoves and utensils for cooking with electricity. Radio was brought in by cable and telephone along with it. Stores were supplied with basic foodstuffs, including flour, pasta, tea, sugar, cereal grains, and pickled and canned fruits and vegetables … The end of the Soviet Union meant that collapse of these government services. In the five year period from 1992–7, except for the houses, an occasional and unreliable service from the telephones, the bathhouse and the post office, virtually everything I have listed has fallen away … All of this would clearly give anyone a sense of material loss.

Among the consequences of these relocation and collectivization projects topped with the vast boarding-school system has been a profound language shift from Itelmen to Russian. Finding ways to energize youth interest in language retention, such as through locating, mapping, and discussing the histories of Itelmen place names, is another critical goal. Life in these closed villages is alive in the memories of older people, many of whom want to document their history in these places and to develop resources for use in the schools and cultural centers to share this

cultural knowledge with the wider community. Indeed the local ensemble Elvel (an Itelmen name for a girl who in a famous Itelmen legend was transformed by a shaman into a mountain that is now located near Kovran village) performed traditional dance and songs at the Sochi Olympics, exemplifying a strong sense of pride in sharing these traditions with the wider community.

We note here that these are all "official" rationales for the collaborative project, which risk playing on tried and true narratives of anthropological methodologies being used to "document and celebrate native cultural life." We want to emphasize, however, that the work is not intended to be in the "salvage anthropology" tradition, which as Koester and Niglas (2011) have recently observed risk freezing cultural life at an imaginary point in time. Indeed, our research partners—indigenous Itelmen colleagues and ethnographers—were emphatic about the agency of a project like this both for the resurgence of cultural practice and as a challenge to dominant narratives about indigenous peoples in fields beyond school curriculums or cultural center exhibits.

However, the Indigenous-Kamchatka Digital Atlas Project also situates itself in the context of larger industrial activities of mineral and hydrocarbon extraction taking place across the Russian North and Far East, and concerns expressed about ongoing alienation of indigenous peoples from subsistence resources and ancestral lands (Gerkey 2011; Koester 2012; Sharakhmatova 2012; Wilson 2012). Kamchatka is rich in mineral resources (gas, oil, gold, and platinum). For example, Itelmen ancestral lands in Tigilskii District are under consideration for potential extraction by gas and oil companies. Farther north, the lands and resources of the Koryak peoples of Karaginskii District suffer from the impact and activities of mining companies.

In terms of the transformation of traditional fishing resources, for instance, there was an all-indigenous fishery at Ust-Utkholok, a very significant fish habitat at the mouth of the Utkholok River, until 1956. Since then, non-local sport and commercial fishermen have become the majority there. Although there is a basic domestic-legal framework in Russia that has the potential to protect traditional subsistence resources, heavy capitalization of quota and fishing fleet works to marginalize these opportunities for indigenous peoples.

During our fieldwork, there were dinner-table talks of deep concerns over the Russian government's fishing quota systems. River-based harvest opportunities for Indigenous fishermen were described as limited in comparison to larger private enterprises working at sea to capture the lucrative salmon about to ascend the rivers to spawn. There were profound doubts expressed about state fish and wildlife management agencies and the steady rise in high-end fishing and hunting related to tourism, which drives a significant portion of the economy of Kamchatka. In recent years, each fishing and hunting season wealthy tourists from America, Russia, Europe, and Asia descend on the area's remarkable fish and wildlife for trophy and sport (Colombi and Brooks 2012).

There were concerns expressed over the anticipated expansion of Russian industries into Kamchatka over the next 10 years. While we were hosting mapping training sessions in the regional city of Petropavlovsk-Kamchatskii, for instance, a major investment forum was being held dealing with transport capacity, integrated freight, fisheries, minerals and raw materials, tourism, health services, water resources, and Kamchatka's energy potential. It is in this context of the further integration of the Kamchatka economy into global networks of capital and trade that we hope the Indigenous-Kamchatka mapping project will introduce indigenous cultural, subsistence, and economic priorities into these economic development frameworks, in much the

same way that projects have had success in Canada in leveraging significant Indigenous voices in large-scale development projects (Freeman 2011; Usher 2003; Willow 2013). Since the 1970s and 1980s, particularly in Canada (Asch, Andrews, and Smith 1986; Brice-Bennett 1977; Brody 1981; Freeman 1976, Lester 1979; Weinstein 1977), but also more recently in Australia (for example, Morphy and Morphy 2006), anthropologists and geographers have worked under the direction of indigenous communities to use cartographic approaches to support such rights claims.

The outcomes of the digital atlas project may also be used by Itelmen and Koryak indigenous peoples to communicate how and where distinctive, indigenous land-based cultural practices may be affected by resource extraction and programs of development and the related crises of livelihood loss that have come to be experienced across the regions. Articulating indigenous traditional use areas, demarcating sacred sites, and highlighting areas and practices being affected by current and planned extractive industries (such as roe poaching, pipeline construction, gas fields, mines, extraction of off-shore oil reserves), are ways of focusing political conversations on accommodating indigenous peoples rights and interests. Although some authors (Nasr and Scott 2010; Westman 2013) have wryly observed that these mapping projects can fall short of communicating a larger picture of indigenous social objectives, our hope is that the Kamchatka Digital Atlas Project will be a tool for improving the quality of life for local indigenous communities by guaranteeing the inclusion and rights of indigenous peoples in these processes, and that it can offer important data to be incorporated in safeguarding the environment.

Indigenous representatives from various communities in Kamchatka have been interacting with international collaborators over the past 15 years to assist in these efforts. For

example, the Itelmen people have brought appeals to the UN Permanent Forum on Indigenous Peoples (Koester 2005; Wilson and Koester 2008), and the leaders are well attuned to how discourses of free, prior, and informed consent may enable them to have a seat at the table. While the Russian government does not engage on indigenous rights per se, one community member said: “we don’t want political and ecological catastrophe in the north. Destruction of Itelmen knowledge and lifestyle leads to the collapse of life. The problem of survival is not only indigenous peoples’ but of those nearby” (Victoria Sharakhmatova, personal communication, December 2013).

There are important precursors to this recognition of indigenous peoples as political actors at various stages of Soviet history. For example, in the mid-1920s governmental bodies created the Committee of the North to articulate an institutionalized means of identity and recognition to the indigenous peoples of northern regions (Grant 1995; Koester 2005; Slezkine 1994). The Soviets then created socio-political institutions in the 1930s of both national districts and national territories, which incorporated indigenous communities. After World War II, Soviet governments worked to further incorporate (assimilate) indigenous peoples into the larger state with village relocation policies, a boarding-school system, and economic transformations of indigenous practices into more Soviet forms. Alexander King (2011), an anthropologist with long-standing relations with indigenous peoples of Kamchatka and especially the Koryak describes well the social and historical transformations of indigenous life in his *Living with Koryak Traditions*: *Playing with Culture in Siberia*. Cultural constructions during the Soviet period connected the various roles that institutions play, including the importance of the “house of culture” as an institution of indigenous civic life in post-Soviet Russia.

