



Struggle for water rights envisioning a wasteland: Big-scale mining and local responses in the Southern Ecuadorian Amazon

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Introduction

This paper discusses popular political responses to environmental degradation caused by big-scale open pit copper mining in the Southern Ecuadorian Amazon. Although these responses are local in the sense of springing out of local initiatives and mobilizations, and also observed locally through ethnographic research within the area directly affected by the mining project, they also reveal different kinds of interconnections. As people address environmental injustice through different kinds of resistance acts and strategies, they make use of formal – legal channels, multi-level civil society networks and public administrative procedures, they practice rural political ecology and engage in scientific knowledge production and management. Facing the global mining industry and extractive activity that as a rule rather than an exception causes environmental damage through (among other) its water uses, people in the area ‘under direct influence of the mine’ follow specific pathways of resistance: They address environmental and water injustice by multiplying and coordinating resistance strategies and make active use of their interconnections (cf. Dodge 2009). In the paper I discuss how the combination of modes of resistance is based on ‘popular environmentalism’ (Latorre 2009, 2012, Martinez-Alier 2002, Folchi 2001), where people struggle against livelihood disposessions (Perrault 2013a, 2013b) and strive to protect the natural resource base their livelihood, life-way and wellbeing depends on. Throughout the paper I will also reflect on the resistance potential of these pathways, taking into account some of the mechanisms and dynamics of modern ‘mining capitalism’ (cf. Kirsch 2014, Sosa & Zwarteveen 2012).

The Mirador copper mine project, run by the company Ecuacorrientes -ECSA, now owned by a Chinese consortium,¹ and currently in a late pre-extractive phase, is located in a humid tropical environment² in the El Panguí canton and Tundayme parish (in the province of Zamora Chinchipe) in the slopes of the Cordillera del Cóndor. The area under direct influence of the mining project forms part of a small watershed consisting of the rivers Wawayme, Tundayme and Quimi that run out into the Zamora - Santiago river basin. The parish centre and the majority of the rural barrios and indigenous Shuar communities are located in this area, and this is also where we find most of the human economic activity, dominated by cattle herding in combination with small-scale farming, and increasingly by the dynamics and influence of an industrial mining economy. ECSA has got a licence from the Ecuadorian Ministry of the Environment to extract 30 000 kt (kilo tons) of copper ore daily from this site, but in the new plans for an extension of the project, presented in March this year, the company applies for a licence to extract the double. The new plans for an extension puts the issue of waste handling into a new light. The doubling of the production comes together with a new and grandiose plan for waste

¹ Tongling Non- Ferrous Metals y China Railway Construction Corporation.

² Rainfall averages for the El Panguí canton fluctuates between 110 – 163 mm/month (GAD municipal 2012).

deposits that will directly affect two rivers, Wawayme and Tundayme, and indirectly affect the whole water system of Tundayme.

A representative of the consultancy company that elaborated the last Environmental Impact Assessment (EIA), envisioned in a presentation of a draft version in March this year that estimated elevated contamination levels from the Mirador mine could turn the area under direct influence of the project into a future wasteland.³ This could seriously affect a human rural population of more than 1000 persons and also threaten exceptionally biodiverse and vulnerable ecosystems. In my last field visit to Tundayme in August, this perspective on the future was expressed more generally in the local population; activists, local farmers, Shuar indigenous people, and the new settlers and also Ecuadorian workers in and in relation to the mine, share the same view of the contamination threat. Moreover, the prediction that the whole Tundayme parish has to be abandoned when the company starts extracting copper ore is more frequently shared by people that both depend on and resist the project. The diverse voices and views on big-scale mining now cluster around some basic experiences as the Tundayme population envisions a future wasteland – a land of waste abandoned by people.

Pathways that the struggle for water justice take

What struggles for water justice could be observed in this situation, and what kind of routes or pathways do these struggles take? In the area under direct influence of the mine there is a growing popular environmental awareness about *daño* (environmental damage), and claims and hopes for *trato justo* (just treatment) in relation to the industrial mining project now established in their neighbourhood. In the paper I will look at three different types of mobilizations around water-related issues in the Tundayme parish; these concern 1) formal-legal claims and processes related to water contamination due to shortcomings in the company's follow-up of the Environmental Management Plan; 2) resistance acts to protect water sources and sites as part of a strategy to regain territory through the use of formal public planning instruments and 'resistance agriculture'; and 3) attempts to establish mechanisms for participatory monitoring of water quality in the affected area in order to democratize scientific knowledge. In all three cases I will also indicate how these mobilizations link to a wider set of practices addressing environmental impacts and justice. My aim is to give a clearer idea about the channels, networks, levels and contexts where water justice can operate in relation to a type of resource extraction which because of its scale and integration into a global market economy generates what critical social theory terms 'livelihood dispossession by accumulation' (cf. Harvey 2003, Perrault 2012, 2013; Sacher 2015)

This concept refers to types of capital accumulation based on creating new opportunities for investment by "privatizing, commodifying, or devaluing assets held or enjoyed by others (...) while externalizing the costs of production (for instance, as ecological fixes via

³ A young Ecuadorian woman with a master degree from a Spanish University hired in to inform about the EIA during the socialization process in the El Pangui area. Our research team met her at the information table in the parish centre of Guismi (the neighbouring parish to Tundayme).

pollution and other forms of environmental degradation)” (Perrault 2013a:1052). This type of accumulation is in traditional Marxist thinking characterized as primitive and primordial, but in Harvey’s (2003) view it is “the predominant mode of accumulation under neoliberal capitalism” (Perrault 2013a: 1051). Accumulation of this kind is observed in relation to the global mining sector’s expansion into new areas with exploitable mineral reservoirs, dispossessing people living there from their means of production, i.e. from vital natural resources such as land, water and forests. In regions such as the Amazon, mining companies expand into ‘frontier zones / territories’ (cf. Little 2001, Santos-Granero & Barclay 2000, Rodriguez-Garavito 2011), and occupy extensive areas to extractive activity. Open-pit, big-scale mining interventions as the one considered here, require considerable accumulation of land and at the same time externalizes contamination costs related to the construction of the mining site and to the extraction as such. Additionally it also generates temporary employment ‘booms’ related to the need for extra work force and service facilities at certain stages in the construction phases of the project, without guaranteeing long-term wage labour opportunities when the Mirador project enter the ‘exploitation’ and ‘benefit’ phases.

