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The global uranium rush and its Africa frontier Lessons from Namibia

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ABSTRACT

Uranium mines are the - often forgotten - source of nuclear power. The promotion of nuclear energy as a clean alternative and the projected increase of electricity demand in countries such as China and India, have led to a global "uranium rush", unseen since the peak of the Cold War. This article studies the formation of the expanding nuclear frontier looking at the interaction between the global uranium metabolism, industrial dynamics and local ecologies of resistance using Namibia as a case-study. Namibia, the world´s fourth largest producer of uranium, stands at the frontier of this rush with sixty-six recently granted prospecting licenses that could turn into mines, compared to only three currently operating mines. We focus on three generic attributes that help to explain the emergence and intensity of resistance by local communities to uranium mining: the ecology and geography of the resource; the degree and type of political and economic marginalization of the community; and crucially, the connection and integration of local concerns with broader social movements and political demands. We show with the use of empirical material how these factors play out differently in five Namibian communities that have been, or stand to be, affected by uranium mining, and explain how local ecologies of resistance shape the global uranium rush.

Keywords: Uranium; nuclear power; mining; social movements; Africa.

1. Introduction

In April 2011, the PEW and other U.S. environmental groups denounced the threat for America's most important natural heritage sites from the pending decision by the Obama administration on whether to extend the two-year respite on the thousands of mining claims, many in search of uranium, surrounding the Grand Canyon, Mount Rushmore, Joshua Tree and the Yosemite national parks. More than 2,900 claims wait in Grand Canyon alone (PEW, 2011). One year earlier in the town of Arlit in the Sahara desert of Niger, seven employees of the French construction company Vinci and the French nuclear energy firm Areva were kidnapped by Al-Qaida (BBC, 16 September 2010) leading to a temporary stop of construction in the mega uranium mine at Imouraren. An anxious Minister of Mines and Energy assured the international community that Niger will "maintain output and not be discouraged by these dramatic events" (The Guardian, 15 October 2010). What connects such disparate events in distant - geographically and socio-economically - parts of the world is the emergent global "uranium rush" (MME, 2010; PEW,2011). This is the subject of this article.

Uranium mining is the forgotten first step in the production chain of nuclear power. Its effects on health and biodiversity are not as grave as those of leakage from a failed nuclear reactor, but they too can be dramatic (Brugge, 2005; IEER, 2006; ECRR, 2003, Kuletz, 1998). Given the low concentration of uranium in natural ore, considerable quantities of residues are produced during extraction and processing, including heavy metals and radioactive decayed elements. Such residues, contained in ponds or dams nearby the mill, can leach to underground and surface water sources. Or worse they can escape to the environment if dams break, as it happened in New Mexico in 1979 when over 1,000tn of radioactive mill waste were released into the Puerco River, a radiation release greater than the Three Mile Island disaster (Kuletz, 1998). Most of the radiation emitted typically in a mining site is considered 'low level radiation' (<100mSv). Regarded as harmless or even beneficial by some scientists (Sanders, 2009), others such as the International Commission for Radiological Protection (ICRP), which sets the radiological limits adopted by the International Atomic energy agency (IAEA) contends that "it is scientifically plausible to assume that the incidence of cancer or hereditary disorders will rise in direct proportion to an increase in the equivalent dose in the relevant organs and tissues, below about 100 mSv" (Wrixon, 2008). And the National Research Council in the US (IEER, 2007) reminds that while low doses may mean less cancers, "it is unlikely that there is a threshold below which cancers are not induced". External radiation (alpha, beta and gamma) as well as internal radiation received through radon gas, dust and water constitute major hazards in uranium mines. Many epidemiological studies have been carried out, among others for the Navajo population in the U.S. and ex-workers of the Wismut mine in Germany that operated until 1990 and demonstrate links between exposure and high levels of diseases such as bronchial and lung cancer (see among others, Gilliland et al., 2000 and studies by the Southwest Research Information Centre for the US and Kreuzer et al., 2011 for Germany).

Social reaction and stricter environmental regulation of uranium mining in countries such as Australia or the U.S., has shifted mining activities to poorer countries with less

restrictive legislation (Otto, 1998; Campbell, 2009; MMSD, 2002). In the context of a pre-Fukushima global "boom" in uranium prospecting driven by the emergence of nuclear power as the energy option of choice, Africa quickly became a global uranium frontier (Financial Times, 1 May 2009, OECD,2009). Namibia is the world´s fourth largest producer of uranium, accounting for 9% of global supply and about 5% of estimated global reserves (WNA 2010; 2011b). Since 2005, 66 exploration licenses have been granted and 5 new mines are in the process of opening (MME, 2010). The purpose of this article is to understand how global patterns and local – natural and social – ecologies combine to shape the expansion of the uranium frontier, learning from the concrete empirical reality of Namibia. Our aim is analytical; leaving aside the normative question of whether, or under what conditions, uranium mining may be desirable or damaging, we focus on explaining a contemporary socio-environmental phenomenon, i.e. uranium rush, and the territorial forms it takes.

Our research is positioned within a growing literature at the interface of ecological economics and political ecology, concerned with the expansion of the global social metabolism of material and energy flows and the impacts and reactions this creates in territories and communities at so-called extraction, or "commodity frontiers" (Moore, 2010). Particular attention has been paid on the emergence and role of social-environmental movements that defend local livelihood against far-destined exploitation (Martinez-Alier, 2003). Unlike the sociology of social movements, which aims to explain the factors determining successful collective action, political ecology focuses on the interplay between social and environmental conditions at multiple scales and how this results in different forms of livelihood environmentalism (Urkidi, 2010; Gerber, 2011).

Movements, markets, corporations and governments co-shape the territory. Social resistance cannot be taken for granted, and in many cases, including Namibia, reaction is conspicuously absent. Understanding when, why and how resistance emerges is crucial for envisaging the shape and implications of commodity frontiers. Drawing from political ecology, we use three entry-points to explain resistance (see also Bebbington et al., 2008). The first concerns the particular "spatial ecology" of the mining resource at stake and the surrounding human and livelihood resource landscape. This includes factors such as the form and nature of impacts (visible vs. non-visible, immediate vs. slow-onset, future risk vs. acute health impact) and the location of the mine with respect to settlements and alternative livelihood resource uses that may be affected by mining activities. We hypothesize that the more direct, visible and immediate the impacts on health or livelihoods are, the more likely mobilization is. The second category concerns the marginalization of the community affected and its relationship with the territory (Robbins, 2004). On the one extreme one finds politically disenfranchised communities that are 'too poor to be green' (Guha and Martinez Alier, 1997) and on the other, strong, politically organized communities with broader historical-political demands. Attachment to the place and the existence of a material or symbolic economy relying on local resources are important variables in this respect. The third category concerns connections between locals and historical or extra-local social movements. National or international NGOs play an important role in bringing knowledge to the local level, making connections to movements elsewhere, mobilizing extra-local resources for local action, and acting at different scales of the metabolism (Urkidi, 2010; Escobar, 2001).

