Geographic Protest: The Role of Counter-Mapping in Supporting Campaigns Against Large-Scale Extractive Projects in Colombia: The Case of La Colosa

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Geographic protest

The Role of Counter-Mapping in Supporting Campaigns Against Large-Scale Extractive Projects in Colombia: The Case of La Colosa

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Introduction

In April 2017, a remarkable referendum took place in central Colombia. The residents of Cajamarca, who had been besieged by AngloGold Ashanti and the spectre of the world's largest gold mine since 2003, voted against mining in their backyard. The referendum was remarkable, with 98% of the community voting against the world's third largest gold producer, a result that effectively ended the project under collective rights laws, at least in the short term. Yet, just a few years beforehand the community had been split down the middle as to whether the mine should be opened.[1] This paper explores the role which spatialised information may have played in this change of public opinion and in the legal battle against AngloGold Ashanti, and examines the role of neogeographic practices alongside more traditional spatial representations.

Maps, counter-maps and spatial representations produced by local people have a long history.[2] In recent years however, the field of cartography has moved in directions which were unimaginable just thirty years ago, and faster than could have been perceived even 10 years ago.[3] The most fundamental change has been the way in which the control held by powerful elites that have exercised dominance over cartography for several hundred years has been radically shifted. Much control is still exercised by organisations such as Google or Esri, and by national mapping agencies such as the Ordnance Survey. Nevertheless, spaces have been opening up through reduced costs, alternative platforms and increasingly accessible APIs and interfaces which bring about the conditions necessary for an age of *neogeography* - the democratisation of participation in mapping.[4] Maps are no longer produced and reproduced solely by a trained elite. Now possible to produce them on the fly, allowing both professionals and amateurs to develop cartographic artefacts.[5] If the Cartographic Gaze still looms large,[6] the new ease of digitalising spatial data in this neogreographical age allows for easier repurposing of spatial data. It opens up the concept of geography and cartography and allows for its repackaging through digital media, the internet and counter mapping activities.[7]

Neogeography, while not a wholly new term, has been reimagined since 2006. The term refers to techniques, tools and practices of geography that were traditionally beyond the scope of professional geographers and geographic information system (GIS) practitioners.[8] It embodies a diverse set of practices that operate outside, or alongside, those of professional geographers.[9] For Goodchild, neogeography goes further than changing practices or the inclusion of more people. It also implies a reinventing of geography, in which the traditional roles of *expert producer* of geographic information and *amateur user* have broken down, with the amateur becoming both producer and user.[10] If this is taken to its ultimate conclusion, as described in prosumption theory, put forward by Ritzer and Jurgenson,[11] there may well come a time in which the big players in the mapping world stand

back and meddle less with those who are now producing and consuming cartographic content. We are however, not yet fully at that stage. An acknowledgement that the relationship between professional and amateur geographers varies across disciplines does not go as far as to suggest that prosumption has been reached. Instead, more cautiously, it follows Goodchild's thinking in noting that in some projects those who may have previously been users have become producers. This is particularly the case in the examination of human rights. Examples of such practices include the mapping of tear gas used against civilian populations by Feigenbaum[12] and the development of Harass Map in Egypt by Ushahidi.[13] In Latin America, Obervatorio de Conflictos Mineros América Latin (OCMAL) attempts to map reports of human rights and environmental issues with the support of the Environmental Justice Organisations, Liabilities and Trade (EJOLT) Atlas, which is funded by the EU and operates globally. Emerging platforms such as Voz have also embraced the philosophies of negeography and participation in mapping human rights.[14]

With access to GPS and digital mapping tools becoming ever more available through locative apps and location tools installed by default on smartphones, even the most isolated areas now have the ability to create digital maps, counter or otherwise. This makes salient the question of how neogeographies might affect activism and social movement organisations (SMOs) in developing countries and remote regions. It has been generally acknowledged that digital media in their broadest sense have an impact on civic and political involvement,[15] but while some studies have examined digital counter-mapping,[16] further investigation is needed to answer the remaining questions and contradictions over its impact. Activities such as participatory rural appraisals (PRA), a mainstay of development work, have previously used maps to understand community needs, and they have been championed for their ability to create horizontal power structures. More recently, other projects have built upon them, fuelled by new technologies. Examples include improving health data through mapping card transactions and mobile phones,[17] improving the legal status of indigenous peoples in Belize[18] and supporting REDD+ (The UN programme for reducing emissions from deforestation and forest degradation) which targets villages for development aid, forestry projects, and water sanitation.[19] However the specifics of counter-mapping in protest are yet to be fully explored. This paper examines, through interviews and surveys, how both digital and analogue counter-maps are used to create and disseminate bodies of knowledge in relation to protests around the adverse social and environmental effects of the mining industry in Colombia. Through this examination, the paper tempers the technological determinism that pervades discussion about participatory geographical information systems (PGIS). It shows that the analogue still has a role to play in counter-mapping activities in the representation of space and rights, and that existing power and social structures remain the dominant driving forces.