The analysis presented here is preliminary and based on work in progress also in terms of method, since the field research period is not ended. The research forms part of the project ‘Extracting Justice’, financed by the Norwegian Research Council. This is research analysing the role of Free, Prior and Informed Consultation and Consent (FPIC) related to socio-environmental conflicts caused by big-scale natural resource extraction in Latin America. In the Mirador case study we focus on popular and community based participative politics in a situation where no FPIC processes have been carried out. We analyse socio-environmental conflicts combining social and natural science approaches and we produce data by collaborating directly with people affected by the mining activity. Work with the Mirador case is coordinated between Noragric – NMBU and a research team at the Observatory of Social – Environmental Conflicts (OBSA) at the Technical University of Loja (UTPL). As a whole the research group is inter-disciplinary and consists of a lawyer, two environmental engineers and two anthropologists, and it also benefits from the expertise of an entomologist. Data production is multi-sited and combines several disciplinary approaches. We make use of interviews and conversations, participatory observation, documentary analysis, perception mapping, develop cartographic resources and apply methodology based on bioindicators. The universe of people we consult and who accompany us in data production is diverse, and consists of core actors working in public institutions at different administrative levels and in NGOs, mestizo farmers, Shuar indigenous population, settlers, mining workers and representatives from the ECSA company. Personally I have carried out three periods of fieldwork so far, in November – December 2014, and in the months of March and August 2015. In addition the research team at OBSA works continuously in the field.

Big-scale mining in an agrarian frontier zone

The area of the Cordillera del Cóndor now ‘hosting’ the Mirador project can be considered a frontier zone not only because of its relative remoteness to political centers

of decision making and to its peripheral integration into national and global markets until recent historical times. El Panguí canton and more specifically Tundayme parish, constitute frontier territories in a geopolitical sense as well, located near the national border between Ecuador and Peru. At the same time, and in spite of restricted access,⁴ this area has been defined as strategic in different ways in various historical periods – military strategic because of the armed conflict with Peru (from the 1970s – 1990s); and economically strategic because of its mineral resources.⁵ Moreover, the biodiversity of the many microclimates in this area has since the 1980s been considered significant and deemed a ‘hotspot’ by conservationist professionals and activists (cf. Cisneros 2011, Latorre 2012).

The Mirador mining site is also literally on the agrarian frontier, located in an area that partly is used as pasture by small- and middle scale cattle farmers, partly consists of non-intervened rainforest, and which also constitutes buffer zones to neighbouring ecological reserves.⁶ The area defined by the company as ‘directly influenced by the project’, is also basically rural and populated by an ethnically diverse population; colonos, or mestizo cattle farmers and indigenous Shuar who have a more diversified agrarian adaptation to the natural environment. The history of human sedentary settlement in Tundayme is also a relatively recent process of colonization, initiated by Catholic missions in the first half of the 20th century (cf. Lorenzo Garcia 1985), and followed by massive internal migration from the rural highlands in the 1960s and 1970s, supported and facilitated by the Ecuadorian State. Colonization meant that the Shuar horticulturalists, that “provided for themselves through a mix of hunting, gathering and shifting cultivation” (Rudel et. al. 2002), and which subsistence required significant human movement over vast areas, were both marginalized and forced to settle within restricted geographical space (cf. Hendrix 1996). During a process of ethno-political territorialisation in the 1970s and 1980s (cf. Cisneros 2011), some Shuar communities consolidated their territories through global land titling processes, while other Shuar settlements and areas are currently in processes of formalization based on claimed customary rights. Shuar land has also been sold individually, both to colonos, which as a rule hold individual land titles, and in recent years also to the mining company. The co-existence of indigenous and colono populations practicing different types of land tenure of varying degrees of formalization, constitute a latent conflictive symbiosis in Tundayme and other parts of the El Panguí canton.

A characteristic of this heterogeneous landed population is that the company considers them to be basically inappropriate as labour force in the mine. People locally are

⁴ The bridge over the Zamora river, connecting Tundayme to the provincial road network and the inter-provincial highway, was constructed as late as in 2012.

⁵ Billiton Ecuador initiated exploration in Ecuador’s so-called South Eastern ‘copper belt’ in the 1990s (cf. Cardno 2014, Warnaars 2010). The first geological and geochemical studies were carried out in December 1994, and exploration started in 1996. From 2000 – 2005, Ecuacorrientes (at that time with Canadian owners) carried out exploration work in the Mirador area. On March 5th 2012, Ecuacorrientes signed a contract with the Ecuadorian state as the first foreign company to extract metals on a big-scale.

⁶ The *Bosque protector Cordillera del Cóndor* and the *Parque bio-nacional El Cóndor*.

marginally and temporary employed within a restricted set of job niches; cleaning and providing for food in the mining camp, manual work in relation to exploration and infrastructure building, work in the company's botanical gardens, and some have also been involved as guides and local experts in relation to data collection (levantamiento de datos) to the Environmental Impact Assessment report elaborated in 2014. In contrast, the work force constituting the Mirador mining enclave is composed of a population of Chinese workers, Ecuadorian labour migrants with higher technical education and job experience from the oil fields in the Northern Amazonian provinces, and temporary workers (both Chinese and Ecuadorians – some also from the region) recruited by sub-contractors operating in the area for shorter or longer periods. For the time being most of the sub-contractors deliver different kinds of services in relation to the building of various worker camps inside the mining area. Contrary to what was promised by the company and promoted as a major advantage by the national authorities, this mega mine has not generated major employment opportunities for the Tundayme population.

At the same time, there has been a considerable transfer of land from the local farmers to the company: Currently ECSA is Tundayme's definitely largest single landowner and claims today (in 2014) the ownership over 5284 has land in the area, 709 has of these are still unresolved cases. In contrast average individual land holdings of the remaining farmers in the area fluctuate between 2 to approximately 300 has. (cf. Cardno 2014, and personal communication with farmers).⁷ Although highly contested by local farmers as irregular and manipulated, it would be somewhat inaccurate to label this land transfer as land grabbing, since a brother share of what ECSA has purchased of land so far has been appropriated through legal transfers. It should be mentioned that the company only has purchased individual properties - communal land with global titles, belonging to the indigenous Shuar population, remains unaffected by this process (so far). It is also relevant to mention that no common price policy was introduced in the Mirador case, and no public surveillance followed the land transfers, resulting in highly uneven and random negotiations of price and conditions for compensation – which in some cases also included compensation through re-location on alternative properties within the parish and elsewhere.

State expropriation is an important additional mechanism, which is increasingly used in relation to the remaining land areas that the company needs to control in order to carry out the new and extended plan. Land that the company does not get a hold on because the owners refuse to sell is made available through the legal figure, *servidumbre minero*, which implies expropriation of land against a compensation defined by the authorities. *Servidumbre minero* is considered to be a form of long-term land hiring against a compensation, and where the idea is that land will be turned back to its owner after use (which in this case could be 30 years later or even more). It should be mentioned here that in Ecuadorian legislation the State has the sovereign right over the underground and

⁷ A considerable portion of the areas that are of strategic relevance for the mining operation is now owned by ECSA. The 'private property' signs densely scattered around in the landscape are concrete manifestations of the company becoming the big landowner in Tundayme.

underground resources, and the exploitation of these resources are regulated through concessions. This can generate conflicts if the holders of the land over the concession refuse to cede their holdings, and in these situations *servidumbre minero* serves to secure access to the copper ore.