Thus, with perestroika in the 1990s indigenous peoples took on new forms of cultural (that is, House of Culture) and political expression (for example, the Russian Association of Indigenous Peoples of the North [RAIPON]). In many cases, conditions in indigenous villages have continued to precipitously decline, and older people regularly reflect favorably on the Soviet past and the ways in which their communities had been able to maintain access to food and adequate health care. Communities have worked to implement development projects and initiatives such as cultural and linguistic preservation and protection of natural resources or sustainable economic development projects (Wilson and Koester 2008). Appeals to the international community have also emerged from these communities, as happened in 1994 when a letter was signed by over 50 individuals in Kovran and sent to the office of the UN High Commissioner for Human Rights in Geneva, asking for help in putting pressure on territory authorities to improve village living conditions (lack of electricity, fishing and hunting quotas, and medical care). International partnerships have ensued, including "foreign, multinational and global governmental and non-governmental organizations … including IUCN the World Conservation Union, UNDP/Global Environment Facility (GEF), the Wild Salmon Center, and Pacific Environment" (Wilson and Koester 2008: 4). Projects such as these have been well intended and in some cases have changed the local situation but not always in either sustainable or capacity building ways.

The work of engaging international collaborators to assist in producing a digital atlas of culturally significant places takes on the shape of counter-mapping in these contexts (Bryan and Woods 2015; Eades 2015), with strategic choices needing to be made around what to map, how to share the information, and what the short- and long-term implications of such a project might be. Indeed, in setting up the project, we discussed the kinds of critical insights the counter-

mapping literature has raised (Chapin et al. 2005; Rundstrom 1995; Willow 2013), including the risks involved in freezing dynamic cultural practices as placemarks on a map (Sletto 2009; Wainright and Bryan 2009), revealing special places to unintended outside groups (Brown and Nicholas 2012; Corbett et al. 2006; Scott and Webber 2001), or the danger that such mapping projects will create problematic "boundaries" or exclusive use claims between indigenous communities that constrain or undermine indigenous territoriality and customary legal orders (Thom 2009). These dynamics are cast in high relief, as we are working with Google's mapping tools, which have the potential for very public exposure and mobilization of the cartographic representations created by the project. However, authors like Nancy Peluso (1995: 393) have argued that not being on the map at all is much worse than the alternative, while Dennis Wood (2010: 141) sees "heightened dignity, enhanced security and greater access to resources" as worth the essentially ethnographic exercise of bridging indigenous worldviews through maps.

In response to this well-established critique, one key methodological consideration in this project has been to ensure that people from the community are at the center of decisions about what gets mapped, how the places are represented in digital form, and which elements of the information get shared broadly and which stay private. The implications of the Indigenous-Kamchatka Digital Atlas Project have not yet fully emerged, as digital atlas products have only just begun to circulate. However, as we elaborate more below, a key element in the project design has been to use Google's geo tools such as Google Earth, Google MyMaps, StreetView, and My Tracks for the collection, management, and representation of indigenous relations to place. By keeping in mind the power and limitations of Google's geo tools from the outset of the project, we have been able to leverage local devices with inexpensive hardware and limited Internet access while allowing for advice and expertise from international and local collaborators

to help refine the outcomes and work to mitigate the risks of a counter-mapping project being a double-edged sword (Eades 2015: 21). Here we want to turn to how our collaboration unfolded, bringing together scholars, NGOs, and the tech firm Google to initiate a mapping project with an indigenous community in the Russian Far East. The connections were made through the remarkable network of indigenous peoples organizing politically in international forms, raising awareness about the situation of their communities since perestroika.

There has been a clear perception within the indigenous communities of Kamchatka of an urgent need for effective cross-cultural dialogue about the resilience and importance of indigenous cultures, economies, and ecosystems. Sometime after 2010, members of the Itelmen community saw the remarkable virtual globe of Google Earth in action. While the satellite images for the western coast of Kamchatka were then fairly low resolution, local people hoped to reach out to Google to get improved high-resolution satellite imagery for their own Kamchatka region, as well as training in how to use this free and easy-to-use software to leverage this powerful tool for their community's benefit. Early attempts by an Itelmen community representative, Tatiana Degai—a graduate student in the United States studying with Colombi at the University of Arizona—to contact Google were made, but to no avail. One cannot simply send Google an email and expect a response. Then, in about 2012 a representative of the Itelmen community was speaking at the UN Permanent Forum in New York. During one of the breaks he met Chief Almir of the Surui Tribe of the Brazilian Amazon. Chief Almir and his community had worked with Google Earth Outreach on an ongoing basis since 2008 to get training in mapping illegal deforestation in their territories and documenting resources for carbon credits (Google Earth Outreach 2016). The Surui chief put the Itelmen representative in touch with Google Earth Outreach, who in turn, coordinated with faculty from the universities of Arizona

and Victoria to co-host an initial training session in the United States for several Kamchatka-based researchers and elders.

During a four-day workshop at the University of Arizona in 2013, we devised a work plan to undertake this kind of computer-aided cultural mapping using Google's geo tools in several indigenous villages in Kamchatka, working with youth and elders to map out the histories of special cultural places, document contemporary and historic land use and occupancy, and to confirm locations and recordings of indigenous language place names using local computers and mobile phones. Community members—including those who attended the Arizona workshop and others who would be learning the procedures for the first time—would be trained in using Google's geo tools for cultural mapping, and a system for systematic data collection would be devised, drawing on the techniques being developed by Thom and his graduate students at the University of Victoria's Ethnographic Mapping Lab. Google had provided funding support for Thom's "Innovations in Ethnographic Mapping and Indigenous Cartographies" initiative, which was used to support these community training and data collection efforts in Kamchatka.

Following the 2013 Arizona workshop, Colombi also leveraged funding from the National Science Foundation, the Arctic Social Sciences Program, and a U.S. Fulbright Scholar Award to commence extensive fieldwork in 2014 in Kamchatka on issues related to village life, including fishing and Indigenous environments. Colombi's fieldwork in Kamchatka would be broadened to provide additional support and field data collection for the digital atlas project. Central to the Fulbright award were several months of travel and GPS mapping of cultural places along the western coast of Kamchatka with the Itelmen scholar and elder Dr. Victoria Petrasheva, Degai's grandmother. Petrasheva and Colombi visited both contemporary

villages,and closed historic villages, recording GPS waypoints to locate important Itelmen locales. They recorded stories of her early life in the Itelmen village of Utkholok before its closure in the 1950s, an important example of the place-based histories we wish to document further to contribute to the cultural map.

So, why is a technology giant like Google funding anthropological research in remote indigenous communities, including those in Kamchatka? Google—through its Earth Outreach program—is involved in supporting numerous public benefit projects (Ewalt 2011; Summerhayes 2015). The most obvious reason for this work is the fact that Google is involved in corporate philanthropy (Finkle 2011: 871), which invests in (among other things) environmental, humanitarian, social justice, and education projects which, in their words, *have real-world impact* (and offer tax benefits in return). A manager from Google's Earth Outreach program said that the company is "trying to democratize tools like satellite data and software for storytelling for indigenous peoples to use" (Rebecca Moore, personal communication, 22 May 2014). There are, no doubt, other less obvious corporate agendas at play, including competing with more expensive GIS software companies for market share, and perhaps the geopolitics of an American-based company enhancing business relations in the Russian Federation.