This paper specifically examines the SMOs who oppose the megamine 'La Colosa' which is under licence to AngloGold Ashanti in central Colombia and how they used counter-maps in their fight. It looks at how they were used to breakdown hierarchies, how they helped manage knowledge within the context of these protests and the extent to which these geographic artefacts contributed to the referendum result.

The paper begins with background information which explains the choice of Colombia and La Colosa as the study area. Then, it presents a theoretical background to the history of counter-mapping and the contradictions of participation and GIS. After presenting the methodology employed for this study the results are presented with a focus on (i) the use of mapping in the fight for human, land and water rights, and (ii) hindrances to these actions. The discussion reflects on the role of different mapping activities in bringing around a change of social consciousness, before concluding with some suggestions for further research.

Background

During 2013 Colombia saw 4.2% GDP growth with low inflation, making it Latin America's fifth largest economy.[20] Much of this growth came through foreign investment in mining and oil. It was driven by the Santos government's policy of opening doors to foreign mining companies,[21] following the long and well-worn trajectory of exploitation and oppression across Latin America.[22] Colombia's expansion of mining activities has led to increased protests and the rise of environmental SMOs across the country. Despite much talk of corporate social responsibility (CSR) and new ways of doing business, there is little confidence that large-scale mining activities will benefit the communities they almost always displace.[23]

Until recently Colombia's mining industry was limited to a handful of coal mines, but since 2002, and even more so under Juan Manuel Santos' *la locomoción* scheme, the sector has grown to account for US$8 billion, or one quarter of all Colombian exports.[24] With increasingly favourable conditions and access to both the Pacific and Atlantic oceans, the world's mining companies are looking at Colombia's rich mineral deposits for their next investment.

The research for this paper focused on the town of Cajamarca, which sits on a large gold deposit which was sold to AngloGold Ashanti – a South Africa based mining company, and the world's third largest gold producer – as the La Colosa mining concession in 2003. Mining activity began in 2006.[25] The main concession lies 14 km from the town of Cajamarca and 6 km from the main highway.[26] The concession itself covers 600 km^2 and includes lands in and around the town of Cajamarca and significant proportions of the surrounding Coello basin.[27] La Colosa has been halted in view of the overwhelming majority against the project in the referendum held in April 2017, although this research was carried out during the period of feasibility. If it became operational, La Colosa would be the largest open air mine in South America, adding significantly to AngloGold Ashanti's portfolio within Colombia. That portfolio already comprises concessions in 20 departments, covering approximately 15,000 km^2, with an investment of US$255.[28]

It is important to note the concerns of the SMOs and the conditions that led to such a pushback against La Colosa. Despite AngloGold Ashanti's 'commitment to environmental stewardship', there have long been significant concerns about the environmental and human rights impacts of La Colosa.[29] These concerns, which persist, concern the potential destruction of the *páramo* (the ecosystem of tropical mountain areas)[30] and water management. The proposed mining activities would use huge quantities of water and the process of extracting gold from the ores uses chemicals including arsenic and cyanide which are mixed with the water to wash the ore. It is subsequently discarded into tailing ponds where it often leaches back into the water table, leading to fears that contaminated water will be returned to the environment.[31] Water pollution is of particular concern in the region due to the large number of springs and the way in which the Coello basin's watershed washes into a large agricultural region.

Beyond these significant environmental concerns, there were also concerns for civil society itself, both in terms of the breakdown of relations within the community and the clear and present threat of human rights violations. According to the plans for the concession, the town of Cajamarca will cease to exist other than as a home for miners from the mining complex. This led to divisions between those who believed that the mine would bring jobs and prosperity to the area and the country, and those who opposed the loss of the town in its present form. AngloGold Ashanti carried out a wide and diverse publicity campaign, supplying school uniforms, minor infrastructure and information on the benefits of employment over subsistence farming. These actions divided families and civic groups and created a general air of tension between parties on both sides. Tension was heightened by the killing of Pedro César García Moreno, a member of SMO Conciencia Campesina, who was shot in November 2013.