In sum, the land-transfer process going on consolidates a necessary and extensive area for the operation of the mine; and a considerable buffer zone: Big-scale extraction requires extensions of land to operate, i.e. to the extraction site, transport and energy infrastructure, processing plants, housing of the workers and adjacent service installations. And since a substantial part (more than half) of the material taken out of the ground is waste, big-scale industrial mining requires land to place different types of waste – tilings and slag heaps (*escombreras*) and the storage basins or containment reservoirs for process water (*relaveras*). The tendency is that this expansion drives farmers off their land without replacing this with permanent or stable wage labour in the mine. Moreover and although this process generates out-migration, not all affected farmers leave the parish; some continue cattle herding in the area, others resettle on and re-cultivate 'lost' land in attempts to regain territory informally.

Water, waste and industrial extraction

Concerning water, processes of accumulation generating livelihood dispossessions are different than when considering land. Livelihood dispossession related to water in the Mirador case is not first and foremost a result of grabbing (cf. Metha et. al. 2012), or processes of privatization or marketization of water (Perrault 2013a, Sosa & Zwartveen 2012, Swyngedouw 2005), issues often focused in Andean water justice literature. Central studies in this current (cf. Arroyo & Boelens 2013, Gaybor 2008, 2013), identify unequal distribution of water resources and the issue of water access the central themes of water injustice. The focus is highly relevant in relation to modern mining, which as Bebbington points out requires “large quantities of water for separating minerals from rock” (2009:15). This demand creates conflicts around scarcity, but less so in a water abundant Amazonian environment. Although access to enough water in the processing and waste handling is crucial to the processing of copper ore also in the Mirador project, water quality is the crucial concern for people’s livelihood and wellbeing in Tundayme. And following Bebbington a bit further in his description of the modern mining process, “by breaking up ground rock into far smaller parts, it increases the speed of naturally occurring chemical reactions that release toxic substances that can then be carried downstream in what is called acid mine drainage”(Bebbington 2009:15) Sacher, a hydrologist commenting on the Mirador project specifically (in a critical analysis of the EIA presented by the company in 2010), holds that “there exists a risk for contamination to surface and subterranean water from heavy metals and other toxic products that might be catastrophic for the ecosystems and the population’s health”. He adds that contamination to water might happen “by the transport of anions such as nitrate, sulphite, ammonium, and by the transport of metals and (metalloids) which can move in acid and basic mediums, such as arsenic, aluminium, iron, magnesium, mercury, lead, nickel, chrome, selenium, molybdenum and uranium.” Since heavy metals are more soluble in acid water, acidification through acid rock / mine drainage increase the

transport of heavy metals. (Sacher 2011:16-17).

Identifying contamination to water as a core problem introduces other dispossessing aspects of accumulation. These aspects are related to the redirection of water to the mine and the mining process cycle. This has to do with accumulation of user and access rights on the behalf of the company – which in the Mirador case comprises of legal dispositions to redesign water flows and to transform water composition by exposing it to ‘subterranean’ substances – rock, tailings and soil. Redesign of water flows is a central topic in the new EIA; in the exploitation phase it is estimated that the Mirador project will need (to industrial processing and domestic use) 166 540 m³/day,⁸ and most of the new water going into the production cycle will be taken from the Quimi-river. Moreover, the new plans include the construction of a new containment reservoir for processed material, located on top of the Tundayme-river, an engineering mega-operation in itself that includes the reduction of the flow in the river to 10% and the redirection of the river.⁹ According to these plans, a new tailings deposit will be constructed on the top of or around the other river, Wawayme. In the lower part of this waste deposit, a drain reservoir will be installed with the storage capacity of 3 150 000 m³.

In a country where the principles of water as a common good and public patrimony are celebrated in the Constitution and the new Water Law, the redirection and redesign of water flows to industrial enterprises as the one under construction in the Cordillera del Cóndor, suggests these changes contribute to a re-configuring of water governance (Sosa & Zwarteveen 2012). Without violating constitutional rights or legal norms related to ‘hydro resources’ (*recursos hídricos*), Ecuadorian authorities facilitate the redirection and redesign of water flows. This is managed through the accumulation of user and access rights in tandem with the establishment of the mine; from the granting of mining concessions (and hence access to underground materials), through exploration and exploitation agreements and approvals of environmental assessment reports and Environmental Management Plans, culminating in the granting of environmental licenses. These user and access rights accumulate, then, over time in favour of the company, and they come together with control and monitoring regimes where data about environmental impacts is managed in reserved ways (more on this further down).

Added to this comes the accumulation of substances carried by water while it circulates, substances that transform the quality of water, and also its effects on the social and natural environment. Redirection of water through a production cycle results in other words in distribution of impacts in down-stream environments. As the mine develops (from exploration phases to extraction phases) the sedimented ‘footprint’ (cf. Perrault 2013a) of the mine expands in the surrounding landscape and waterways. Mining on this scale implies a type of water use that displaces or externalizes the problem it causes (Hornborg 2015) and causes an ‘ecological-distributive’ problem and conflict (cf.

⁸ Of this a major volume (approx. 146 000 m³/day) is considered possible to reuse or recycle, indeed an highly optimistic estimate.

⁹ The Tundayme-river according to these plans will be redirected, through a reservoir and a treatment plant, to the Machinatza-river connecting with the Zamora-river further south in the canton.

Martínez-Alier 2002). As slag heaps and tailings piles grow and containment reservoirs fill up, and concentrations of acids, toxic substances, heavy metals and sediments accumulate, the hydro-social landscape will gradually transform into a wasteland, threatening subsistence and the possibility of inhabiting the zone over time. Contamination as an accumulative process that generates dispossession (through a gradual deterioration of water and soil quality) will speed up when the company does not comply with its management plan or violates the conditions for its environmental licence, and when environmental authorities do not fulfil their monitoring and controlling functions. But, contamination as a process of accumulation by dispossession is also built into the design of the mine and the environmental management plan - that most probably will be approved in November / December this year.

Much of the potential contamination risks are not visible for the Tundayme population at the moment – since the mining is in a late pre-extractive phase and people are far from fully exposed to the consequences of the regular operations of the mine. People are also unaware of the future contamination scenarios because access to the EIA and the environmental management plan is restricted, and because the reading of these documents require specialized technical knowledge. So when the population talk about environmental damage – *daño* – they refer to the first signs of an ecological distributive conflict. This is related to forest cleaning in the area around the future extraction site (*el tajo*), and to the moving of material in relation to the construction of the mining camps with a planned capacity of approx. 3000 persons. This work visualizes a transformation as new open wounds of brownish-red soil shows in the green topography from a long distance. But more important is the dumping of unearthed materials directly into the environment and its waterways, overflowing pastureland downstream and filling Quimi with sediments, changing the river's colour and composition. Relevant is also the fuel used in relation to the perforation work, fluid that with rainfalls filters into mud pools and into streams and other water paths. An unintended landslide caused by the collapse of one of the containment walls of a reservoir for materials should also be mentioned here. Contamination from these sources are irregular and not in accordance with the Environmental Management Plan – but for a long time ECSA or the Ministry of the Environment did not intervene. And when there was an intervention in April this year, there is considerable uncertainty about its outcome. Change is most notable on paper and in public discourse.