We use five case-studies of mining projects in Namibia to enrich understandings of how different communities respond to uranium mining; we do not seek generalised causation, but in-depth understanding. The communities examined represent the different socio-economic and historical uranium mining landscapes that are emerging in Namibia. This research has been developed in a period of two years, including participation in meetings, discussion lists, exchange of information with NGOs and other researchers. The main part of empirical research was carried out during three months of field stay in Namibia (May-July 2009). Conde Puigmal visited the capital Windhoek, and the communities analysed in this article conducting 155 semi structured interviews and 2 informal focus groups with different stakeholders such as mine and government representatives, union members, consultants to the mining industry and journalists. Interviews with policy makers and corporations discussed the regulatory framework, the monitoring of impacts and technical aspects of mining planning and regulation. Interviews and focus groups with individuals and workers from the affected communities focused on livelihoods, perceptions and knowledge of the mining industry and reactions. Some interviewees wish to remain anonymous so interviews have been numbered for reference. Email contact has been maintained since with several members of NGOs, mining industry, journalists and government representatives for subsequent research questions.

Section 2 analyses the changing and growing global uranium metabolism, focussing on production, consumption and market patterns and explaining how these interact with socio-regulatory forces that shift the frontier to Africa. Section 3 presents the empirical research. First, we explain the geographical and political-economic context of Namibia and the governance vacuum that is taken advantage by the uranium mining industry. Next, we document the history of the most emblematic uranium mining community in Namibia, developed by Rio Tinto at the end of the seventies and being to this day one of the world's largest uranium mines. Next, we move to the recent rush and analyse the plans for four new uranium mines in different geo-political settings, presenting the perceptions and reactions of the communities that stand to be affected. Section 4 pulls together the various threads, global and local, historical and contemporary, of this research to assess and theorise on the uranium frontier.

2. The global metabolism of uranium

2.1 The commodity chain

The global metabolism of a material resource can be conceptualized in terms of a commodity chain starting with resource and extraction and ending up with consumption and disposal. U235, the isotope required for the production of a fission chain reaction, makes less than 1% of natural uranium (IAEA, 2009). The first step for obtaining U235 is the mining of economically viable ores. Traditionally this has been done with either open-pits or under-ground mines. The ore extracted is crushed, ground and leached with sulphuric acid, undergoing a process of ion exchange before being dried at high temperatures to obtain yellow cake powder that is finally packed in steel drums. This process is generally done in a uranium mill. Uranium oxide (yellow cake) is then

transported via truck, trains and boats to a processing facility, where it is transformed into Uranium Hexafluoride and enriched to increase the proportion of U235 (generally from 0,71 to 3-4%). It is then turned into a hard ceramic oxide (UO2) for assembly into rods specifically designed for each type of reactor. The rest of the yellow cake, mostly U238 is considered depleted uranium, and can be used with reprocessed plutonium (extracted from nuclear waste) to produce MOX, which is an alternative nuclear fuel. Enrichment facilities are only found in 11 countries (Iran being the latest addition) as countries are discouraged from developing them to avoid nuclear military proliferation. Uranium fuel rods are then transported to the various nuclear power plants (WNA, 2011a; IAEA, 2009).

The consumption and production of a resource coevolve, regulated by market forces and propelled by capital flows and the actions of corporations and investors. For the remaining of this section we look in turn at the interdependent demand, production and market forces of the uranium chain.

2.2 Demand patterns

Figure1 shows the evolution of uranium consumption and the shift from military to civilian (electricity) uses. The global distribution of uranium consumption largely corresponds to nuclear energy production, with the US being the largest consumer with 104 reactors, followed by France with 58 reactors and Japan with 54 reactors operating before the Fukushima events (WNA, 2011c).

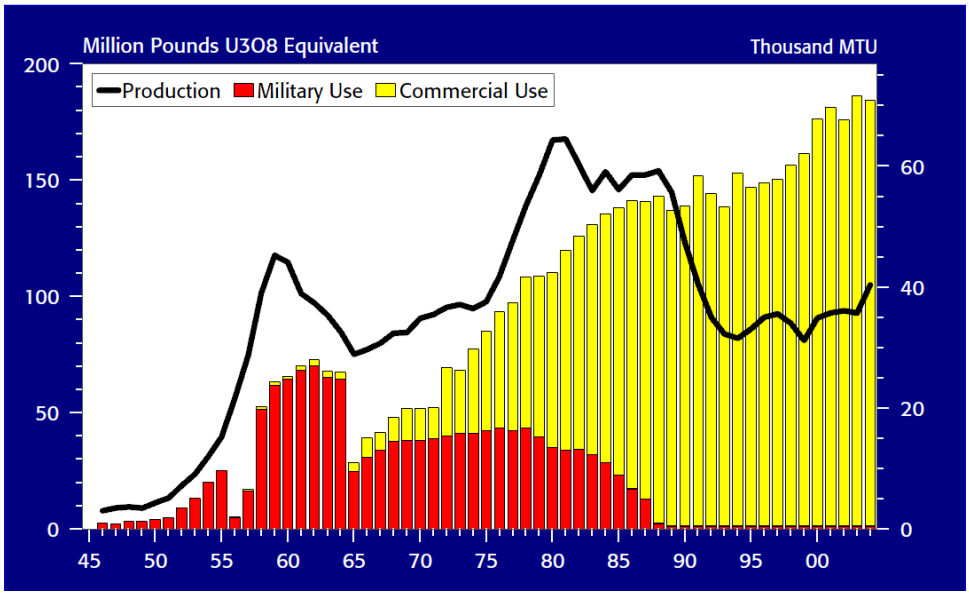


Figure 1. Production of uranium from uranium mines. Source: Klingbiel (2005)

The uranium metabolism today is driven by an inexorably growing demand for electricity, expected to increase at an annual rate of 2.2% to 2035. Most of this demand is expected to come from Asian countries such as China and India (IEA, 2010). Rising electricity demands coupled with international commitments to mitigate carbon emissions and climate change have been taken up by the nuclear lobby, which has successfully remarketed nuclear energy as a 'clean' alternative (Combs, 2010;

OECD/NEA, 2009; IEA, 2010). Nuclear energy is benefiting from the price rise, the possible "peak" of other energy sources such as oil and gas (OECD, 2009) and the geo-political instability in Northern Africa and the Middle East. Prominent advisory groups such as the OECD and the International Energy Agency see nuclear energy (together with renewables) as an essential component of future energy portfolios (IEA 2010; OECD, 2009). In his 2010 State of the Union address President Obama called for "a new generation of safe, clean nuclear plants" (CRS, 2010), while many environmentalists, such as James Lovelock or Guardian journalist George Monbiot have joined the chorus.