As AngloGold Ashanti's presence in the Tolima region of Colombia grew, so too did the opposition to the proposed mining activities. One of the longest standing opponents, Semillas de Agua, became active in the area in 2007, with a mission to protect water supplies. An established SMO (c.1992) with a permanent staff and national and international networks, it became one of the leading organisational bodies in the region. Other SMOs include Comité Ambiental Cajamarca, a local sector of the national organisation based in Bogotá, APACRO, a small SMO that promotes local produce and sustainable farming methods through workshops and a small shop in the town of Cajamarca, Fundación Vida Libre which has increased its presence in the region and Colectiva Cosajuca, a student youth organisation based at the Universidad del Tolima. Two international organisations turned their attention to Tolima and the fight against La Colosa. The Latin American Institute for an Alternative Society (ILSA), a North American organisation with a local office in Bogotá, gives much needed legal support and aid to the communities and SMOs in the region. With a focus on promoting self-determination, ILSA provides advice and workshops in the region. The World Wide Fund for Nature (WWF) Colombia is a subsidiary of the International NGO. The WWF also provides training and workshops, but unlike the other organisations mentioned, will not officially denounce AngloGold Ashanti, La Colosa nor the government's pro-mining stance.

In many other places around the world, notably Skouries (Macedonia)[32] and Rosia Montana (Romania),[33] technological interventions using non-locative media, such as social media and the internet, have brought protests against mining companies and their activities to the attention of a global public, and have helped SMOs to mobilise locally. Again, research has been published, but much of this is limited to the development sector. This technological shift is, however, of particular interest in Latin American and the Caribbean where 20 out of 33 countries have more mobile subscriptions than people.[34] Of these, increasingly large numbers of subscriptions are being taken up on data plans, allowing access to the internet. In July 2012, 25% of the cell phones sold in Colombia were smartphones, of which 64.3% were running iOS and 11.9% Android.[35] This high penetration rate of smart technology has allowed many SMOs around the world to increase their online presence, but here it is the inclusion of the GPS technologies in each of these devices that is of interest due to its perceived potential to create opportunities for the inclusion of spatial knowledge and counter-maps in protest activities. Colombia has seen an especially rapid expansion of mobile and internet use,[36] allowing for potentially significant shifts in the politics of spatial knowledge.

The politics of spatial knowledge

New technologies are evolving fast and a culture of *mass-self broadcasting* is demonstrating a change in the structure of information transmission and circulation, supposedly lowering many of the barriers to civic involvement and increasing individuals' political efficacy.[37] Sarah Joseph suggests "this means that information from far corners of the world is accessible to exponentially larger and more geographically diverse groups".[38] This breakdown of commercial, social and geographical boundaries is only set to increase as mobile internet becomes even more widely available, allowing people, according to Sandra González – Bailón and Ning Wang, "to react and adjust rapidly to shifting targets, crossing geographic and temporal boundaries as needed".[39] Combining mobile internet with technologies such as video and GPS to increase the power of communication has already been shown to increase the response rate to crises. This is due to the diversity of information available and to the ability to report in real time.[40] Furthermore, online collaboration platforms enable people who are spatially separated to share and combine knowledge in a single space. The *ExCite* project based at University College London engages in a number of such collaborations. It works, for example, with Mbendjele hunter-gatherers in the Congo basin rainforests to monitor and map the activities of commercial poachers in their area.[41] This project demonstrates how flexible, speedy information flows and counter-mapping can provide the

infrastructure to create and demonstrate knowledge as well as document events. It also supports the emergence and renovation of SMOs.[42]