A burgeoning local awareness and contestations of contamination grows as the effects of mining activity is now experienced in the environment. And although contamination has been on the agenda of the resistance movement earlier (cf. Cisneros 2011, Espinosa 2012, Latorre Tomás 2012), it is now revitalized through the direct experience of waste handling and the company's and authorities' failure to comply with the Environmental Management Plan. We experienced this incompliance (*incumplimiento*) directly when local cattle farmers took us for a walk through an area inundated by mud-water streaming down from the construction site. Although this is a highly visible impact, Perrault (2013) observes that different from an oil spill, which creates a sudden and violent environmental change, the accumulation of heavy metals and other contaminating

substances from mining activity is slower. It takes time and is therefore less tangible and detectable and hence less easy to confront. Nevertheless, people now experience a substantial change in the river Quimi –what used to be transparent water with a deep mineral ‘taint’, has now become a chocolate coloured sediment saturated fluid.

The changes occurring have made Tundayme inhabitants reflect on future scenarios, and motivated some to engage politically, while others turn to pragmatism or face the situation by resignation. Nevertheless, changes are gradual and impacts will be more strongly felt as the project advances and the metal ore is removed from the ground. This gradual process also influences the way people let their experiences with environmental change inform their everyday lives and political behaviour. Some express expectations to the promise of modernization linked to industrial mining (cf. Ferguson 1999), and others fear the impact this development might have. Tundayme inhabitants associated with the anti-mining movement could be described as popular environmentalists; they ‘turn green’ because the resource base they depend on and the life-ways they have and associate with are threatened. The core of the current resistance group in Tundayme are mestizo cattle farmers or members of land-owning mestizo families. Some of them are returned migrants - from the US and Spain and from urban centres within the country where some have received higher education.¹⁰ Some of the main activists are former employees of the ECSA company, and some also work temporarily for the company in order to access extra wage income. Some of them clearly express that they are not anti-mining or anti-ECSA, but they are fighting for the rights that are their due.

Today popular environmentalists associate with the resistance group, CASCOMI: *Comunidad Amazonica de Acción Social Cordillera del Cóndor*. Earlier this resistance group identified itself as an association – *ASCOMI – Cóndor Mirador*, but now they have been accorded legal status as an indigenous community.¹¹ In spite of turning indigenous, the community has few Shuar members, and the indigenous component is instable. This is not too difficult to understand considering the recent history of colonization, and the colono - Shuar alliance constitutes an interesting and potentially conflictive constellation. CASCOMI is the last formation of a series of shifting local and regional alliances between campesinos, environmentalists and indigenous Shuar groups. This and earlier alliances have in critical moments also linked up with the national anti-mining movement

¹⁰ Since the land now owned by ECSA was basically former colono-land (i.e. land which last owner / user were colonos), it is the land-owning cattle farmers of the Tundayme parish who are most directly affected by the Mirador project.

¹¹ On the 21st August 2014 the Consejo Nacional de Desarrollo de las Nacionalidades y Pueblos del Ecuador, CONDENPE, registered CASCOMI as an indigenous community. This must have been one of CONDENPE’s last acts before it was closed by the sitting government in November 2014. CONDENPE is replaced by a set of new public institutions called Consejos de igualdad (cf. interview with Patricio Trujillo de ECORAE – Quito, 2.3. 2015). According to one observer a representative of one of the Shuar associations in the area facilitated the application to CONDENPE through the regional Amazonian organization, CONFENIAE. Today CASCOMI is a member of the national indigenous organization CONAIE. The ‘community’ has no consolidated territory (it has no formally recognized global title to a certain land area), and recons its members’ individual land properties as a discontinuous territory with ancestral and collective rights. Although the number of members in the community is growing, colonos still constitute the majority of the community.

and with broader social protest agendas.¹² CASCOMI has established a working relationship with the Quito-based human rights organization, INREDH, and the leadership of the organization/ community also has close ties to the current Parish Junta Junta¹³ which is in opposition to the ruling party. CASCOMI also receives more sporadic support from the leader of the provincial GAD - Consejo Provincial of Zamora (Salvador Quishpe, a high profiled opposition politician). Based in a town, Gualaquiza, north of Tundayme, the CASCOMI-leader, Luis Rodrigo, is also linked to the indigenous – environmental anti-mining activist network of the neighbouring province Morona Santiago.

Popular environmentalism and anti-mining resistance associated with CASCOMI are important to take into consideration when we now turn to mobilizations around water-related issues in the Tundayme parish. In the following I will look closer at some of the water-related issues that people in the Tundayme, and specifically popular environmentalists in the parish has brought to the resistance struggle, and point at some of the challenges that these initiatives meet. I will consider three different types of responses, and start with a formal complaint presented by the Parish Junta to the provincial government early this year.

Responses I: Formal-legal processes

As the case has been referred to me by different sources, the complaint was formulated in coordination with CASCOMI and the human-rights organization INREDH, and concerns contamination of the Quimi-river caused by the Mirador project. The sources to this contamination are multiple and include both dumping of material into the water system, insufficient handling of fuel used to operate machinery, run-off from areas stripped of vegetation. Observing these circumstances the claimants hold that the ECSA company has not complied with the Environmental Management Plan, and asks the Environmental Ministry (the MAE – Ministerio del ambiente) at the province level to take action. Under a public hearing in Tundayme in late March this year, the director of MAE confirmed that they had received a complaint from the Junta concerning irregularities related to the Mirador project, and as a result opened an administrative process (proceso administrativo) against the company. Late April MAE informs on their website that they have suspended some activities at the Mirador mine “until they carry out the necessary corrections” (MAE 2015). This communiqué, which has no reference

¹² Several moments and events should be mentioned: The violent confrontation between anti-mining campaigners and the company and military forces in Tundayme in December 2006; La Marcha por el Agua, la Vida y la Dignidad starting in centre of the El Pangui canton in early March 2012 and culminating in mass demonstrations in Quito two weeks later. The so-far last indigenous protest march against the sitting government, La Marcha por la Democracia con Dignidad, started from the parish centre in Tundayme on 4th August this year and reached Quito to join with other social movements in a national strike the 13th August.

¹³ The Junta Parroquial (parish Junta) forms part of the Gobiernos Autonomos Decentralizados – GADs, which are administrative units at the province, municipality and parish levels. The GADs are politically elected which implies that they might be pro-government or in opposition to the sitting government. In the case of Zamora Chinchipe, the province and parish GADs are in opposition to the sitting government, while the municipality GAD is pro-government. Parallel to the GADs the government also carry out its functions in the province through a province gobernación - and provincial ministerial departments.

to the administrative process, states that the environmental authorities have carried out a series of inspections of the Mirador project. As a result they have found that the EIA and the Environmental Management Plan (EMP) has not been followed in various aspects, and the most serious of these are lacking measures that can hinder soil erosion and the rehabilitation of affected slopes, gullies and brooks; and inappropriate handling of different types of waste. MAE asks the company to elaborate a plan for environmental remediation and assures that they will continue their control function in relation to the Mirador project.