With 57 new reactors under construction and 210 more on order or planned (WNA, 2011c) an estimated 44 countries intended before Fukushima to introduce new nuclear power networks or expand existing ones in the foreseeable future. The Nuclear Energy Agency (an OECD organ) predicted an increase by a factor of 1.5 to 3.8 by 2050 from 441 units in operation today (OECD/NEA, 2008). The Fukushima events have altered the nuclear energy expansion, with Germany being the first country to halt construction of new nuclear plants. Other countries also encountering ageing reactor fleets such as the UK, US and even France could also meet civil opposition. However, financial difficulties and lengthy approval and construction processes are the main underlying causes deterring the renaissance in these countries (The Economist, 14 October 2010 & 30 March 2011; Bradford, 2010). Russia, China, South Korea and India stand at the forefront of the 'nuclear renaissance' (WNA, 2011c) and although the Fukushima event might slow down the rate of construction of new plants, their main focus will be on improved nuclear security.

This nuclear renaissance translated in increased uranium exploration efforts which soared between 2003 and 2009, with 400 junior companies forming or changing their orientation to raise US$ 2 billion for uranium exploration (WNA, 2010). Global uranium consumption was predicted in 2010 to increase 33% by 2020 and 54% by 2030 (MEG, 2010).

2.3 Production

Some 53,663 tons of uranium were produced globally in 2010 from uranium mines accounting for 78% of global consumption. Secondary sources such as civil stockpiles, decommissioned nuclear weapons, reprocessed natural and enriched uranium and re-enriched depleted uranium tails, account for the remaining 22%. Kazakhstan is presently the leading producer of mined uranium (33%), followed by Canada (18%), Australia (11%) and Namibia (8%) (WNA, 2011b). Figure 2 shows the distribution of total mine production and reserves between different countries. Production is very concentrated: the largest 5 uranium mines in the world - McArthur River in Canada, Ranger and Olympic Dam in Australia, Rössing in Namibia and Kraznokamensk in Kazakhstan - account for 43% of world uranium production (WNA,2011b). Reserves are also concentrated, from the roughly 5.4M tU of identified resources (those costing less than US$130/kgU to extract) in 2010, Australia, Kazakhstan and Canada hold 51% of reserves (OECD, 2009).

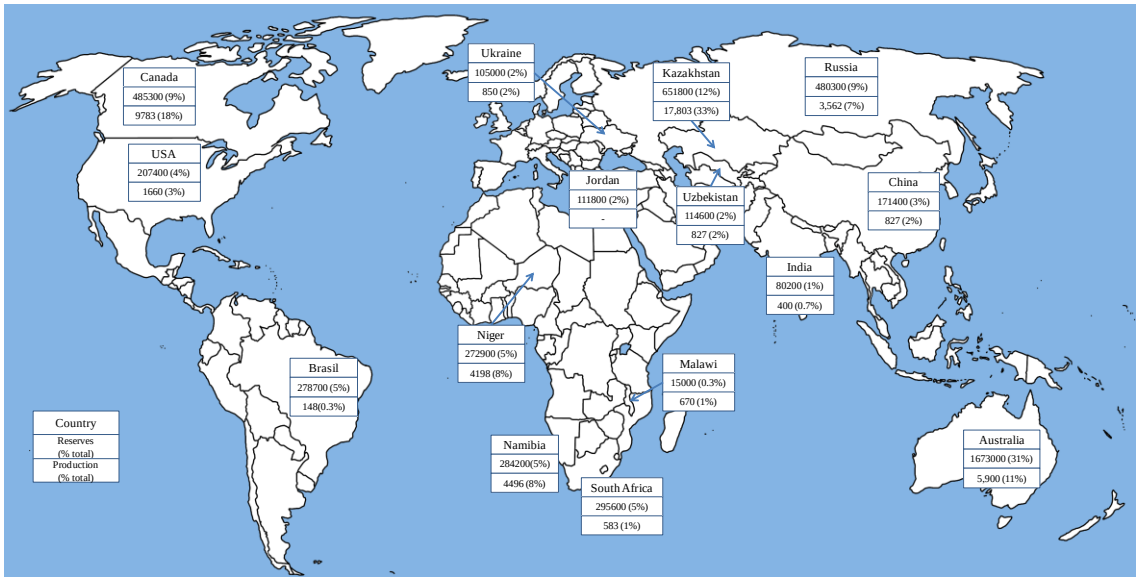


Figure 2. Major uranium producers and major world reserves of uranium (cost of extraction at less than US$130/kgU). Source: WNA 2011b; OECD, 2009

Countries such as Canada and Australia not only have more identified reserves than Africa, but also their resources are of a much better quality and economically less costly to extract. Uranium concentration in the ores generally varies between 0.1 to 0.5 per cent (IAEA, 2009), with high concentrations (average 1.1%) found in Canada at the rich Athabasca basin (Mudd and Diesendorf, 2008), compared with the lower range of concentrations as low as 0.01% ores found in Namibia's deposits (WNA, 2010). Such ores require the use of more water and energy (Mudd and Diesendorf, 2008) and the use of alternative techniques such as heap leaching, where sulphuric acid is sprayed over piled-up-crushed ore and the solution with uranium oxide is collected below. This allows a more economic extraction of uranium from lower grade ores (IAEA, 2005) however its environmental impact is bigger as the piles not only take up more land but also create a bigger hazard releasing dust, radon gas and leaching liquid seepage (wise uranium, 2010) . The method that is becoming most dominant is In Situ-Leaching (ISL), which injects sulphuric acid solutions into underground deposits to dissolve uranium, which is then pumped up and processed in the mill. This technique avoids the creation of open-pits, but there is a risk of contaminating groundwater (Mudd, 2001).

There is a notable shift in investment in new mines from countries in the "developed" world, such as Australia and Canada, to Kazakhstan and Africa, despite the fact that the former hold the most of the high quality reserves (E&MJ, 2006, 2009; MEG, 2010, Combs, 2010; Financial Time 1 May 2009). Australia, which holds 23% of known recoverable uranium reserves followed since 1984 a "Three Mines only Policy", in effect a moratorium on all new developments (Panter, 1991). Moratoria to uranium mining in Australia was accompanied by a strong anti-nuclear and aboriginal movement demanding land rights (Adamson, 1999). Although legislation in countries such as Canada or Australia is not necessarily prohibitive, environmental regulation and compliance is much tougher than in other parts of the world. It is the combination with effective social resistance and lengthy legal challenges that can slow down considerably the opening of a mine, and make investments in Africa advantageous. As noted by John

Borshoff (head of a uranium mining company called Paladin Energy Ltd): "Australia and Canada have become overly sophisticated. (..) there has been a sort of overcompensation in terms of thinking about environmental issues, social issues, way beyond what is necessary to achieve good practice" (abc, 2 April 2006). As a result, several Australian mining companies such as Paladin have all their uranium production in places like Namibia and Malawi (OECD,2009; RCR,2011). Of the 31 mines that were planned to be opened[1] from 2009 to 2012 only 5 where located in Australia, US and Canada (OECD, 2009). 34 countries in Africa have already handed exploration licenses (wise uranium, 2011) with Niger issuing more than 100 exploration permits in the last 2 years while Botswana issuing 138 (MME, 2010). During the period 2009–2012, in Niger, Namibia, Malawi and South Africa, uranium production is expected to increase 118% (Kate and Wilde-Ramsing, 2011).