There is an extensive body of literature which examines how maps become sites of knowledge and power.[43] Brian Harley, inclined to Foucauldian thinking, brought post-structuralism to a cartographic world which had previously viewed maps purely as communicative tools. John Pickles later developed this thinking and viewed maps as products of space and place combined with the political identities of the people who inhabit the spaces which they represent.[44] Both these positions can be seen as supportive of counter-mapping ideas. They go beyond the notion of maps as a means to deliver information so that they also encompass ideas about the exploration of that information. This creates a more nuanced relationship between scientific maps and counter-maps. It is now possible to represent various kinds of knowledge alongside one another. As Paul Robbins suggests, 'by simultaneously allowing the expression of a variety of knowledges … this approach to GIS creates a "level playing field" for comparing knowledge consensus and division'.[45] To these ends, Harley has suggested that a single map should consist of 'multiple, competing visualisations'.[46] Such counter-maps, expressing local knowledge in cartographic form, can produce powerful tool for promoting the rights of communities.[47] This shift has significant implications for SMOs which work against geographical change, especially over large areas.[48] These kinds of *bottom-up* mapping practices have been lauded as successful in promoting the inclusion of marginalised communities.[49] Yet these projects were regularly imposed by outside agencies bringing tools and knowledge to a community. In true counter-mapping, led and controlled autonomously by the community, maps can go beyond thr mere inclusion of marginalised knowledge. Maps can also be used to interrogate hegemonic knowledge itself; exploring links between production and information, politics and ideas. Robbins has suggested that mapping has hitherto been used to eliminate epistemologies and codify knowledge into set forms, but now, in a rapidly changing landscape with increased use of counter-maps, geographic information can break down barriers and open up new ideas for the production of knowledge itself, with conflict at the centre of attention.[50] Much will depend on how the tools are made available, and how far conventional science and society are willing to view the importance of these new maps.[51]

The basic entry requirements for GIS have not actually moved all that much. Fast internet and a computer are still required to produce maps, and as mapping technology becomes more complex, the computing power needed to render sophisticated maps gives global mapping agencies a renewed advantage.[52] By using the tools of cartography, the knowledge of local people has to be translated into tools and language to suit the needs of these agencies.[53] We might question why anything should be so radical about participatory GIS (PGIS) which is mediated through tools which were invented by the military at the height of colonialism.[54] It could be argued that PGIS and counter-mapping provide little more than a simulacrum of local and indigenous knowledge,[55] a practice which replaces 'bad' colonial maps with 'good' anti-colonial ones. While colonial representations of space which deny the existence of indigenous peoples are inherently violent, and this violence must be addressed by a postcolonial geography, counter-maps of indigenous lands are neither inherently good nor beyond question. They too are open to multiple readings and may have potentially undesirable outcomes. Accordingly, we need an analysis of the social processes through which maps are produced and read.[56] PGIS cannot be conceptualised as a tool to be picked up and then put down again. Mappings have become an intrinsic part of the fabric of everyday life.[57] Yet although citizens have shifted from being the object of maps, to being their potential creators, maps have not been turned thereby into natural objects separated from power.[58]

Having noted these limitations, it is also clear that the speed of technological advancement and the ubiquity of smartphones are changing the way in which spatial knowledge is constructed and shared. The digital nature of maps makes them part of the networked

society that is championed by researchers as a means of shifting the ways SMOs work. Given the potential cited in the literature we might expect that a more digitally connected society, in which counter-maps can be produced by a defuse group of people, would lead to an increase in public participation and in turn a more widely integrated lay knowledge.[59] Many have suggested that these networks will shift power from centralised control towards a more collectivist knowledge base.[60] Others have suggested that a digitally connected world would enable SMOs to operate cheaply and efficiently in a global sphere, creating international movements and generating support globally through a variety of actions, including counter mapping, adding credibility to and protecting their causes.[61]

Many scholars have explored how digital mapping tools and the internet have already begun to create a global public sphere which gives space for the inclusion of more – often marginalised – voices and alternative world views. An example is HarassMap in Egypt.[62] Again, caution should be taken not to see this combination of a networked society and counter-maps as a silver bullet for use everywhere.[63] While there is evidence to show that the two together do indeed provide a space for counter narratives, nothing guarantees that those narratives will be acted upon. Success is never automatic.[64] This paper now seeks to explore whether these claims of the power of counter-maps to deconstruct hierarchies a) meant that they could constitute possible counter-narratives against La Colosa, and b) were responsible for the outcome of the referendum of April 2017.