MAE's response falls into a larger discourse on responsible waste management supposedly guaranteed through the EIA, the environmental licence and the EMP, and secured through competent authorities control functions. But there are several problems with this discourse. First, there is uncertainty around what the status of the administrative process is. The president of the parish junta view the MAE suspension as a response to other issues at the mine, and not a response to the activity that continuously contribute to the contamination of the river, as emphasized in their complaint. As a result it is highly uncertain that these problems will be dealt with in a proper manner. Second, a growing frustration in Tundayme concerning the company's incompliance with the EMP is related to the environmental authorities' incompliance with their control function. At the time of the public hearing in March, information circulated that ECSA had lost its environmental licence because of incompliance with the EMP.¹⁴ Qualified information also indicated that MAE already had issued fees to the company and sub-contractors, without this improving the situation. According to the president of CASCOMI, nothing had changed after MAE opened the administrative process - contamination to the Quimi-river has worsened rather than improved.

At our last visit to Tundayme in August, neighbours to the mining camp told about how sewage stored in tanks inside the mining area is drained directly into the river, adding new substances to the existing mix. People living in the parish centre and in the indigenous communities down-stream complain that they no longer can bath in the river and children are reported to suffer from skin ailments as result of being in contact with the 'chocolate-coloured' water. They also observe that fish is disappearing, that thick layers of mud shore up on the riverbanks, and that oil shows in the water and trickle up on the sediment surface. These everyday observations, resonates with what better informed persons working within and in relation to the State, public administration and the mining company comment: There is an increased accumulation of contaminating substances in the Quimi-river. Right now the local population express a generalized experience of no return - big-scale mining implies big-scale contamination; what they have seen so far is nothing compared to what lies ahead. Moreover, ECSA is proceeding

¹⁴ We got this information confirmed from two sources; from a representative of a consultancy firm, Cardno, which organized the work with the new EIA (2015); and from a TV-interview with one of the lawyers of the human rights organization, INREDH.

with its pre-extractive preparation work without being noteworthy disturbed - the Mirador project has come to stay.¹⁵

What is the significance of a formal complaint in this situation, why do popular environmentalists with relatively few resources choose this strategy of resistance? There are two important aspects to this strategy to take into consideration. First, it enables a scaling up of the contamination issue through a formal process that requires a response from public authorities. Even if this public response is uncertain, incomplete and practice not in accordance with decisions made and expressed in public discourse, it still establishes contamination as a fact beyond the local context (cf. Yashar 2005). Second, the potential of this case has to do with its link to similar legal-formal cases that run parallel to as well as prior to it. For example, at the public hearing in Tundayme where the province director of MAE talked about the administrative process, the president of CASCOMI intervened and placed MAE's incompliance with the EMP into another legal frame by referring to a report from the Controller General of the State with 17 critical observations concerning the Mirador – project (cf. Controloría General del Estado 2012). The one point from this report that the president mentioned specifically concerned the lack of a free, prior and informed consultation process in this case.

At the public hearing CASCOMI handed over a letter to the public authorities present. The letter (dated 24th March) was directed to the ministers of the environment and mining, and the director of ARCOM (Agencia de Regulación y Control Minero) and signed by the president of CASCOMI, the leaders of three Shuar communities and a Shuar association.¹⁶ It addresses the socialization of the extended EIA of a mining project that directly affects their ancestral territory and collective rights. With reference to ILO 169 and UNDRIP 2008, and to standards established in specific emblematic cases (such as Pueblo Kichwa Sarayaku vs. Ecuador and Pueblo Saramaka vs. Suriname – see Red Amazónica et. al. 2013), the letter points to the State's obligation to carry out a prior consultation with affected communities through their representative institutions. It also emphasizes the indigenous communities' right to participate in the making of decisions concerning matters that might affect their rights and their development. As these rights have not been respected in the Mirador case, the Amazonian communities of Tundayme categorically reject 'the non-consulted extension of the Mirador mining project',¹⁷ and also ask for the halt of all activity until a proper FPIC process has been carried out.

The formal complaint as well as the letter to the mining and environmental authorities are the latest examples of a series of formal processes, including legal court cases and hearings, which based in indigenous collective rights and nature rights principles (established in the Ecuadorian Constitution) address issues related to environmental

¹⁵ It could also be mentioned here that Mirador is the first of several big-scale extractive projects, including hydroelectric plants, planned to be built in the Cordillera del Cóndor, constituting a future mega mining district (cf. Corral 2015)

¹⁶ The communities Yanua Kim, Churuwia and SanCarlos Numpaim, and the Shuar Association Kakaram.

¹⁷ 'la ampliación inconsulta del proyecto Minero Mirador'.

impacts and irregular land transfers in the Mirador project. These cases have been taken forward by popular environmentalist groups in the El Panguí / Tundayme area,¹⁸ in alliance and coordination with national and international human rights and environmentalist organizations, and regional indigenous Amazonian organizations. These includes a case presented to the *Juzgado Constitucional* (the lowest of three levels of the Constitutional Court) concerning unsettled land disputes and prior consultation claims; a hearing at the Provincial Court of Pichincha concerning the violation of nature rights related to big-scale mining in the Cordillera del Cóndor; a public hearing to the Inter-American Commission on Human Rights concerning the situation for the indigenous peoples of Ecuador, with a mention of the Mirador case; and a request for review to Canada's National Contact Point under the OECD Guidelines for Multinational Enterprises concerning damage to persons due to activity carried out by the ECSA company.

Scaling up and accumulating formal-legal cases places local concerns for water justice on a specific pathway. Along this pathway popular environmentalism with a focus on the protection of natural resource bases and the ability to maintain local livelihoods and life-ways, are connected to national and also global environmentalism and universal rights concerns, and specifically to collective, indigenous rights and environmental or nature rights. An observed change should be mentioned concerning this pathway, namely that national (and global) civil society mobilizations tended to connect former local anti-mining resistance to their political agendas and policies, while the direction now tends to be the other way around. The implication of this is that popular environmentalism in Tundayme today manages to make use of broader rights discourses and alliances to support their everyday struggles against livelihood dispossessions. Earlier the tendency was that these struggles were converted into examples supporting and/or illustrating other and non-local political battles.

Responses II: Resistance agriculture

Turning now to a very different set of responses to the threat of livelihood dispossession, I allude to the analytical concept 'guerrilla agriculture', defined by Cavanagh & Benjaminsen as 'illegal food production strategies' (2015:727). Distinct from these authors application of the concept on biodiversity conservation, protected areas and land dispossessions, my main focus here is not on land but water uses and water rights – although it should be acknowledged that land and water are tightly connected, not least concerning farming and herding as 'tactics' of resistance.¹⁹ This also implies that it is necessary to understand the dynamics of land to get a hold on water as an essential resource in livelihood struggles.

¹⁸ For the time being CASCOMI and earlier, Comité de Defensa de la Vida de El Panguí.

¹⁹ Although crucial for the understanding of current livelihood struggles and conflicts and popular environmentalisms in Tundayme, the history of land tenure and land uses is too complex to be included here. In this paper I will only mention some dimensions concerning land that are necessary to understand in order to capture the dynamics of water-related strategies and concerns.