2.4 Industry and the market

The uranium mining industry is heavily concentrated, ten companies marketing in 2010 87% of the world's uranium production. The French giant Areva, the Canadian Cameco, Anglo-Australian Rio Tinto, and KazAtomProm the Kazakhstan state company (WNA, 2011b) are the main players in this 'cartel-type' industry These corporate players are rooted in the major consuming countries (France, Russia, USA) or in developed countries such as Australia and Canada with considerable reserves who served much of the early demand (Amundson, 2002; Combs, 2010; OCDE, 2007). Some of these companies, are active in the whole uranium commodity chain, like Areva, the French state nuclear giant, and Rosatom from Russia who are major players in both mining, enrichment and nuclear plant construction and operation.

While all mining commodities are susceptible to market fluctuations and concomitant booms and busts in production and investment, uranium has the exceptional feature of a very constrained range of uses and users. This makes it stable in the short-term, and extremely unstable in the longer-term. Unlike gold for example, whose prices depend on a variety of economic factors and the tastes of millions of people, or copper, which is used in a variety of industrial applications, uranium is basically used for two purposes, bombs (no longer) and power stations, both dependant on political circumstances and vulnerable to inherently unknown events, such as an armistice or a nuclear accident. It was the Three Mile Island accident in 1979 for example that led to the spectacular bust of the 1970s boom with the stop of commissioning of nuclear plants in the US. Price plummeted at $10/lb, a level at which it stayed until the early 2000s. Figure 3 shows the evolution in the production of uranium after the 2nd world war to our days, and the fluctuations in prices, linking those to key political and industry events.

[1] Most of these mines have not opened yet because the opening dates tend to be optimistic, however they give a good indication of future openings and where is the thrust of uranium mining development.

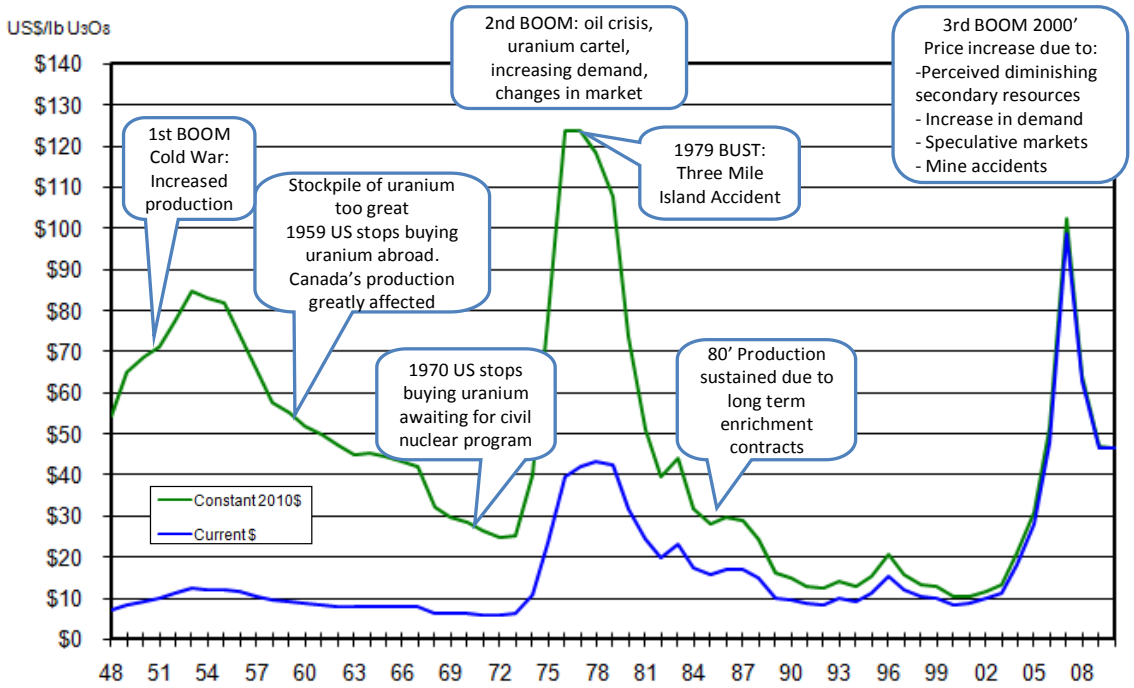


Figure 3. Evolution of uranium price. Price sources: 48-68 US/AEC, 69-86 Nuexco EV, 87-Present Ux U3O8 Price. Info provided by The Ux Consulting Company, LLC. History sources: Amundson (2002), Combs (2010), Radeztki (1981)

The uranium market works on the basis of bilaterally negotiated contracts between uranium producers and buyers, i.e. nuclear utilities, with a number of intermediaries including traders and hedge funds. The vast majority of contracts are transacted under long-term, typically 3-15 year contracts directly between a mine and a nuclear plant (WNA, 2010). The remaining are traded through "spot" trade (up to 12 month delivery) that accounts for less than 20% of supply (WNA, 2010). Two features are important: first, since it takes considerable time to expand production at existing mines or through development of new mines, price can increase for an extended period of time before production can grow to satisfy demand. Vice versa, the long-term nature of contracts means that production may continue at some level, even as prices fall, i.e. there is a time lag between price and production, though price and prospecting are more closely correlated. The cost structure of nuclear power generation, with high capital and low fuel costs, means that once power generators are in place, demand is relatively predictable, more so than for other mineral commodities.