Methodology

Mixed methods were employed, using interviews and participant observation. Purposive sampling was used to identify interviewees from SMOs, snowballing from Universidad del Valle, Cali, where links with SMOs had already been formed. This technique was required due to prevailing suspicion and mistrust within SMOs which made it impossible to gain access without an introduction. The interviews among SMO members (n = 24) were conducted to gain insights as to levels of smartphone and map usage, to ascertain the nature and actions of the SMOs and to provide insight into how these organisations saw the role of maps and counter maps in their protest. Participant observation helped making estimates and assumptions about people's readiness to engage with spatial technologies. Observing how comfortable people were to use smartphones in public was a broad benchmark, but given that until recently the use of a mobile phone in public marked you out as a paramilitary informer, the ease with which people would now use their phones publically was a good indication of the potential of their use in other areas such as mapping and navigation (*interview*, anon, 2013). Secondary material such as flyers, maps, books, pamphlets, photographs and notations were also collected and reviewed. Survey data was processed using Statistical Package for the Social Sciences (SPSS). Qualitative data from semi-structured interviews was transcribed and coded for further analysis.

Results

(i) The Use of Mapping in the Fight for Humans, Lands, and Water Rights

The remainder of this paper will examine the different types of maps which were used to communicate the SMOs' concerns about the activities of AngloGold Ashanti and which produced the significant referendum result. The three principal types of map employed by SMOs were high quality GIS-produced maps, lower quality digital or hand-drawn maps which were featured on posters and flyers, and a 3-dimetional model that was used in conjunction with field trips. Despite this apparently wide range of tools, the levels of map use in the region were generally discouraging. This was despite the suggestion tin the academic literature that they might play a significant role in providing information about environmental issues to large numbers of people. Those who were engaged in mapping were from a very narrow demographic of younger and educated persons. Yet time and again

it was maps that were cited in interviews with members of SMOs as the key element in increasing public knowledge and in supporting legal cases.

SMO	Tools Used	Scope of use
1. Semillas de Agua	ArcGIS AquaAndes Trips to surrounding area Model of area Hand-drawn maps	Produced maps to show the extent of the mining concession, the *páramo* and where land violations had taken place. Purchased land in these areas to protect it. Mostly used maps in legal cases.
2. WWF Colombia	ArcGIS AquaAndes	Provided some training, and produced very high quality, detailed maps of the region, vegetation, subsoils and water courses. These were made freely available to SMOs
3. Comité Ambiental y Campesino Cajamarca	None, but worked closely with Semillas de Agua	Would help in sharing and creating maps with Semillas de Agua. Supported field trips.
4. Fundación Vida Libre	None of their own, but worked closely with Semillas de Agua	Would help disseminating others' maps.
5. Asociación de Productores Agroecológicos del Cañón del Rio Anaime (APACRA)	None	Distributed paper maps produced by others. Provided a meeting point for trips.
6. Colectivo SocioAmbiental Juvenil Cajamarcuno (Colectivo Cosajuca)	None	Would regularly share the maps and photographs of other organisations, especially Conciencia Campesina
7. Conciencia Campesina	Hand drawn maps Photographs of the area, edited to show potential area of the mine	Most map- based work consisted of dystopian edits of photographs or maps of the area to show extent of potential mine. Spread through social media.
8. Latin American Institute for an Alternative Society and Alternative Law (ILSA)	ArcGIS	Had worked previously on major projects mapping displacement of people in the war and their movement away from natural resources. No specific work around La Colosa.

Table 1: *Mapping tools and scope of use by SMOs.*

While general engagement was low, GIS-built maps helped by providing the backbone to the legal struggle against La Colosa. Produced primarily by Semillas de Agua, these maps were used to show that AngloGold Ashanti had broken the terms of its licence by prospecting beyond the bounds of its concession. This eventually led to a temporary suspension of the project pending a resubmission of environmental impact assessments.[65] Later, the maps were used to help conduct the referendum itself. SMOs would rather invest in professional GIS software and tools, such as AquaAndes or ArcGIS, than in social media training or campaigns. This was also reflected in the lack of using more social locative media, such as geotagging on Twitter of Facebook posts. Despite the limitations of GIS (including the

expense of software, the levels of expertise required, requirements for data accuracy and the tendency of GIS to promote scientific over local knowledge) the use of GIS and mapping tools such as *ArcGIS* or *AquaAndes* was prevalent among SMOs (see table 1). This use of mapping in preference to other media is perhaps explained by a perception of the capability of maps and geographic data to codify knowledge in a way that is seen as legitimate and scientifically grounded.[66] Maps and spatial knowledge are inherently political, and this is perhaps why they appeal to those SMOs in the region which focus their struggle on legal objection. While these legal implications are incredibly important for the preservation of the *páramo* and the water table, and in protest against the actions of AngloGold Ashanti, they do not help to shift public opinion. The SMOs themselves though were happy to admit that the maps they produced were not for general consumption by the public. Jorge Rubiano of Semillas de Agua stated in an interview that 'we use maps in legal fights. They help us to define the terms of the struggle'. They played a crucial part of the whole campaign, but not one which necessarily helped to sway public opinion in the referendum.