A comment first on the notion of resistance as used by Cavanagh & Benjaminsen to denote covert and overt strategies to counter, contest and manage the conditionality of dominance and oppression. Acknowledging the political agency of rural populations resistance acts, they follow Scott (1985) in delimiting such agency to ‘hidden transcripts’, “to the narratives that subaltern individuals use to interpret their own experience of domination or oppression, to give meaning to their resistance and to frame alternatives” (Cavanagh & Benjaminsen 2015:729). In the Tundayme context subaltern resistance acts of this kind could be observed in local farmers’ relatively frequent harvesting of food crops and cattle herding on land now owned by the mining company. Not all land purchased by ECSA is currently in use, and some will remain part of the mine’s buffer zones, and some of this ‘barren’ land is still in use by their ex-owners, the colono and Shuar rural population. There might be hidden transcripts behind this agricultural activity, i.e. ways farmers take advantage of a historically established principle of the right to use ‘barren’ land, or more conventionally to make use of surplus resources from the new big landowner. What I will focus on here, however, are resistance acts where one can identify an explicit political agenda. These agendas emerge especially in relation to what the company terms ‘unsettled cases’, i.e. cases of land transfer where negotiation is going on concerning the value and conditions for sale, and also in cases where owners refuse to sell and where the State makes use of the legal figure ‘servidumbre minero’ (see above for an explanation of this concept).

There are a series of different circumstances and land use genealogies related to the unsettled cases, and here I will only and briefly describe the most emblematic of these, namely the conflict in San Marcos – the community that disappeared.²⁰ Since the area where San Marcos is (were) located is destined to the construction of one of the mine’s containment reservoirs for process waste, it has been crucial for the company to secure access to this land. This need brought ECSA into a complex land tenure conflict that is still not resolved. A short version of this story is that several colonos obtained individual titles to land in the San Marcos area in the 1980s, and one of these owners donated three has to form a *poblado* – the San Marcos community. Small plots of land (lotes) were offered to people without land, and as people moved in and constructed their houses, a school and a church were built on the communal area. In the latter half of the 2000s middlemen managed to buy the land from the San Marcos owners, including the one that donated the three has. These middlemen resold this land to the ECSA company.²¹ In case of the land including the San Marcos community the parties (the colono owner and the middlemen) agreed orally to not touch the 3 has of ‘communal’ land; this belonged to the San Marcos population and could not be sold. Unsurprisingly, when the land was resold, the company did not respect this oral agreement, and started a process of displacement of the San Marcos population. Some of them accepted the payment offered

²⁰ This short version is based on accounts from a series of colonos in the Tundayme area, and as such I present this conflict from one side. The ECSA version is distinct and based on formal legalistic ‘facts’ related to these land transfers.

²¹ Within the Tundayme population there are various and contested versions of why these farmers were willing to sell their land – spanning from profit oriented motives to the manipulation they were exposed to by agents from the company.

by the company, while others denied it, and concerning these latter unsettled cases public authorities initiated a process of *servidumbre minero*. The process of displacing the San Marcos population culminated in late May 2014 when the company entered the community with bulldozers and armed security guards and pulled down the school and the church – resulting in the disappearance of the community – or its almost total disappearance.

One landowner has refused to sell a land property of three has., and this has now become the centre of the current anti-mining resistance movement in Tundayme. Today the three remaining hectares of land is included in the indigenous community (*Comunidad Amazonica de Acción Social Cordillera del Cóndor* - CASCOMI). To a certain degree the story of San Marcos repeats itself since the owner of the remaining land in San Marcos now dedicate these hectares to a re-settlement initiative: People from the parish centre without land are offered plots on this property, and on a community work basis the land has been cleared and new houses constructed. So far 5 or 6 families have moved into San Marcos. In tandem with this new settlement the San Marcos population is involved in re-cultivating practices. Through a program for cacao cultivation financed by the province GAD (a public administrative entity for the time being governed by the political opposition), the new San Marcos population has received cacao seedlings, technical assistance and tubes to collect water to irrigation. In this case it is significant that cacao is a long cycle crop, the plant needs at least three years to develop the first harvest. Cacao cultivation establishes a deeper time relation to the land in a community that has to disappear if the mining project shall develop according to plans,

Considering the San Marcos conflict and the location of the ‘new’ community, literary under one of the planned containment reservoirs and direct neighbour to a 260m high future dike / containment reservoir, there is no doubt that re-settling and re-cultivating are acts of resistance. They are also understood and talked about as resistance, and they are linked to other undertakings that strengthen bonds to the natural environment. One of these undertakings concerns the protection of water sites. Access to clean water and the protection of water collection sites (*sitios de captación de agua*) are important tasks in this rural environment where only the parish centre is provided with public tubed water. All communities I have visited so far in the parish have their own water sources, and as the rivers are gradually more contaminated the protection of these sources becomes a principal concern. Also San Marcos had/s its own water source, and on one of our visits we were taken to the water reservoir and the collection site along a small stream. Here we were told about the construction of the community water system back in the 1980s, based partly on communal work and partly supported through financial and technical assistance by a NGO.

An interesting information here is that we had to walk through ECSA property to access this site. San Marcos water source is disconnected from the remaining San Marcos community, but the collection site, the water collecting facilities and the tubes are maintained and cared for. And as part of securing and protecting this water source the president of CASCOMI has initiated a process with the public water authorities,

SENAGUA, to apply for the water concessions of this area. Given the current conflict in San Marcos the predictability of obtaining these rights are relatively low, but this initiative is still an interesting example of a local strategy to construct a territory of resistance by connecting to, protecting and caring for essential natural resources. The importance of water is crucial in this respect. This became even more evident after our last conversation with the technician at the Parish Junta in August where he mentioned a proposal to establish an ecological corridor in extension from an area reserved for conservation. The water concessions solicited overlap with this proposed conservation area, which is included in the draft version of a new development plan for the parish – a Plan de Desarrollo y Ordenamiento Territorial – PDOT.

The PDOT is a public territorial planning instrument that is defined and also regulated by the State planning institution, SENPLADES. PDOTs are developed on all three levels of public administration – parish, municipality and province and are a type of baseline studies that define natural resource situations, economic development potentials and risks of resource depletion. Each new administration on these three levels writes a new PDOT, and to the work with the last version in Tundayme the Parish Junta made use of a mechanism called ‘participatory diagnosis’. Through a series of workshops in Tundayme’s communities, people locally were invited to take active part in defining the problems, needs and potentials of the parish. Although not regular or formally intended, during these workshops the CASCOMI leadership participated actively and had a strong influence on the workshop dynamics and hence also on the definition of needs and problems. The product coming out of this process has to follow a standard format but it can, as in this case, also open for political uses of a public planning instrument by a civil society actor with specific stakes in local environmental politics. The proposed ecological corridor must be understood as a result of this political use.²²

Returning now to the analytical concept ‘guerrilla agriculture’ related to ‘water concerns and micro-politics’, and considering the pathway that these local struggles against livelihood dispossession take, it is interesting to focus on the rural population’s political agency. The most striking characteristic of this agency is the way community based agricultural and water-related resistance acts are connected to public cultivation schemes, public instruments for participatory planning and formal user rights (water concessions) in order to strengthen and give legitimacy to their cause. This requires a considerable collaboration with public institutions on different levels – and interestingly the access to these institutions seem to hinge on the possibility of creating some core alliances – in this case to two levels of the GAD system – the Parish Junta and the Provincial GAD (the Consejo Provincial). Both these levels of public administration are in the current situation governed by the political opposition, and this is also the weakness of this pathway. Without the close connection between the Parish Junta leadership and the local rural association/community, and without the political commitment of the prefect of the

²² Another result of CASCOMI’s active influence on this process is the establishment of a strong correlation between contamination threats and big-scale mining activity in the parish.