Google has been explicit, however, that it has no interest in owning the data produced. Indeed, the KML files produced using Google Earth are stored locally, and ownership and control of these data are squarely in the hands of their creators. Data hosted in Google's cloud services (including, for this project, YouTube, MyMaps, and Fusion Tables) also have strong provisions for local ownership and practical privacy and access controls. Of course, the extent of privacy of data hosted by US cloud service providers is limited under US legislation (Adams and Thom n.d.), so communities must carefully consider what data gets hosted in the cloud and is

potentially subject to unwanted state scrutiny. While using Google's services and support may require caution, we have come to appreciate that this is a community-initiated request, and that key decision makers about the project are very much aware of both the strategic opportunities and the costs associated with accepting corporate philanthropy for training in using freely available and publicly accessible tools. To date, it has been an empowering partnership.

The Project's Methodological Approaches and Technical Challenges

Key to the structure of the project is the train-the-trainer approach, where community members and local scholars learn the Google Earth software and indigenous mapping methodologies, and continue to utilize those skills in their home communities, growing the knowledge and spreading the accessible research methodologies. The intent is very much to train people to be able to train others in their communities to undertake community-based research using these tools. To this end, community members from the villages of Kovran, Palana, and Petropavlovsk-Kamchatski all met in the University of Arizona for four days of training and work planning late in 2013. We followed an agenda to provide training in the theory and method of indigenous mapping, elaborating on what such maps have the power to do with respect to indigenous rights, land and resource management, inter-generational education within the community, and the outreach to broader publics.[1] We walked through the use of Google Earth and MyMaps to cover basic concepts of creating points, lines and polygons with associated rich attribute data on top of Google's imagery. We then reviewed in detail using Google Earth how to conduct a mapping interview, adding text, folders and name labels to features drawn on places in Google Earth pointed out by indigenous collaborators. Documentation of the cultural knowledge shared is an important element of this work, including making audio and video recordings of places

discussed, so that details not immediately added to the map during the interview could be elaborated later on when reviewing the material. Organizing the information in a tabular format on a spreadsheet is helpful to making the information consistent and comparable, so we provided training in Google's Fusion Tables, Sheets, and Forms as ways to connect such tables to the shapes drawn in Google Earth. Finally, we taught techniques for embedding photos, videos, and custom icons in Google Earth, providing rich multi-media sources to visualize and publish map data.

During the workshop, our research team of community members and anthropologists met outside of the technical training to discuss what the digital atlas could be asked to do, beyond local capacity building. The conversations between academics and community scholars highlighted the importance of strengthening the documentation and circulation of cultural heritage. It became clear that through a common engagement with digital technologies, the mutual interests in this cultural heritage of elders and youth could be ignited in the community. Drawing on the expertise of law faculty members from the University of Arizona's Indigenous Peoples Law and Policy Program, we also had a frank discussion of how such maps might further the recognition of the rights of Itelmen and Koryak communities to occupation and use of their lands. Following this workshop, we requested that higher-resolution imagery be made available from areas around the west coast of Kamchatka, which Google promptly updated with more detailed imagery of that region in Google Earth's basemap.

In August 2014, we flew to Petropavlovsk-Kamchatsky to host training sessions for local researchers and indigenous college students and elders living in the city.[2] We were fortunate to have been supported by a remarkable interpreter, Anya Gorshkova, who volunteered her vacation time and skills to make communication possible with the primarily English-speaking academics

during the training and fieldwork. We were also ably assisted by Itelmen elder and scholar, Dr. Victoria Petrasheva of the Kamchatka Branch of the Pacific Geography Institute, and Yulia Vasilieva a representative of Kamchatka Association of Indigenous Peoples of the North, who made arrangements for the workshop, and who was instrumental in its success. These are not merely sentiments of acknowledgement, but a recognition of fundamental elements of a collaborative methodology that make any indigenous mapping project work.

Тип места	**Site Type**
места жительства и поселения (лагеря, поселки, могилы)	habitation (camps, villages, burials)
место охоты	Hunting or Trapping
места для рыбной ловли	Fishing sites
места сбора растений	plant harvesting
места сбора камней и минералов	rocks or mineral collection sites
места для выпаса оленей	reindeer herding
пути передвижения	travel routes
места культурной значимости	cultural site
священные места	spiritual or sacred sites
места, связанные с легендами и мифами	sites of legends or mythic stories
исторические места (битвы, встречи с поселенцами)	historic sites (battles, settler relations, etc)
места с названиями на коренных языках	indigenous place name
Другое, опишите, что за место	Other, describe later

Table 2. Site types for the Kamchatka Indigenous Mapping Project.

At this workshop we set the stage by describing examples of indigenous mapping in Canada, and the kinds of outcomes they have had for these communities. We followed a similar technical training in basic and intermediate techniques using Google Earth to document indigenous land use and occupancy. This included training in Google Earth, teaching about points, lines, polygons, basic KML editing, image history, tours, snapshot views, folder and file management. The workshop also provided the opportunity to develop a preliminary typology of site types that were of critical interest to the community members to map. Drawing both on examples from the Canadian mapping projects and the particular priorities and landscapes in Kamchatka we crafted a typology of about 12 site types of particular interest (see Table 2) and created standard approaches to organizing the data in a spreadsheet using a data entry form (see Figure 1).