Opinions about La Colosa in 2013 were deeply divided in the town of Cajamarca. Many people were unaware of the environmental and social impacts that the mine would undoubtedly have. Joir Fuentes of Comité Seguimiento observed that 'It's really important that people understand what is going to happen here if they open the mine'. Tis was a sentiment echoed by most interviewees. Yet while maps were seen as very important for the legal fight, they were rarely used in the campaigns to sway public opinion against the mining operations. Many of the SMOs spoke of needing to engage people with maps and spatialised knowledge as an additional tool in their struggle, but that was rarely undertaken.

There were nevertheless two instances in which spatialised information played a role. First, in visits to the *páramo* areas. Rather than using maps with the public, the landscape itself offers a connection to spatialised information. Fernando Perez commented that 'Some people have never seen what they are about to lose. As soon as they see it, their opinion about the mine begins to change'. In this way the SMOs have, to a greater or lesser extent, reimagined the relationship between the map and the territory in a manner similar to that discussed by Korzybski in *Science and Sanity*.[67] Drawing a map will not change the territory, but a mine certainly will. The SMOs in the area saw the necessity in taking people by jeep up into the high hills, leading them both beyond and further into the map. These trips were generally seen as eye-opening and awe-inspiring experiences that were sure to change people's minds. Sadly though, the costs, both in terms of fuel and jeep hire, as well as in terms of time – each trip was a full twelve hour day – meant that few people could be engaged in this way. Consequently, a second project was undertaken by local groups led by Semillas de Agua. It used a 3D model of the ara (see figure 1). Sadly, despite initial enthusiasm for the project, and the huge amount of time given to its construction, the sheer size of the model has meant that it has remained largely within the offices of Semillas de Agua in Cajamarca. When it could be used, though, the model was invaluable in showing the extent of the mining project and just how much land would be lost. The model served as more than just a map. It became an immersive experience, engaging with the textured surfaces of the scaled-down hills and rivers. While it is essentially impossible to know any actual territory vicariously, an understanding might be gleaned through one or more sensory channels.[68] The model, like the jeep trips, allowed people to enter the map in a multisensory way, creating a sense of place which, if not literally truthful, was suitably analogous for the purpose in hand.[69] The marking of springs and water sources made it clear just how likely it was that the water table would be damaged. Showing the community what would be lost by use of what was essentially a counter map enabled the SMOs to develop stronger arguments and convince the local population of the destructive nature of La Colosa.

Figure 1: *Fernando Perez shows the 3D model of the páramo built to help explain the spatial significance of the La Colosa mining project* (author's photo)