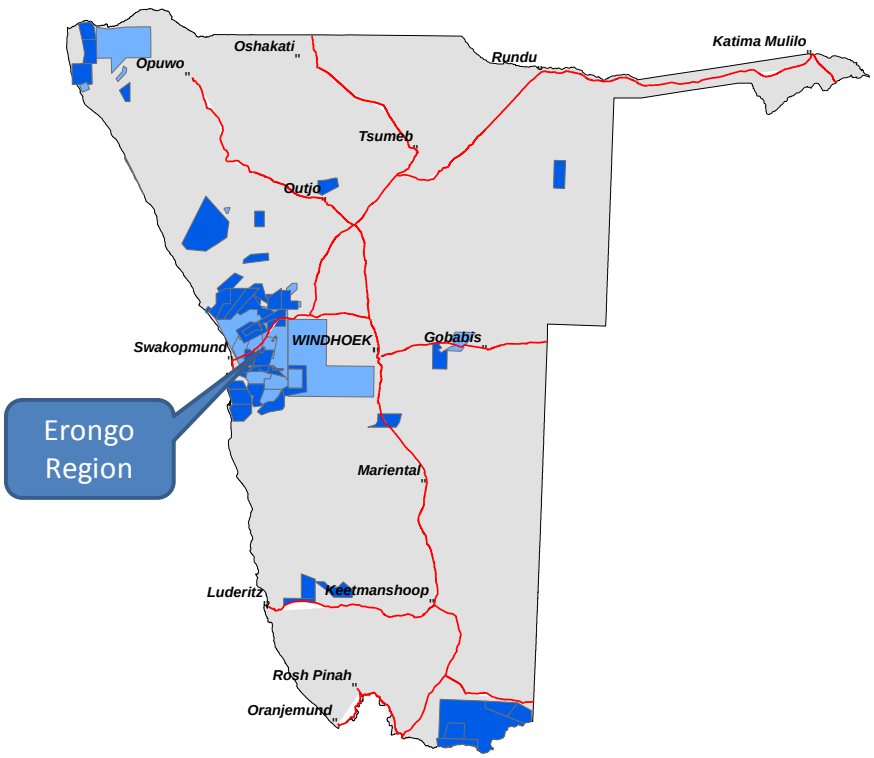
In the 2000s, uranium followed other commodities with a spectacular rise up until the economic crisis of 2007/08, from just $7 a pound in 2003 to $140 by 2007 (see figure 3). This was provoked partly by two mine accidents lowering production, the entry in the market of hedge and investment funds and the growing perception of diminishing secondary resources with the end in 2013 of the 'megatons for megawatts' program between Russia and the US, whereby the US supplies 50% of its requirements buying miliatary stockpiles from Russia. This was reinforced by the 2007 edition of the "Red Book", the authoritative publication of the International Atomic Energy Agency (IAEA) and the OECD Nuclear Energy Agency since the 1960s about uranium supply and demand, *"given the long lead time typically required to bring new resources into*

production, uranium supply shortfalls could develop if production facilities are not implemented in a timely manner." (OECD, 2007). However, after a spectacular rise, the price felt down to $40-50 and was on a recovering path (reaching $70) when it fell again to $55 after the Fukushima events (UxC, 2011). It is still at a very high level compared to its early 2000 levels. Despite the high costs of nuclear power in a context of stressed public finance, the reduction of electricity demand in countries hit by the crisis, and the Fukushima events, analysts maintain that in the longer-term, and by 2020, there remains an important imbalance (of approximately 80 million pounds) between supply and demand that requires new mines and high prices to incentivise such a mining expansion (RBC Capital Market, 2012).

3. The effects of the global uranium rush in Namibia

3.1 Namibia's uranium rush

Why a uranium rush in Namibia? Namibia has considerable reserves, some 284,000tn, about enough to supply 4 years of the world's demand at 2010 levels, but they are of low-concentration and therefore expensive. Namibia's attractiveness is a function of geographical, political and social factors. Namibia is a vast country, the second least sparsely populated in the world; 2.1 million people share 824,292 sq km. Most of central and south Namibia is suitable only for cattle herding or small-scale horticulture and is inhabited by scattered, small ethnic tribes. It is in central Namibia, in the Erongo region that uranium prospecting concentrates (see map 1). The lack of population relaxes health concerns and possible resistance that can delay works. Land is cheap and water scarcity means less risk of water contamination.



Map 1. Map of Namibia with the 66 exclusive prospective licenses (blue boxes in the map).

Namibia offers a good and stable "business environment". The World Bank praises Namibia as a "success case" with GDP growth of 4.5 percent per year since 1990 and a middle-class income profile (GDP per capita of US$ 3,614, BoN, 2008). Politically Namibia is stable, governed since independence from the South African apartheid regime in 1990 by the liberation party, South West Africa People's Organisation (SWAPO), which has won all five free parliamentary elections. SWAPO quickly abandoned plans for the nationalization of foreign corporations, opting for market-oriented policies and an investor-friendly tax regime, better than even that of neighbouring South Africa (Rakner, 2001). Resource rent collection is poor when compared even to other African nations; Botswana captured 76% compared to Namibia's 42% between 1980 and 1997 (Lange, 2003). The royalty for uranium is currently set at 3% of revenue[2], a relatively low rate by international standards (MME, 2010). Companies can apply for deferment or reduction of royalty payment; as a result uranium royalties account for only 0.08% of total government revenue in 2008 (US$2.5 m compared to the desired US$43.7 m; MME, 2010)[3]. The corporate tax rate for mining is 37.5% of profits, but several exemptions are often taken advantage by corporations (MME, 2010), including "Export Processing Zones", such as the one offered to Areva's Trekkopje uranium mine, free from corporate, import or sales taxes, in exchange for "technology transfer, capital inflow, skills development and job creation" (sic) (MME, 2010: 7-109).

Attractive for investors is also the lack of restrictive environmental regulation. Even if better than in some other African countries, regulation in Namibia is definitely not in par with the magnitude of the uranium rush (MME, 2010). Apart from a binding constitutional clause for ecosystem maintenance, the only other concrete body of Law is the – under revision – 1992 Minerals Act which asks for a "lite" Environmental Impact Analysis, and lacks important provisions such as mining closure and rehabilitation requirements[4]. An Act with requirements for an EIA applicable to all mining projects has been approved since 2007 but so far has not been implemented. Implementation of law is hampered by a weak administration; indicatively in the Ministry of Environment, there is only one person in charge of revising all EIAs for the whole country (Interview#138); in the Ministry of Water only five people monitor the water quality of all 13 regions of the country. Approved uranium mining EIAs have been widely criticised by local and international NGOs (Schmidt and Diehl, 2005; wise uranium, 2011; Interview#1). Environmental management is largely left to voluntary industry self-regulation (such as ISO and corporate responsibility standards) or to the Namibian Chamber of Mines program that is no legally binding and is not independently monitored.

Corruption in Namibia is low (61st out of 180 countries in the global Corruption Perception Index[5]), however according to the Afrobarometer (2008), 49% of

[2] Except for Rössing Uranium, for which is levied at 6%.
[3] In 2004, the government decreed a 5 percent royalty on all non-diamond mining companies, but the mining lobby challenged this as illegal based on a clause of the Mining Act 1992 that higher levies could be enforced only on a case to case basis (Sherbourne, 2009).
[4] Closure provisions are to be included the revised Act, though they are likely to remain voluntary.
[5] http://www.transparency.org/policy_research/surveys_indices/cpi/2008