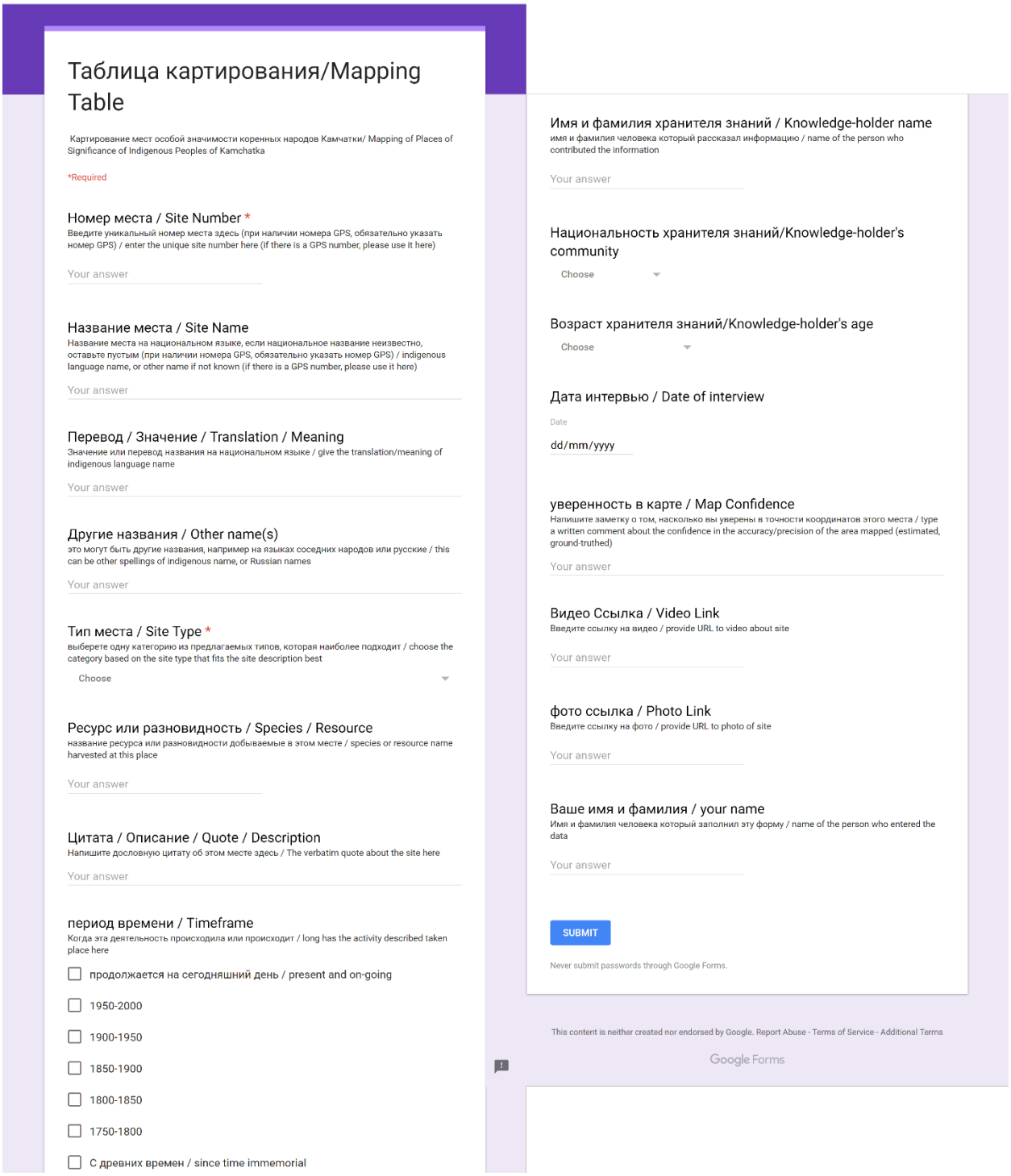

Figure 1. Collaborative data entry using Google Forms

As several elders participated in the urban training session, we were able to review a number of Itelmen place names, as well as important resource harvesting locations, both locally

and in and around their homes in Kovran. One of the participants who had lived in Yelizovo (located approximately 30 kilometers from the urban center of Petropavlovsk, along the Avacha River) for many years described how intensively she uses a local forest and park-land near her home for picking berries, mushrooms, and wild plants. She said that her grandparents didn't harvest there, that she had discovered the area herself. It is now an important place for urban indigenous peoples to practice and maintain their cultural identity. The building of deep connections to place in urban settings echoes the experiences of Ainu peoples living in Tokyo, and helpfully destabilizes narratives of "authentic" indigenous cultural practice being frozen in time/place (Watson 2010).

The next week, we flew to the village of Kovran to carry out a pilot project led by Degai, who had attended the two previous trainings.[3] Degai and her family live in Kovran, where she directs Dom Kul'tury (the House of Culture), a prominent institution in every Soviet as well as post-Soviet town and village (Donahue and Habbeck 2011). Our trip was organized to coincide with the famous Alkhalalalai festival held in September as many people who might wish to participate would be there for the festival, and the indigenous collaborators on the project suggested that the timing would strategically draw on the general enthusiasm for cultural projects at that time.

In Kovran, we ran the workshop at the school with 11 high school students—ages 13 to 17, along with several elders and cultural leaders from the community. The Kovran School provided training space together with computers and Internet access. The school also released all the schoolchildren who participated in the workshop from regular classes. All the training sessions focussed around three protocols: (1) land use and occupancy mapping, (2) significant sites mapping, and (3) indigenous place names mapping. Our land use and occupancy mapping

approach is based on documenting individual map biographies (Tobias 2009), using the imagery in Google Earth to virtually fly through the landscape to mark places used by the individuals sharing their life history, an interview technique pioneered by Steven DeRoy (2014) at the Firelight Group. Our approach to (2) significant sites mapping focused less on showing the extensivity of individual peoples' land use across a region and more on revealing the deeper significance of places through intensive place-based storytelling and fieldwork. The (3) place names mapping expands on already published Itelmen-language materials by drawing on the expert knowledge of community members to locate and unravel meanings and stories behind the names.

Not only did our stay in Kovran coincide with the Alkhalalalai festival, but it was also at the same time as the last major coho or "silver" salmon run of the year. Salmon were harvested every day by net, weirs, or spin casting on the river right at the village, and salmon disher present at every meal. Char, steelhead, rainbow trout, and smelt, as well as other species are taken in the waters close to the village. Local berries (including blueberries, huckleberries, cloudberries, and crowberries) are on the table as jams and teas. Reindeer is actively traded and shared with Koryak neighbors and kin, and fish roe (*ikra*, made from salmon eggs) sales help very modest household cash economies. There is an offshore island (now recently demarcated as a Russian military area) where people take seagull eggs. People hunt seal and one girl told us that a year or two ago, they hunted a Beluga and brought it up to the beach at Ust-Kovran. Kids as young as 10 are comfortable with camp skills, taking initiative to collect firewood and setting up camp to cook locally harvested foods.