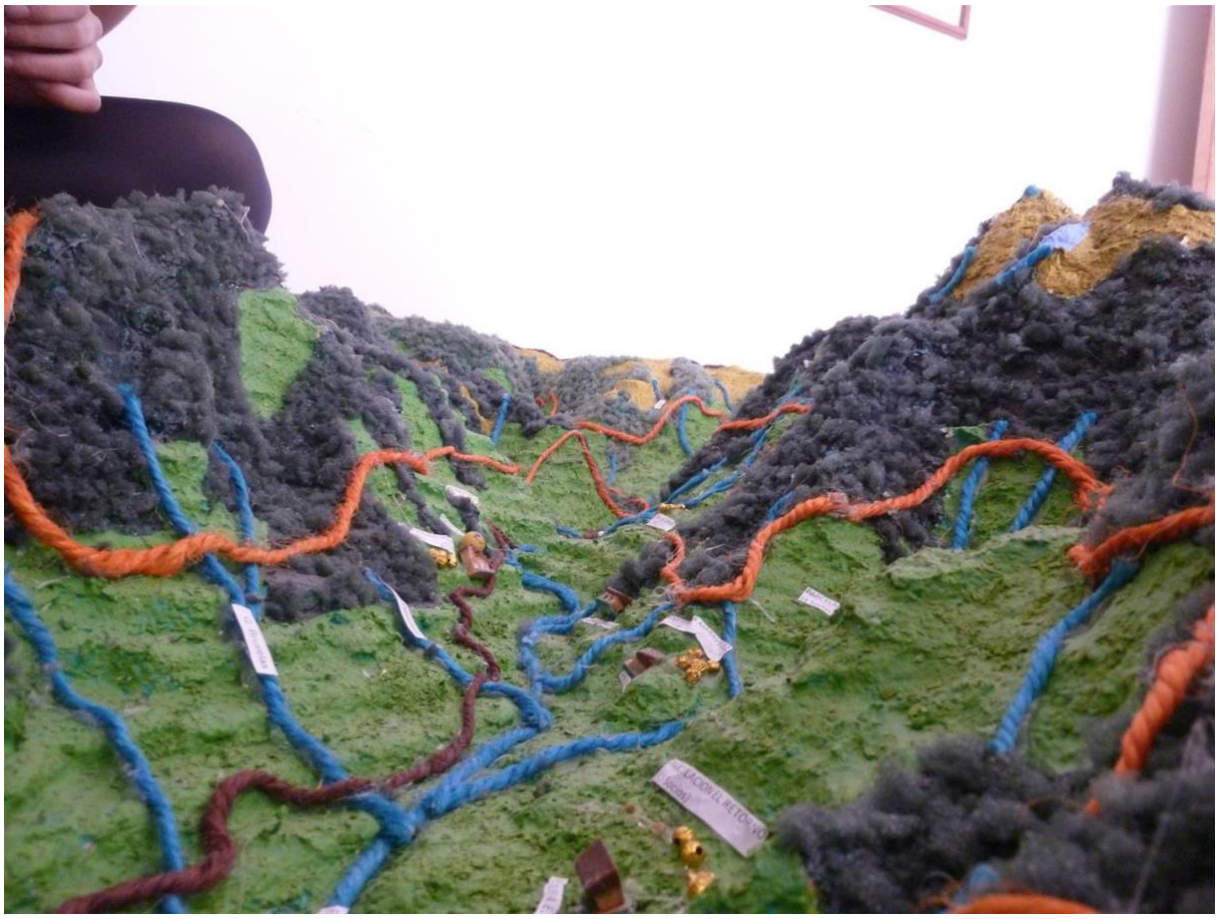

Figure 2: *Details of the model* (author's photo)

(ii) Hindrances to Counter-Mapping

Power plays a very significant role in the production of maps in the region and while the maps and models produced are indeed counter-maps, the persistent use of GIS tends towards scientific, non-participatory modes of creation. The continuation of old power systems, in which persons with more human and economic capital control flows of information and knowledge, has a significant effect on mapping practices. Key players fulfil a brokerage role within the digital environment, and these brokers are generally from a more socio-economically affluent background. Those who hold power have university degrees, and they continue to forge relationships with universities and research institutes. It is also notable that they are all men. Each has raised concerns over who controls output, who controls the knowledge, and clearly none of them were keen to relinquish their hold over the knowledge they hold. One of them stated that "you shouldn't just let anyone post [to social media]. There should be just one or two people from each organisation". This was representative of assertions about knowledge control.[70] One prominent member of an SMO did not hold a higher level of education, and was often marginalised by other members of the organisation. Many of his suggestions were ignored due to the way they were presented. It was observed that he was excluded from a knowledge production position, although he did take a lead in the dissemination of knowledge. This was often met with concern by other SMO members. His ability to work in this position is derived solely from his high level of social capital - having previously worked as a missionary in the region, he knows many families. While the value of his networks is acknowledged by other SMO members, there is a reluctance to put more power over knowledge in his hands.

Only a minority of SMO members fulfil these brokerage roles. They tend to concentrate most of the action in the network around themselves, both as content producers and as targets for messages sent by other users. This creates networks that are far from the horizontal structure often described in the literature on collective counter-mapping.[71] However, it is the possession of this social-economic capital that determines the potential of taking these counter-maps to the government and prevents them from being dismissed at the outset. It remains unclear whether the increased use of counter-mapping will break down these hierarchies, or whether the hierarchies need to be broken down first to allow effective use of new modes of working. The limited evidence from the field would suggest that the two will need to occur in tandem for greater levels of participation on the basis of shared spatial data. Greater participation is needed to create maps which represent and bind communities, along with an understanding that hegemonic power structures will only allow certain sectors of society to take these actions forwards at a national level.