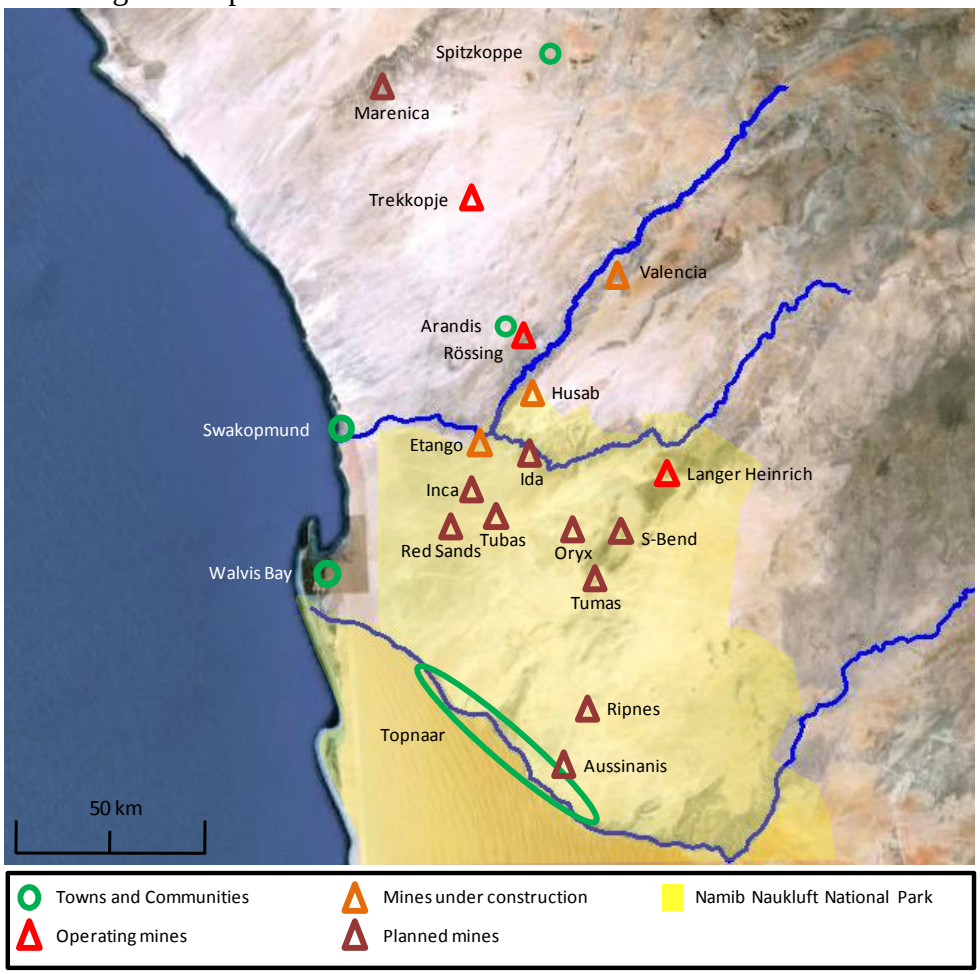
respondents inside Namibia felt officials were corrupt. Critics (Melber, 2003; Bauer, 2001) contend that there is an emerging, black elite based around SWAPO's control of the growing public sector, which gives work to 22% of the employed population, and spends more than 30% of GDP (Sherbourne, 2009) channeling public funds to privileged interests in defense, paramilitary security and intelligence (Mbai & Sherbourne 2004 cited by Melber, 2007). Mineral exploration licenses are protected by a "secrecy clause" in the 1992 Minerals Act and the Minister has much leverage for the terms of agreement with foreign corporations, with no public oversee (IPPR, 2010).

Namibia is 94th out of 129 countries in the UNESCO's Education for All Development Index partly reflecting the legacy of a two-tiered apartheid education system (Cohen, 1993). Moreover, spending in crucial sectors like health and education has declined since the mid 1990s (Sherbourne, 2009). The Human Development Index is at 105th (out of 169 countries), 50% of the population were unemployed in 2008 (NFLS, 2009), with two thirds of Namibians living in rural areas and half of them relying on subsistence agriculture (Sherbourne, 2009). 27.6 % of the population are considered to live in poor conditions (NPC, 2008) and due to HIV/AIDS life expectancy has reduced to 51.2 years (OECD, 2008). Namibia's inequality is amongst the highest in the world, with a Gini coefficient of income distribution 0.73. The government maintains a focus on overall economic growth to address such social problems with mining at the forefront. Mining (diamonds and other minerals too) produced 10% of economic output in 2009 compared to 17% by tourism (NTB, 2008). However mining is responsible for 43.7% of export earnings (BoN, 2010) and uranium alone could in theory add 3-9% of total government revenue by 2015 (MME, 2010). There is much lip-service paid to mining as a source of employment, but the sector employs only 7,563 workers (0.02% of the employed population) (Sherbourne, 2009), ten times less than tourism (NTB, 2008).

Namibia has a relatively good – for African standards – infrastructure that facilitates material export with the mines connected to port facilities (map 2). However, isolation, aridity, and the use of water-intensive techniques to extract the low-quality ore, require new water supply for the mines and the government is in search for funds for a new desalination plant. Namibia's bulk water supplier provided in 2008 67Mm^3 of water (The Namibian, 7 July 2008), yet seven new mines will require 30Mm^3 more by 2015 (Chamber of Mines, 2009a). Mining stresses also the electricity system which faces periodic power shortages due to its dependency on South Africa (Sherbourne, 2009). Energy demand by uranium mining alone may reach 150MW by 2015 compared to 564MW in 2010; a 25MW emergency diesel generator is currently constructed, with plans for a coal-fired power plant near the coast (NAMPOWER, 2010)[6]. The isolation of the uranium reserves means also that there is a shortage of local labour and a cost for the resettlement or transportation of workers that has to be born by the mine or the

[6] Other projects in the pipeline are a the Walvis Bay coal-fired power station (250-400MW), a complex project to exploit the offshore kudu gas reserve and a 951km power line connection with the Zambian grid that will require borrowing of up to US$129 million (Global Transmission, 2009; Sherbourne, 2009; Nampower, 2010). Mining revenue therefore comes at a considerable cost for the public burse.

workers themselves. All these needs raise questions about the net monetary benefit of uranium mining for the public burse.



Map 2. Map referencing main uranium mines in the area (operating, under construction and planned) and town and communities most affected by the uranium expansion. Source: Authors with Google Earth map and data from MME, 2010 and Reptile Uranium.

In 2007 the government enacted a moratorium on new Exclusive Prospective Licenses (EPL) to allow environmental regulation and infrastructures to catch up. Nonetheless, at least 12 more mines are in the pipeline (map 2). In the remaining of this section we investigate the social responses, actual and potential, to the expansion of the uranium frontier. We start from Rössing, Namibia's first and the world's 3rd largest uranium, and next compare four diverse cases of prospective mines with different socio-environmental settings.