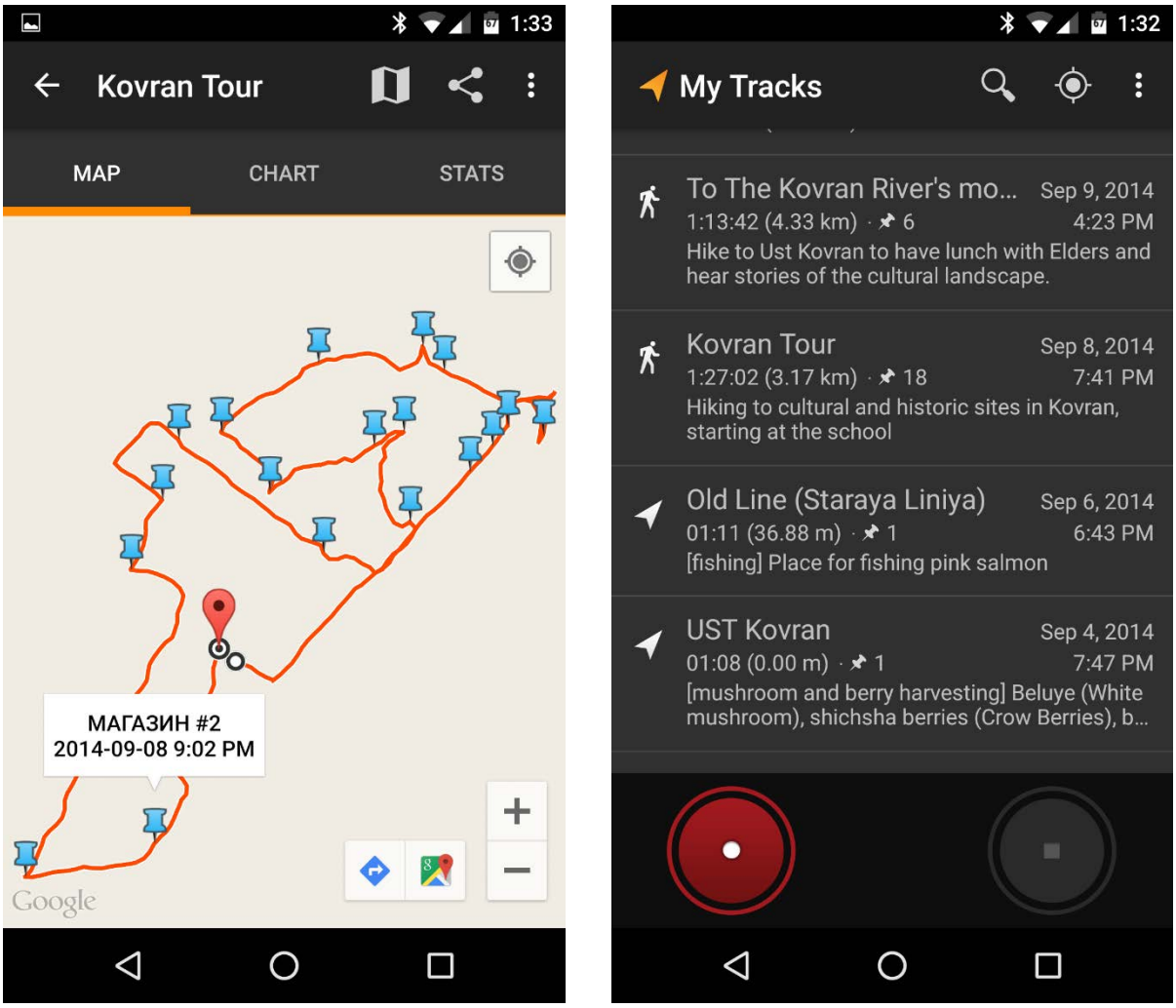

Figure 2. Field mapping significant places with Google MyTracks

Over the course of our stay in Kovran, the youth participating in the project were charged with plotting the places they knew themselves for hunting, fishing, plant gathering, villages, camps, cabins, as well as cultural sites, sacred sites, travel routes, legendary sites, and other places that elders who were attending the training pointed out to them. We took two fieldtrips by foot and ATV to some of these locations, and added Soviet-era historic sites and other contemporary important places (wells, markets, fish-drying racks, etc.). Each place recorded in the field was given a name/label, and a short description as to why the place was important. As

many students had Android phones, we used Google's MyTracks app and the built-in GPS to record waypoints with attribute information (easily typed in the field using both Russian and English keyboards in Android) to later import into the Name-Description place mark structure of Google Earth (see Figure 2). Several of the youth were able to contribute to clarifying information about sites for fishing, sea-mammal hunting, plant gathering, and hunting cabins in Ust-Utkholok. This area at the mouth of the Utkholok River has been cherished by generations of people living in Kovran. It is also the location for one of the greatest runs of steelhead (which are a very desirable food item for the Itelmen) in Kamchatka and the world over, and is situated along a coastal, mountainous region north of Kovran and draining into the Sea of Okhotsk. Much of the cape at Utkholok has been designated a wildlife sanctuary, and its ecological richness has been protected in some ways because it is hard to reach. The only motorized access is by off-road vehicle, on the beach, at low tide from Ust-Khayryuzovo or Ust-Kovran, or from further away by helicopter or by dedicated snow vehicles. All of these are economically more demanding than most Kamchatkans could frequently manage.

It was a challenge to implement the direct-to-digital method early on in the project. The North American University research partners' lack of fluency in local languages and geographic knowledge resulted in our clumsily trying to keep up with mapping places described by knowledgeable people who were speaking quickly and freely about places they were intimately familiar with and in great detail. To facilitate a more orderly (for the researchers) place-based conversation, we created a template for data collection using Google Forms and Sheets (see Figure 2), allowing us to structure the data about each site consistently. This template highlighted questions related to hunting, fishing and plant harvesting stories, as well as cultural sites, and land-based mythic stories. Once we introduced the structure of a Google Form to the interview

methodology, the conversations slowed down, focussed more tightly around eliciting particular details of each place described, and prompting people to talk about a range of types of places. However, once the youth got engaged in documenting sites outside the classroom, the use of these online forms became impractical (as there was little internet connectivity away from the school) and elders generally preferred sharing their knowledge of the land in a more open-ended manner. Colombi continued with this more open-ended methodology during his extended fieldwork, using a Garmin GPS to record waypoints (he did not have an Android device) and relying on handwritten fieldnotes for associating attribute data for each point. Colombi and Thom set out to re-associate the waypoints with the information in the fieldnotes after the conclusion of the fieldwork, but this turned out to be a laborious task without the benefit of immediate access to people who can fill in important details about points stored on the device but not fully recorded in the notes. Given the challenge of revisiting these notes and structuring the data in the lab later, we suggest that this may be the least effective of our approaches in documenting information for digital maps, and would in the future implement a form-based methodology to record details at sites.

With the context, scope, and approach to the indigenous mapping methodology established, the next key decision—a decision that impacts the workflow of the rest of the project—was how to structure the information shared within the mapping system itself. The practical problem is how to take what is said in the narratives about these places and represent them visually on the map (with a point, line, or polygon), how to organize those marks in relation to each other (in folders or layers), and how information should be displayed relative to any particular place when it is selected.

Conventional GIS systems (like ArcGIS or QGIS) generally require that within a layer of points, lines, or polygons that locate a place, each individual placemark will have data associated with it in the form of a table of attributes (like a spreadsheet, where each site is a row, and all the different information about the site organized as columns of a table). These tables can be connected to each other through data in common fields (unique site IDs, for instance) to create a complex database of information about each place. For example, for each individual location marked by a point, line or polygon with a unique site ID, there could be linked attribute tables showing multiple uses or species present at that site. Organizing the data relationally (using a one-to-many relationship between site locations and site uses or species harvested) can be a powerful way to query and analyze once the data is compiled, but takes significant expertise in GIS and database design to build and maintain over the long term. It is an investment in software and computer expertise that may be beyond the financial reach of small communities or organizations with limited year-over-year budgets to maintain such a system.

Although such complex datasets are a future possibility, the Kamchatka indigenous mapping project leverages Google Earth and its sister software, which are all based on KML (Keyhole Markup Language) open standard to display geographic data in 2D (like Google Maps) or 3D (like Google Earth) browsers.[4] The standard data structuring approach in KML is to have an associated “name” and “description” for each placemark location. The ‘description’ field for each placemark is very open-ended, allowing for virtually anything that could appear in a webpage to be displayed as the ‘contents’ of that place (including video, photos, text, and so on). These placemarks can then be organized in folders (similar to a GIS layer), and the placemark be given a particular color, size, or icon.

We found that though using Google Earth allows for a more relational data structure (one could list, for instance, many different uses and species found in a place as text in the 'description' field), keeping the information relatively 'flat' (one geographic site marker is created for each different site use) works best for being able to host the data online in MyMaps or Fusion Tables. This requires potentially multiple map data points in the same location for sites with multiple uses or species, with each of these different instances appearing in its own folder in the Google Earth project. We found that keeping the data structure strictly flat (one site marker for each use and resource) makes for extremely cumbersome field interview mapping. Making duplicate points or polygons on the fly takes too much time away from engaging in a quality discussion about the multiple ways people relate to these locations during the interview. We found that the best methodology to make the interview mapping process less onerous for the knowledge-holders is to collect the data in a relational structure—collapsing all shared information about a single place in an individual temporary field site location marker—and then later go through these, pulling out individual site uses to create a flat field structure (one placemark for each use type) for display in different folders of a Google MyMaps or Fusion Tables.