Discussion

The results of the research suggest that two major things were occurring in Cajamarca. First, power was being constructed in the usual places, by middle-class, whiter, male, educated SMO members. This conflicted with the political aim of changing and moulding public opinion. Secondly, maps were thought of as incredibly important in the legal struggle, but this overlooked the importance of field trips and models in the struggle to change people's opinions. Somewhere among these contradictions, people's minds were changed, and this shift resulted in a resounding pushback against the mine. How can we make sense of these contradictions?

Counter-mapping is lauded for its ability to break down hierarchical structures, creating horizontal power and increasing political participation through the non-hierarchical management of knowledge. This almost utopian ideal has failed to manifest itself in Cajamarca in the terms described by its supporters. While information sharing is hugely important to the SMOs in the region, strong hierarchical structures are perpetuated, reinforcing scientific knowledge and male, educated dominance within the protest movements. These characteristics nevertheless allow for information to be promulgated in a country which is dominated by the same hierarchical structures. While members of SMOs talk about lack of finances and skills as hindrances to the inclusion of more social media in their work, the underlying concern about the ownership and management of knowledge is in fact a greater barrier to wider participation in knowledge production and sharing. Time and again, concerns were raised as to who might control and hold the knowledge spread through maps and other media. While these concerns are legitimate and should certainly be taken into consideration, it is impossible not to wonder whether the fear of losing power and status on the part of heads of SMOs reduce their desire to engage with more horizontal organisational structures. The present use of spatial knowledge is seen as important, but it is limited. This may at least be due, albeit subconsciously, to a desire to maintain exisiting power dynamics within SMOs. Perhaps it should be asked whether this matters. The campaign won a major victory. La Colosa has been halted, and it appears that the whole community has come together in a common cause. This suggests a level of harmony in the community that is rarely seen around such projects. Questions over the uneven distribution of power feel redundant in such a circumstance. However it is important to continue to address such inequalities if there is to be a lasting peace in the area. There is still a great difference between passive and active peace around such projects, to borrow from Lynn Davies.[72] The technologies employed are used across different parts of society,[73] but they have not broken the hegemonic status quo in the region or the country. Indeed the SMOs were in many ways utilising their position within the hierarchy in order to be heard. Thus while 98% of people voting against the mine is an overwhelming outcome, the community is not immune to the continued pressures of the mining company. Nor should it be assumed that technological interventions have changed local norms and practices.

While the referendum is seen by many as a victory for human and environmental rights, the fight against AngloGold Ashanti in Tolima will not be easily won. There are already rumours of legal action against the country, as has been seen in El Salvador.[74] SMOs in the region should seek to utilise all means available to them which may help in the creation and continuation of epistemic communities, including counter-mapping. By drawing more people into the creation of maps and discussions around them, alongside traditional structures and activities, SMOs may further improve their public relations and outreach activities for countering La Colosa.

Conclusion

Within Cajamarca it has been made clear that maps and counter-maps supported legal challenges to La Colosa. The maps which challenged the boundaries of the concession and the activities of the mining company begin to dismantle what Harley terms the 'arbitrary dualism' of propaganda versus 'true' maps, of scientific versus artistic maps.[75] But the use of these maps was largely limited to legal cases, which was in turn due in no small part to the historic power dynamics within the region's SMOs. Concern over ownership of information was at the centre of why participatory counter-maps were not utilised more fully. The much championed ability of counter-maps to create horizontal power structures could not develop organically in this instance, and power over geographic knowledge and its dissemination continued to lie in the same generally male, middle class hands. This may reduce drastically the ability to sustain resistance to La Colosa. The success of trips into the surrounding region and the model of the area, both of which were important in shifting public opinion in the run-up to the referendum, showed the potential for situating people within their geography as a way of heightening environmental awareness - a true step into neogeography.

Maps are clearly not the sole reason the referendum was won by the SMOs. The strength and tenacity of the SMOs and their members was the main and most important driving factor. Given the success of the SMOs in having La Colosa suspended, set alongside their use of numerous geographic tools to convince people, might suggest that the ease with which people can now access and produce maps is breaking down many of the old theories of how maps are used. Caution is still needed, but there is a significant shift in the power of maps and the sources of the information they represent. They do not hold all the answers, but they are becoming significant tools to be used by the subjugated.[76] And so, while still a long way from fully changing global power dynamics, the marriage between counter-maps and a networked society is opening space for new conversations where communities can create their own geography.[77]

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