Province GAD,²³ the actions taken locally to protect land, essential natural resources and territories, and to defend a specific cattle herding way of life, most probably would have been dismissed by the authorities as irregular and illegal activity.

Much has been said and written about the shrinking of spaces of participation generated by civil society due to the interventionist politics of the Rafael Correa-governments (cf. f.ex. Falletti & Riofrancos 2014, Ortiz Lemos 2013). Less attention is given to the invited spaces of participation (cf. Cornwall 2004) that the current regime introduces in order to build a civic state, through a so-called ‘civic revolution’ (*revolución ciudadana*). The critics rightfully view this dimension of a State-building project as a major effort to control and condition different sectors of civil society’s participation in policy making and political influence work – creating through this a ‘participatory tyranny’ (cf. Cooke & Kothari 2001) many retract from. Too little attention, however, is given to the potential that invited spaces of participation also provide for alternative political uses. In an interview with one of the leading actors in the first generation of environmentalists in Ecuador, Arturo Jiménez²⁴ pointed at an unused potential in the continuously growing number of participatory mechanisms, instruments and institutions implemented by the State. Actions and initiatives described above provide an example of how people make use of this potential. A crucial precondition, however, is the institutional alliances that civil society actors manage to create around specific projects of livelihood – such as the struggle for water sources and water sites as part of a broader effort to protect natural resource bases and achieve territorial rights.

Responses III: Participatory water monitoring

The last kind of responses considered here, concern initiatives to democratize the production of scientific knowledge about water quality and ecosystem ‘health’. These are intents to create alternatives to ‘corporate science’ (Kirsch 2014), i.e. to the production, use and control of scientific knowledge about the environment by corporate interests, in this case the mining company, through its sub-contractors (consultancy firms, universities, applied research institutions, laboratories) and State authorities (the ministries of mining and the environment, ARCOM and SENAGUA). A considerable scientific knowledge production is taking place in the Cordillera del Cóndor concerning the environment directly affected by the Mirador project. In relation to the work with the Environmental Impact Assessment reports (three reports have been produced so far, in 2006, 2010 and 2015), a series of studies are undertaken in order to document different dimensions of the natural milieu intervened by the copper mining project. These studies span biodiversity, geological, hydrological conditions, soil and mineral, and climate conditions, among other dimensions. The Ministry of the Environment and the national water authorities, SENAGUA, are responsible for following up the monitoring of environmental impacts, and they carry out regular inspections, and write reports and recommendations concerning the daily mining activity. These authorities have a specific

²³ Salvador Quishpe.

²⁴ Leader of the environmental conservation NGO, Arcoiris, and one of the leading activists establishing the one of the first national parks in Ecuador, the Podocarpus biological reserve.

responsibility to control that the company comply with the environmental licence and follow up the Environmental Management Plan.

Also independent actors carry out environmental impact assessments and assist in evaluations of mining activities. In relation to the Mirador project, an US-based organization providing environmental technical support to communities on the potential environmental impacts of large development projects, E-TECH, has carried out independent evaluations of potential water quality impacts from the project in Tundayme, on the behalf of a Shuar federation and the prefect of the province GAD (E-TECH 2015). Another independent actor is the Observatory for Socio-Environmental Conflicts at the Technical University of Loja (OBSA-UTPL), my research partner in the Extracting Justice project. AS part of a project monitoring environmental conflicts, a research team from OBSA-UTPL has taken initiative to form 'ecological clubs' in the canton of El Panguí. The objective with the clubs is to involve people locally in the monitoring of water (and more broadly ecosystem) quality, and in this way provide people with their own participative instruments for environmental impact assessment.

Generally, two types of methods are currently in use to measure water quality in this area. One consists of tests of physical-chemical properties based on water samples and laboratory measurements. The other is a method employing different kinds of bio-indicators. The first is a fairly expensive method that requires specialists and advanced instruments in the whole process of taking samples and measuring components (including toxic substances) carried out in laboratories. The second method, however, is inexpensive and requires simple measurement technology and could easily be taught to lay persons although the analysis of the samples needs guidance and assistance of a specialist (an entomologist). Methods employing bio-indicators evaluate water (and soil) quality on the basis of different insect species adaptation capacities and their sensitivities to change in the ecosystems they inhabit. The OBSA-UTPL research team work with benthic macro-invertebrates (*macroinvertebrados bentónicos*) and dung beetles (*escarabajos coprófagos*). Based on accumulated knowledge about insects, their responses to microenvironments and their inter-relationships, one can within broad quality categories determine (with a high degree of certainty) the condition of a given environment as well as monitor changes. Guides (or keys) developed to evaluate the composition of insects in samples help determine quality based on their relative frequencies.

Both laboratory-based water measurements and bio-indicators are methods employed by public authorities and the company, but the latter method is now also introduced to the people of Tundayme through OBSA-UTPL's ecological clubs. So far the ecological clubs have had moderate success. Several rounds of socialization of the project and sessions disseminating the methods in the El Panguí canton have resulted in the establishment of two clubs, one outside the area of direct influence of the mine (in the Pachikutza parish) and one inside this area (in the Shuar community San Carlos Numpaim). There are several obstacles to the implementation of community based monitoring, and one of them has to do with how relevant people perceive this method to be. Awareness about how corporate science works varies in the local population. In one end of the scale we

talked to community leaders who were tired of specialists visiting them and telling them what they already know - that the river is contaminated. In the other end of the scale there are activists who realize that they have to do a job on scientific knowledge production in order to establish this 'fact'. Moreover, there is also doubt about the bio-indicators as tools in the resistance struggle: What counts as sufficient scientific evidence? Would bio-indicators be likely to be challenged, by the company, in a court case? Tied to this are the issues of time consume and continuity. Although the bio-indicator methods are relatively inexpensive they are time consuming, and also require systematic work over long time and continuity in the production of results. Should community based monitoring succeed to challenge corporate science, it has to be able to establish facts about environmental change. This requires stability in monitoring teams that might be difficult to establish on the ground of voluntary community work alone.