In these indigenous mapping interviews, the conversation can very much be guided by either focusing on a more narrow area (like an estuary, particular stretch of river, or around the village) or asking more broadly about where their important places on the land are throughout the entire region. Our work, by in large, took the former approach, enabling us to more quickly populate a focused area with storied points and polygons. However, this also narrowed the extensiveness of documentation across the landscape (particularly as during the pilot project, less than a dozen individuals contributed to the points on the map), which while helpful for cultural

resurgence work, highlights the importance of the train-the-trainer method: as more people contribute to their stories to the map, a larger sense of the extensivity of community use and occupancy will be demonstrated which can be particularly useful in indigenous rights contexts(Tobias 2009:386).

Not all sites mapped are as straightforward as a ‘hunting cabin’ or ‘fishing spot’. When we one of the elders shared the story of the mountain “Elvel” -- a women who was transformed into a mountain by her powerful shaman father -- a great many places that transcend the single placemark for the mountain appear and connect across the regional landscape. Representing Itelmen landmark and associated totality of place-relations in a story performed like this (and many others) requires careful consideration and discussion with elders who know the story and the mythic landscape. That the now famous (at least since the Sochi 2014 Winter Olympics) Itelmen dance troup took their name from this place underscored for us the ways in which identity and land continue to be so deeply bound together. These more fulsome stories shared by the elders were also particularly impactful moments of the project. During these stories, the attention of the kids shifted from fiddling with their phones and computers to serious attention to what was being said. We asked several of the youth if they knew the stories they had heard, and none claimed they knew them well, if at all. It was clear that this was an important moment of inter-generational sharing.

A particular challenge was limited reliable broadband internet. Local access is available in the school, which is connected via a shared satellite service that, while basically reliable, is very slow at high-use times. Android cellular phones connect to the internet via service provided by “Beeline,” a private company operating in the Kamchatka area, which provides a similarly limited, slow and costly service. To get around the technical problem of limited internet access,

Thom made a ‘cache’ of Google Earth’s Kamchatka imagery while still at the University of Victoria by flying around the region at three different zoom levels, and copying the contents of Google Earth’s temporary ‘cache’ folder to a flash drive, which he then copied to all the computers at the school working on the project. This worked generally well as long as we did not have to go outside the cached areas, which then took a lot of time to load.

The training in Kovran went very much like the previous workshops, with regular attendance by elders and knowledgeable people who shared practical examples of places important to Itelmen history and culture to illustrate during the training. As Google Earth runs on most operating systems (Windows, Linux, Mac) and does not require any exceptional computing power, the existing six PCs in the school worked well for training purposes. We installed Google’s MyTracks on the students’ Android devices (cellphones that the students were enthused to put to use for this purpose), which allowed on-the-fly KML to be created by the students as we visited places in the field over the period of three days, and the KML files were copied to the PCs via USB cable when back in the training room, compiled and elaborated. As we went along, the training materials and sample data were uploaded to a website created for the project in Russian and English. After the workshop had ended and the collaborators returned home Thom and Degai continued to refine the KML created during the training sessions and subsequent fieldwork, providing translations, additional details, and video clips made at many of the places. The resulting KML was uploaded to Google MyMaps, symbolized with icons designed by UVic’s Ethnographic Mapping Lab and published on the project website.[5]

Itelmen Indigenous Mapping Looking Forward

Degai has continued to conduct map interviews over the course of the winter and spring of 2015, with additional work planned for 2017, including more detailed mapping and videography of the Elvel story. The website has already had some impact, with a remarkable 257,000 hits on the immersive PhotoSphere images posted on the website and in Google Maps as of November 2016.[6] Two of the older students stood out, Sasha and Ivan, engaging the project goals and mastering the skills learned. Clearly, it would be unrealistic in places with such spotty internet access to rely only on Google's cloud-based services (like YouTube and MyMaps), but for the software which did not depend on the Internet to operate locally (MyTracks, Google Earth), the techniques were still productive, and the results of the essentially offline data collection can then be mobilized and shared using 'cloud-based' tools like Google MyMaps and Fusion Tables when there is access to more reliable internet (in this case, when the academic collaborators were back in North America).

Next steps include implementing a strategy to review the published ethnographies and historical documents published in Russian and English since the 1770s. We began this review using the excellent study produced by Dürr et al. (2005) in both Russian and English, giving Itelmen place names throughout the Kamchatka peninsula. While the names and their meanings have prompted good dialogue with elders, the maps turned out to be very challenging to relate to on the ground, and an important effort for the upcoming fieldwork has become better locating these places on the ground using GPS and the detailed Google Earth imagery. We also hope to incorporate an archive of oral histories of village relocation recorded by anthropologist David Koester in the 1990s into our digital atlas project.

The final phase will be to integrate this information more fully into a digital atlas of the region, and to make decisions about what can be shared publicly, and what will remain in the

community cultural centre. Our vision is that over three to five years, the train-the-trainer approach will grow the skills of local community members to undertake the work, ignite passion, pride and understanding of the youth for their communities history and cultural practices, and produce a set of powerful maps that can assist the indigenous peoples of Kamchatka in seeing their circumstances improved, and their life projects fulfilled in Post-Soviet Russia.

Brian Thom is an Associate Professor in the Anthropology Department at the University of Victoria (http://anthropology.uvic.ca/faculty/thom). He founded UVic's Ethnographic Mapping Lab in 2010 (http://ethnographicmapping.uvic.ca) where indigenous communities and university researchers collaborate on innovative cartographic projects. He is also research axis co-leader for Community Mapping with the Centre for Indigenous Conservation and Development Alternatives (http://cicada.world/research/themes/community-mapping/) (McGill U), and with the Canadian Conservation in Global Context (CCGC) project (U Guelph) (http://www.ccgc-iaa.ca/our-team). From 1994-1997, 2000-2010 he acted as researcher, senior advisor, and negotiator for several Coast Salish First Nations (Canada) engaged in treaty, land claims, and self-government negotiations.

Benedict J. Colombi, Ph.D. is Faculty Director of the University of Arizona's Graduate Interdisciplinary Programs (GIDPs) and Associate Professor of American Indian Studies and Affiliate Associate Professor of the School of Anthropology, School of Geography and Development, and School of Natural Resources and Environment. He also holds a Faculty Appointment with the Institute of Environment, a center for disciplinary and interdisciplinary environmental and climate change research. He is the Past Program Chair of the American

Anthropological Association (AAA), Anthropology & Environment section, Past Faculty Fellow with The Udall Center for Studies in Public Policy, a Fellow with The Society for Applied Anthropology (SfAA), and a recipient of a 2014 US-Russia Fulbright Scholar Award.

Tatiana Degai is PhD candidate at the University of Arizona in American Indian Studies and Linguistics, and Director of the Community House of Culture, Kovran, Russia. She is a member of the Council of Itelmens in her home community, and is actively involved with culture and language development projects. She has a Master on Arts from the University of Alaska Fairbanks in Anthropology and a teaching degree in foreign languages from Kamchatka State University. Her research borders on indigenous education, sociolinguistics, ethnography, Indigenous activism, and revitalization.