3.2. The Rio Tinto mine in Arandis

The Rössing mine was founded by Rio Tinto in 1976. Rio Tinto is one of the biggest mining companies in the world with earnings of $1.19bn for its energy segment in 2010 alone. Total production of uranium oxide from Rio Tinto's uranium mines in Australia and Namibia in 2010 was 16.6 million pounds (Rio Tinto, 2010). The Rössing mine is located in the middle of Erongo, 60km from the nearest town of Swakopmund (map 2).. Rio Tinto built Arandis at a stroke in the middle of the dessert to house workers. Most

came from far away, often without their families: in 1977 only 550 of the 1600 black workers were from the local Damara ethnicity, others coming from as far as South Africa or Malawi (Moody, 1992). After a long period of downscaled production, the mine in the last few years has pumped up again its production (from 2,000tn in 1993 to 4,150tn in 2009; Chamber of Mines, 2009b). Furthermore, French AREVA built a new mine nearby Rössing and 3 to 4 new mines stand to open soon. How do locals perceive these developments? Our interviews suggest that many people in Arandis are welcoming this revival of mining activity. As interviewees indicatively stated uranium mining means "more money into the country" (interview#98), reopening "a bank branch, a hospital and a petrol station" and turning the town hopefully into "an industrial hub"(interview#16) with "permanent jobs" (interview#120).
Such lack of reaction comes as a surprise, given Arandis' emblematic position internationally in social resistance against uranium mining (Hecht, 2010; Moody, 1992). The history of this resistance is worth to be recapped. The mine started during the 1970s global uranium boom, with a fixed contract between Rio Tinto and the British Government, which used uranium for military and civilian purposes (Avery Joyce, 1978; Roberts, 1980). By the early 1980s, UK was importing nearly half its requirements from Rössing alone (Moody, 1991). The deal induced an international 'Campaign Against the Namibian Uranium Contract' (CANUC), which brought together the Namibian independence movement, the anti-apartheid movement (the deal was in breach of UN decisions), and "Partizans" (People Against Rio Tinto Zinc and Subsidiaries), a London-based grassroots organization. The movement held a number of direct actions and demonstrations in the U.K., Germany and Japan mobilizing in the process students, anti-nuclear groups, campaigners for nuclear disarmament and trade unions. In 1984, the biggest contract between Rössing and a UK nuclear power plant wasn't renewed, partly due to weakening demand and partly due to the activist pressure. Flows of uranium from Namibia to the UK continued, even if in several occasions delayed and rerouted as during the strike of Liverpool dockworkers in February 1988, who refused handling 13 containers of uranium coming from Namibia (Dropkin and Clark, 1992).

The international campaign highlighted the appalling living, wages and worker rights' conditions in Arandis (Dropkin and Clark, 1992; Roberts, 1980). Rössing's workers also mobilised and held continued strikes in 1976 and 1978 (Hetch, 2010; Moody, 1992). The crackdown was fierce, as the Apartheid regime prohibited unionising and in 1980 closed the main workers' Union of Namibia, imprisoning much of its leadership without trial. Still, the combination of local and international pressure partly paid off, as Rio Tinto in the early 1980s set up a special Foundation investing in improvements for the Arandis community. As one of the initial settlers recalls from those years: 'We didn't have to pay for housing, water or electricity, everything was provided for us, we even had a social centre and sports facilities' (Interview#97). Still, in 1989 half of Rössing's workers lived in hostels without their families, while whites continued having the better jobs (Moody, 1992). In 1988, and with independence around the corner, workers formed Rössing's Mining Workers Union and fought to end racism in the workplace, extending this to safety and health demands (Hetch, 2010; interview#125). Hetch (2010) gives an excellent historical account of Rössing's workers' struggle for health rights and the micro-politics of science involved. Local struggles were linked to the international movement, which after Namibian independence gave priority to health

issues, with the publication in 1992 of 'Past Exposure' (Dropkin and Clark, 1992), a report that denounced the high levels of radiation and pollution in the mine, documenting a huge seepage of 780m gallons of radioactive tailings prior to 1980. Rössing invited experts of the IAEA for inspection, who concluded that the mine had an 'oustanding' track record and that radiation was well below limits (Hetch, 2010). The Union and the international campaign hired a black Namibian medical student working in Germany to conduct a health assessment of Rössing's workers, who concluded that miners had increased risks of genetic damage and a worrying reduction in testosterone levels (Zaire et al., 1996, 1997). Rio Tinto disputed his findings with two internationally recognised scientists who concluded that there was 'no chromosoma aberration' (Lloyd et al., 2001). The campaign came at a peak and then receded in 1998, as an ex-mineworker with cancer won the right to bring his US$650,000 compensation case in the UK, but the case was dismissed because it had expired (Meeran, 2011; Hetch, 2010).

What happened to this struggle? We hypothesize that the disappearance of resistance relates to the three factors mentioned in the introduction to this article; the "ecology" (natural and social) of Arandis, the deepening process of economic marginalization of the community and the weakening of the multi-scalar ties between workers and the international movement that mobilised resistance in the 1970s and up until the 1990s. First, the workers, settled in the middle of a dessert, have no alternative source of livelihood, than work in the mines. This dependence has intensified since the end of the 1980s, following the bust of the global uranium market (section 2). Declining profitability strengthened Rio Tinto in its negotiations with SWAPO, which gave up its initial plans to nationalize the mine. Rio Tinto stayed but operating the mine in "sleep mode", diverting money from a future restoration fund in order to pay the workers, and cutting down community expenses, handing the responsibility for the town back to the government in 1992. Almost 70% of the workforce was fired in the 1990s (Chamber of Mines, 2009b), making many people flee the town. Arandis lost many of its facilities, including the bank, the petrol station and the hospital, which was reduced to a clinic. Residents found themselves having to pay for services such as electricity, water, schooling and housing and the local authority was stripped of its revenue base, while facing increasing demands from an impoverished population (Interview #16). While marginalization deepened, the international movement against Rössing waned. Partizans shifted their limited resources to other fights against Rio Tinto, the anti-nuclear movement subsided with the retreat of nuclear energy in the 1990s, while pro-independence groups had achieved their purpose. We might also speculate on a possible cooptation of the Union within SWAPO's and Rössing's paternalism.

Presently Arandis houses some 4,500 people, Rössing remaining the largest and almost only formal employer providing work to 494 people in 2008. Six to eight people are dependent on each mineworker in Arandis (Hoadley et al., 2005). Although Rössing's salaries are relatively good for Namibia (they start from US$1,000/year), 88% of Rössing's mine workers in 2008 were subcontracted to companies that do not offer benefits or labour security. The revival of mining appears therefore as the only hope for the town's residents and its local authority. Yet the first signs of a renewed local-international campaign may be found in the awareness activities since 2008 by Earthlife Namibia and the Labour Resources and Research Institute (LaRRI), which disseminate

interviews with sick Rössing's ex-workers who link their health problems to the mine[7]. The health impacts to workers are becoming more acute now, with many of the old workers becoming sick (interviews#96,98,99,109,110). Assessing the full-scale of such claims is nearly impossible, as many ex-workers die unregistered at their places of origin, whereas Rössing refuses to make public any data related to the health condition of its workers not only to us but also to the health authorities (Interview#11).