Added to this are people's perceptions and sensibilities to contaminated substances. Contamination is not a new phenomenon in Tundayme. In relation to the elaboration of the new Master plan for water and sanitation for the parish, the municipality in coordination with the Parish Junta carried out physical-chemical tests in the drainage area that provide the parish with water. These tests show high concentrations of arsenic and magnesium, a result confirmed by a base-line study carried out by the OBSA research team (cf. UTPL 2015). In a conversation we had with the environmental engineer of the municipality we asked why these concentrations are high. The engineer related this to artisanal mining-activity 20 years back in time, and explained that these substances tend to accumulate in certain sites in the hydro-landscape where circulation is slow, creating 'magazines' that gradually transpire arsenic and magnesium into running water. The observation illustrates the distinction between visible and invisible sources; the sediments show, chemical substances and heavy metals do not. Nevertheless, the sources of contamination to water in Tundayme are multiple²⁵ and contaminating sources are not easy to separate from each other. Moreover, there has not been established scientific proof concerning the health effects people now experience and relations to specific contaminants in the Quimi-river. Faced with this complexity, that certainly creates ambiguity and uncertainty, what can work with bio-indicators in the ecological clubs establish as scientific facts about environmental impacts caused by the Mirador project?

This issue is crucial because access to systematic data produced by the State institutions that are responsible for monitoring and controlling big-scale mining activity, is restricted. The periodic inspections and the reports elaborated on the basis of these are reserved basically for internal use. In spite of the image of confidence that the authorities want to create around their own inspection of environmental impacts, the Ministry of the Environment, as one Shuar leader commented, protects the ECSA company. This does not imply that inspection reports are not produced, actions (such as fees and suspension of activities) not taken and follow-up plans not asked for, but it does mean that this universe of data and practice is difficult to access for people outside a relatively restricted

²⁵ Exposure of solid waste to water from grazing cattle and incomplete sewage and garbage handling are other sources that contribute to diversify the contaminated composition of river water.

State – company network. It is difficult if not totally impossible to know what kind of methods, monitoring instruments and databases that authorities employ to assess environmental impacts. It is equally difficult to evaluate to what degree responsible authorities comply with their control functions, and to what degree their findings influence decisions concerning the granting of the environmental licence and the continued operation of the mining project. Similarly, the substantial data production carried out in the elaboration of Environmental Impact Assessment reports form part of a universe of authoritative scientific knowledge with restricted access. Ironically, people locally participate in the making of these assessment reports, as informants, guides and native experts providing information about flora, fauna, land tenure, topography, demography and local natural and social history, among other topics. The majority of those that contribute never get to know the complexity of these reports, as their main access to the EIAs is through information sharing events, ‘socializations’, that are designed according to the logics, needs and interests of the mining industry and the State’s strategic extractive policies.

Access to authoritative scientific knowledge about the Mirador project is restricted for many types of actors – for researchers studying this case, for public functionaries working in the municipality and parish administrations, for activists on the ground in the area of direct influence and for people inhabiting places as San Marcos, San Carlos Numpaim or the parish centre of Tundayme. As a consequence it becomes difficult for “independent observers to accurately predict the environmental impacts of mining projects, assess the damage that occurs, evaluate the alternatives, and determine whether or not the impacts can be remediated” (Kirsch 2014:155). These conditions calls for participatory monitoring carried out in coordination with independent research institutions. Participatory monitoring is a possible pathway for water justice with a potential not yet fully explored. To set up a participatory monitoring system is a demanding task requiring capacitation, continuity, and considerable mutual interest in overcoming differences between rural, ecological and scientific, hydrological worldviews. The potential on the other side is considerable; it is not just that affected people can get involved in the production of data in this way, it opens new possibilities for the political use of open data bases on the environmental impacts people live by. Additionally, the work in ecological clubs or in participatory monitoring teams link local people to alternative institutional networks, where information about environmental damage can travel via academic and technical milieus to spaces of public opinion and political-legal decision-making. The hope, then, is that alliances between independent and critical observers of the Mirador project can join forces in efforts to gain control over what Kirsch describes as a counter-‘politics of time’; “new strategies employed by the critics of the mining industry, who increasingly focus their protests earlier in the production cycle, with the aim of preventing harm from occurring rather than addressing it after the fact” (Kirsch 2014:158).

Some preliminary final reflections

The three pathways viewed together, scaling up and diversifying formal-legal claims, connecting resistance agriculture to formal participatory mechanisms, and democratizing

scientific knowledge production about environmental impacts, constitute a basis for water struggles. The cases discussed show how rural people confronted with industrial mining and the prospects of seeing their natural environment turn into a wasteland, can mobilize against processes of dispossession. The cases indicate that a relative strength of popular environmentalism rests on the multiplication of tactics and strategies and moreover on rural people and communities' political understanding of the importance of spreading out the possibilities for resistance. Also in a reverse sense it is wise 'not to put all the eggs in the same basket' (not in the sense of braking the eggs but in the sense of producing different types of "resistance chickens"). An effect of multiplying possibilities is that more complex connections generate, within social and institutional networks, over levels and scales, between formal and informal practices, and over rural, public and civil society boundaries.

At the same time, the last of these three pathways is probably the one where the modalities of mining capitalism have the hardest and most powerful effects. This has to do with the way extractive industry (and corporations more generally) see scientific authority as a political resource in their relationship with their critics (cf. Kirsch 2014). Scientific authority is obtained through a series of mechanisms or corporate tactics. Restricted access to the information about the mine as a production system and the impacts of this production is central. A deliberate construction of uncertainty around the functioning of the mine, its infrastructure, transport network and energy-supply, contribute to obscure the view one can have of a project as Mirador from the outside. Likewise does the company's underestimating of risks, and the control over the methods and instruments used to monitor and evaluate impacts and damage serve to protect the company from critique and claims. And when damage is evident, the politics of delaying responses help downsize or trivialize the consequences. The mere existence of an EIA, a management or remediation plan is taken as evidence of action and factual remediation. An observation made by Kirsch and others is that these, and other mechanisms, often hinder the forecasting of 'slow-motion environmental disasters' (2014:133, cf. also Perrault 2013b). Corporate science reports poorly about its own consequences and its actual relationship with the natural and human environment it intervenes in.

As a basis for legal claims and contestations, access to scientific verification of and public recognition of knowledge about contamination is a crucial yet scarce resource of resistance. A characteristic of this resource is that it enters into another struggle for control – between the State, the company and popular environmentalists. The claim to authoritative versions is fought between specialists enclosing scientific knowledge within certain relations of power and decision-making processes, and specialist – activist alliances intending to articulate this knowledge in alternative spaces and channels of influence. This is indeed a very unequal struggle, especially in frontier zones and within sectors where public authorities side with corporate interests as part of their proper strategic political dispositions. Another aspect of inequality which is crucial, and which I can only briefly mention here in the last paragraph, concerns the regimes and strategies of compensations – practices of redistribution, social investment and community development - that both the State and the company make use of in order to negotiate the

presence of this kind of modernity and corporate expansion. Faced with the offers of f.ex. technical and financial assistance for the building of pisciculture installations (and promises of access to an internal fish market within the mining camp); a new bridge over the river and improved infrastructure for the transport of agriculture produce to local markets; or an improved health centre in the parish; colonos and indigenous Shuar alike readjust their responses. And this unequal exchange dynamics change the conditions of possibility on which water struggles are fought.

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