ACKNOWLEDGEMENTS

This project is part of the Innovations in Ethnographic Mapping and Indigenous Cartographies project, funded by a Google Research Grant, and the Social Sciences and Humanities Research Council (SSHRC) Insight Development Grant, with additional funding from the National Science Foundation, the Arctic Social Sciences Program, and the US Fulbright Scholar Program.

NOTES

1. We must confess upfront that we (Thom and Colombi) are relatively new to the scholarship of Russian Indigenous cultures of the North (Siberia and the Far East). However, we have benefited greatly by our collaborations with Degai, PhD candidate of the American Indian Studies Program and Department of Linguistics at the University of Arizona, Professor Victoria Sharakhmatova of the Russian Academy of Foreign Commerce of Kamchatka Government Technical University, Dr. Victoria Petrasheva of the Kamchatka Branch of the Pacific Institute of Geography, Professor Andrew Gerkey of the Department of Anthropology at Oregon State University, and David Koester of the Department of Anthropology at the University of Alaska at Fairbanks. We are particularly indebted to Anya Gorshkova, a most remarkable, generous, and skillful interpreter who enabled fluent communication and dialogue throughout the project and to Yulia Vasilieva from the Association of Indigenous Peoples of the North of Kamchatskii Krai for helping with formal accommodations related to the project, as well as Ekaterina Selvestru of Pacific Environment, who attended the training and assisted with interpretation.

2. Training materials and agendas for the 2013 workshop are archived at https://ua.earthoutreach.org/.

3. Materials for both the workshops in Petropavlovsk-Kamchatski and Kovran are available at https://sites.google.com/site/kamchatkamapping/.

4. See https://developers.google.com/kml for details on the KML open standard.

5. The icons can be freely downloaded for use in any indigenous mapping project at http://www.uvic.ca/socialsciences/ethnographicmapping/resources/indigenous-mapping-

icons/index.php.

6. The digital atlas products of the work to date can be viewed at http://www.uvic.ca/socialsciences/ethnographicmapping/projects/kamchatka/index.php.

References

Adams, Rosanna, and Brian Thom. n.d.. Indigenous Mapping in the Cloud: A White Paper on Privacy, Ownership, Access and Security issues for First Nations using Google Geo-Tools. Unpublished manuscript.

Afable, Patricia O., and Madison S. Beeler. 1997. "Place-Names." Pp. 185–189 in *Handbook of North American Indians*, ed. Ives Goddard, vol. 17. Washington, DC: Smithsonian Institution Press.

Asch, Michael, Thomas D. Andrews, and Shirleen Smith. 1986. "The Dene Mapping Project on Land use and Occupancy: An Introduction." Pp. 36–43 in *Anthropology in Praxis: Occasional Papers in Anthropology and Primatology*, ed. Philip Spaulding. Calgary, AB: University of Calgary Press.

Bobaljik, Jonathan. 2005. "Itelmen Diminutives: A Belated Reply to Perlmutter 1988." In Booij, Geert & Van Maarle, Jaap (eds.), *Yearbook of Morphology 2004*. Dordrecht: Springer. Pp. 317–319.

Bobaljik, Jonathan. 2006. "Itelmen Reduplication: Edge-In Association and Lexical Stratification." *Journal of Linguistics* 42(1): 1–23.

Brice-Bennett, Carol (ed). 1977. "Our Footprints Are Everywhere: Inuit Land Use and Occupancy in Labrador." Nain: Labrador Inuit Association.

Brody, Hugh. 1981. *Maps and Dreams: Indians and the British Colombia Frontier*. Vancouver: Douglas & McIntyre.

Brown, Deidre, and George Nicholas. 2012. “Protecting Indigenous Cultural Property in the Age of Digital Democracy: Institutional and Communal Responses to Canadian First Nations and Maori Heritage Concerns.” *Material Culture* 17 (3): 307–324.

Bryan, Joel, and Dennis Woods. 2015. *Weaponizing Maps: Indigenous Peoples and Counterinsurgency in the Americas*. New York: Guilford Press.

Chapin, Mac, Zachary Lamb, and Bill Threlkeld. 2005. “Mapping Indigenous Lands.” *Annual Review of Anthropology* 34: 619–638.

Colombi, Benedict J., and James F. Brooks. 2012. *Keystone Nations: Indigenous Peoples and Salmon across the North Pacific*. Santa Fe, NM: School for Advanced Research Press.

Corbett, Jonathan M., Tim Kulchyski, and C. Peter Keller. 2006. “Using Community Information Systems to Express Traditional Knowledge Embedded in the Landscape.” *Participatory Learning and Action* 54 (Special Issue on “Mapping for Change-Practice Technologies and Communication”): 21–27.

Degai, Tatiana. 2016. “‘Itənmən’—‘The One Who Exists’: Sociolinguistic Life of the Itelmen in Kamchatka, Russia in the Context of Language Loss and Language Revitalization.” PhD diss., University of Arizona.

DeRoy, Steven. 2014. “Direct-to-Digital Mapping Methodology using Google Earth: Guidebook.” Vancouver: The Firelight Group. https://docs.google.com/a/google.com/viewer?a=v&pid=sites&srcid=ZWFydGhvdXRyZWFjaC5vcmd8aW13LWNhbmFkYXxneDo1YjM5N2Q0N2I4NjI1MWI3 (accessed 12 Feb 2016).

Donahoe, Brian, and Joachim Otto Habeck. 2011. *Reconstructing the House of Culture: Community, Self, and the Makings of Culture in Russia and Beyond*. New York: Berghahn Books.

Dürr, Michael, Erich Kasten, and Klavdiya Khaloimov. 2005. *Itelmen Language and Culture.* Pt. 2. Rev. Ed. Ed. David Koester and Tjan Zaotschnaja. Waxman: Münster.

Eades, Gwilym. 2015. *Maps and Memes: Redrawing Culture, Place, and Identity in Indigenous Communities*. Montreal: McGill-Queens University Press.

Ewalt, Joshua. 2011. "Mapping Injustice: The World is Witness, Place-Framing, and the Politics of Viewing on Google Earth." *Communication, Culture & Critique* 4 (4): 333–354.

Finkle, Todd. 2011. "Corporate Entrepreneurship and Innovation in Silicon Valley: The Case of Google, Inc." *Entrepreneurship Theory and Practice* 36 (4): 863–887.

Freeman, Milton. 1976. *Inuit Land Use and Occupancy Project*. Ottawa: Minister of Supply and Services Canada.

Freeman, Milton. 2011. "Looking Back—and Looking Ahead—35 Years after the Inuit Land Use and Occupancy Project." *Canadian Geographer* 5 (11): 20–31.

Gerkey, Andrew. 2011. "Abandoning Fish: The Vulnerability of Salmon as a Cultural Resource in a Post-Soviet Commons." *Anthropology Work Review* 32 (2): 77–89.

Google Earth Outreach. 2016. "Chief Almir and the Surui tribe of the Amazon." https://www.google.ca/earth/outreach/stories/surui.html (accessed 2 February 2016).

Grant, Bruce. 1995. *In the Soviet House of Culture: A Century of Perestroikas*. Princeton: Princeton University Press.

Khaloimova, Klavdiia, and Aleksandr Volodin 1988. *Bukvar*. St. Petersburg: Prosveshchenie.

King, Alexander. 2011. *Living with Koryak Traditions: Playing with Culture in Siberia*. Lincoln: University of Nebraska Press.

Koester, David. 2003. “Life in Lost Villages: Home, Land, Memory and the Senses of Loss in Post-Jessup Kamchatka.” Pp. 269–283 in *Constructing Cultures Then and Now: Celebrating Franz Boas and the Jessup North Pacific Expedition*, ed. Laurel Kendall and Igor Krupnik. Washington, DC: Smithsonian Institution Press.

Koester, David. 2005. “Global Movements and Local Historical Events: Itelmens of Kamchatka Appeal to the United Nations.” *American Ethnologist* 32 (4): 642–659.

Koester, David. 2012. “Shades of Deep Salmon: Fish, Fishing, and Itelmen Cultural History.” Pp. 47–64 in *Keystone Nations: Indigenous Peoples and Salmon across the North Pacific*, ed. Benedict J. Colombi and James F. Brooks. Santa Fe, NM: School for Advanced Research Press.

Koester, David, and Lilvo Niglas. 2011. “Hunting in Itelmen: Filming a Past Practice in a Disappearing Language.” *Sibirica* 10 (3): 55–81.

Krasheninnikov, Stepan Petrovich. 1972. *Explorations of Kamchatka, North Pacific Scitimar: Report of a journey made to explore eastern Siberia in 1735–1751; by order of the Russian Imperial Government*. Portland: Oregon Historical Society.

Lester, Geoffrey. 1979. “Aboriginal Land Rights: The Significance of Inuit Place-Naming.” *Études/Inuit/Studies* 3 (1): 53–74.

Moore, Patrick, and Daniel Tlen. 2007. “Indigenous Linguistics and Land Claims: The Semiotic Projection of Athabaskan Directionals in Elijah Smith’s Radio Work.” *Journal of Linguistic Anthropology* 17(2): 266–286.

Morphy, Howard, and Frances Morphy. 2006. “Tasting the Waters: Discriminating Identities in the Waters of Blue Mud Bay.” *Journal of Material Culture* 11 (1–2): 67–85.

Murashko, Olga. 1997. Itelmens and Kamchadals: Marriage Patterns and Ethnic History. *Arctic Anthropology* 34 (1): 181–193.

Orlova, Elizaveta P. 1999. *IItel’meny—Istoriko-etnograficheskii ocherk*. St. Petersburg: Nauka.

Nasr, Wren, and Colin Scott. 2010. “The Politics of Indigenous Knowledge in Environmental Assessment: James Bay Crees and Hydroelectric Projects.” PP. 132–155 in *Cultural Autonomy: Friction and Connections*, ed. Petra Rethmann, Imre Szeman and William D. Coleman. Vancouver: UBC Press.

Peluso, Nancy Lee. 1995. “Whose Woods Are These? Counter-Mapping Forest Territories in Kalimantan, Indonesia.” *Antipode* 27 (4): 383–406.

Rundstrom, R.A. 1995. “GIS, Indigenous Peoples, and Epistemological Diversity.” *Cartography and Geographic Information Systems* 22 (1): 45–57.

Scott, Colin, and Jeremy Webber. 2001. “Conflicts between Cree Hunting and Sport Hunting: Co-Management Decision Making at James Bay.” Pp. 149–174 in *Aboriginal Autonomy and Development in Northern Quebec-Labrador*, ed. Colin Scott. Vancouver: UBC Press.

Sletto, Bjorn. 2009. “‘We Drew What We Imagined’: Participatory Mapping, Performance, and the Arts of Landscape Making.” *Current Anthropology* 50 (4): 443–476.

Sharakhmatova, Victoria. 2012. “Indigenous Peoples’ Traditional Fishing in Kamchatka and Local Community Development Concept Based on Sustainable Use of Fish Resources: Problems and Solutions.” Pp. 89–108 in *Keystone Nations: Indigenous Peoples and Salmon across the North Pacific*, ed. Benedict J. Colombi and James F. Brooks. Santa Fe, NM: School for Advanced Research Press.

Slezkine, Yuri. 1994. *Arctic Mirrors: Russia and the Small Peoples of the North*. Ithaca: Cornell University Press.

Starkova, Nadezhda. 1976. *Itel'meny: Material'naia kul'tura*. XVIIIv.—60-e gody XXv. Moscow: Nauka.

Steller, Georg Wilhelm. 2003. *Steller's History of Kamchatka: Collected Information Concerning the History of Kamchatka, Its Peoples, Their Manners, Names, Lifestyles, and Various Customary Practices*. Fairbanks: University of Alaska Press.

Summerhayes, Catherine. 2015. *Google Earth, Outreach and Activism*. New York: Bloomsbury Academic.

Thom, Brian. 2009. "The Paradox of Boundaries in Coast Salish Territories." *Cultural Geographies* 16(2): 179–205.

Tobias, Terry. 2009. *Living Proof: The Essential Data-Collection Guide for Indigenous Use-and-Occupancy Map Surveys*. Vancouver: Ecotrust Canada and Union of BC Indian Chiefs.

UNESCO. 2016. *Atlas of the World's Languages in Danger*. New York: United Nations Education, Scientific and Cultural Organization.

Usher, Peter. 2003. "Environment, Race and Nation Reconsidered: Reflections on Aboriginal Land Claims in Canada." *Canadian Geographer* 47 (4): 365–382.

Volodin, Aleksandr P. 1976. *Itel'menskii iazyk*. St. Petersburg: Nauka.

Volodin, Aleksandr P. 1997. "Itel'menskii iazyk." Pp. 60–72 in *Iazyki mira: Paleoaziatskie Iazyki,* ed. Georg Ralf-Stefan and Alexander P. Volodin. Moscow: Indrik.

Wainwright, J., and J. Bryan. 2009. “Cartography, Territory, Property: Postcolonial Reflections on Indigenous Counter-mapping in Nicaragua and Belize.” *Cultural Geographies* 16(2): 153–178.

Watson, M.K. 2010. “Diasporic Indigeneity: place and the articulation of Ainu identity in Tokyo, Japan.” *Environment and Planning A* 42 (2): 268–284.

Weinstein, Martin. 1977. *What the Land Provides: An Examination of the Fort George Subsistence Economy and Possible Consequences on it of the James Bay Hydroelectric Project*. Montreal: Grand Council of the Crees.

Westman, Clinton. 2013. “Social Impact Assessment and the Anthropology of the Future in Canada’s Tar Sands.” *Human Organization* 72 (2): 111–120.

Willow, Anna. 2013. “Doing Sovereignty in Native North America: Anishinaabe Counter-Mapping and the Struggle for Land-Based Self-Determination.” *Human Ecology* 41(6): 871–884.

Wilson, Emma. 2012. “The Oil Company, the Fish, and the Nivkhi: The Cultural Value of Sakhalin Salmon.” Pp. 25–46 in *Keystone Nations: Indigenous Peoples and Salmon across the North Pacific*, ed. Benedict J. Colombi and James F. Brooks. Santa Fe, NM: School for Advanced Research Press.

Wilson, Emma, and David Koester. 2008. “Community Participation in International Projects: An Analytical Perspective from the Russian Far East.” *Environment, Development, Sustainability* 10(3): 267–290.

Wood, Dennis. 2010. *Rethinking the Power of Maps*. New York: Guilford Press.