5.3. Snapshots from Namibia's current uranium rush

Whereas the community of Arandis lived through the typical boom and bust cycle of the uranium industry, the four cases examined here have not had previous contact with uranium. 1. The Spitzkoppe community is located in the northern part of the Erongo region, 50 km from the site where Areva obtained a mining license in 2009 to build a mine (see map 2) and inside their conservancy area. 2. The Topnaar is a community that belongs to the Nama ethnic group, living along the Kuiseb river, where two Australian corporations, Reptile and Toro Uranium are undertaking exploration (see map 2: Aussinanis and Ripnes). 3. In the Valencia farm area, five white land-owners have bought land as a second residence; this is the site of a new mine owned by the Canadian Forsys Metals. 4. Finally, Swakopmund is a coastal town with 29,000 inhabitants living from tourism where several mines are in the process of obtaining a license in the nearby National Park. Compared to Swakopmund, Spitzkoppe and Topnaar are much smaller communities with 1600 and around 1000 people each.

Table 1 compares the four cases and Arandis. Differing levels of perception and reaction towards uranium mining are observed. In Spitzkoppe where we talked to 22 people, nobody was aware what radiation means or the potential impacts of uranium mining. People were very enthusiastic with the arrival of mines, a woman commenting: '(The opening of the mine) it's my dream, our people must be given a job, training, we must change our living standards' (Interview#40). As the headman of the community states: '228 applications have been presented [to the mining company] and I think most of them will get a job'[8]. Areva fuelled expectations of development by drilling a village borehole for potable water in 2008. 'If they have power to bring us water, they can also develop the community', an interviewee told us enthusiastically (Interview#22).

With the Topnaar the situation is different. While a large part of the community, especially elders, are ignorant of the nearby mining explorations, and their potential impacts, many expressing similar sentiments as in Spitzkoppe about jobs and development, a significant proportion of the population, particularly those more educated and further up in the hierarchy of the community are aware and concerned with impacts. Many expressed similar sentiments to this interviewee: "I don't mind the mines, but not here, not in the Kuiseb, they can be located there (points out), in the gravel plains, away from us' (Interview#69) because 'they will impact on our grazing areas, they create too much dust and noise and the (wild) animals will go'

[7] One of them, Petrus Haoeb, an ex-worker now out on disability, talked to us and is convinced that his bad health, including proven anemia, is related to radiation exposure in the early years of the mine (interview #98).

[8] However, the minimum education required to work in a uranium mine is Grade 12 and only a very small number of the people from Spitzkoppe reach that level.

(Interviews#47 and 73). Others, complaining about the arrival of mines told us 'I like our way of living, here is peace and quiet' (Interview#66). 'I will never die of hunger here, I can kill a goat if I am hungry, there will always be something to eat' (Interview#63). The Topnaar community is the only community in Namibia that has expressed publicly its concern about the mining expansion; statements by their Chief Seth Kooitjie appeared in a national newspaper (New Era 13/11/2008). Yet, the Chief sounded more pragmatic to us than in public: 'We have no power to stop the mines, nobody asks us, nobody has ever asked us permission for anything' but added that 'at least they should give us something, we want jobs and development' (Interview#46).

Case studied (community)		Arandis	Topnaar		Spitzkoppe		Swakopmund			Valencia Farmers
Mine(s) associated		Rössing	Aussinanis	Ripnes	Trekkopje	Marenica	Etango	Omahola	Langer Heinrich	Valencia
Basic Data	Main owner of the mine	Rio Tinto	Reptile Uranium	Toro Energy Limited	AREVA	West Australian Metals/ Hanglong Energy Limited	Bannermans	Reptile Uranium	Paladin Energy	Forsys Metals
	Owner nationality	Australia/UK	Australia	Australia	France	Australia/China	Australia	Australia	Australia	Canada
	Start of Project (expected)	1978	exploration phase	exploration phase	2010	exploration phase	2013	2014	2007	2012
	Duration of project/closure date	12 years	na	na	11 years	na	16 years	12 years	15 years	17 years
	Location (Distance from the mine)	5km	5km (aprox)	30km (aprox)	50km	55km	36km (aprox)	45km (aprox)	82km	5km (aprox)
	Location (Near river)	Khan river	Kuiseb River	Kuiseb River	No	Omaruru River	Swakop river	Swakop river	Swakop river	Khan river and aquifers
	Location (National Park, Conservancy Area)	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No
economic	Resource quantity (tons U)	113,4	8203	na	103000	na	68900	23043	74500	38100
	Estimated mine output/year (tons U)	4500	na	na	3200	1000	2300-3200	1000	1700	1600
	Type of company (junior/senior)	Senior	Junior	Junior	Senior	Junior	Junior	Junior	Junior	Junior
	Nº employees	2384	na	na	na	na	na	na	852	na
	Subcontracted (% total employees)	969(40%)	na	na	na	na	na	na	637 (75%)	na
	economic advantages	Rössing Foundation	none		CSR by AREVA	none	Influx of people and business			none
	tourism	no	yes (two camp sites)		yes (one camp site)		yes			planned
social	indigenous community	No	Yes		No		No			No
	sacred value	No	Yes		No		No			No
	Prior information consent	No	No		No (Areva consultation through Env&Social Impact Assessment)		No (some tourism members consulted)			No
	historically marginalised	No	Yes		Yes		No			No
	Perceived health risk	Yes	Yes		No		Mixed			No
	Health impacts	Yes	No		No		No			No
	Powerful chief	No	Yes		Yes		No			No
environmental	Water issues (present & potential)	Yes	Yes		Yes		Yes			Yes
	Water scarcity	Yes	Yes		Yes		Yes			Yes
	Impacts on environment (present & potential)	Yes	Yes		Yes		Yes			Yes
	Type of environmentalism (Martinez Alier, 2002)	Too dependent to be green	Environmentalism of the poor		Too poor to be green		Cult of wilderness			Cult of wilderness
	Closure Plan/Closure Fund	Yes/Yes	na	na	Yes/No info	na	na	na	Yes/No info	na
conflict	Voiced discontent	Yes	Yes		No		Few			Yes
	Legal challenge	Yes	No		No		No			Yes
	Demonstrations	No	No		No		No			No

Table 1. Comparison of four cases and Arandis based on basic data of the mines and the communities near them, including economic, social and environmental characteristics as well as absence or not of conflict. Source: the authors based on interviews, mining companies' websites and Chamber of mines (2009b)

In the city of Swakopmund in turn, there is awareness that the uranium mines are going to damage the tourism industry, either by the visual impact of the mines and the associated infrastructure, the blocking off routes and often visited places in the National Park, or the influx of migrant workers that could increase insecurity (Interview#144b) and the development of new industry supporting the mines in the city which will change its laid-back character (MME, 2010). The tourism industry is controlled by whites; although most of them realize the importance of conserving the park (Interviews#130,129,129b), few have ventured to voice their complaints outwardly and more hope for "sustainable", mutually satisfactory solutions through the information sessions that are held with the mining companies. Few complaints have reached though national newspapers (The Namibian, 12 August 2010, 31 October 2008) and even made it to the international press (abc, 30 October 2010). Officials believe that mining and

tourism can co-exist (interview#142, 138), since many areas of visitors' interest will remain unaffected by the infrastructure; the same is the hope of the tourist operators.

Interestingly, the only legal challenge to the national uranium rush comes from one of the handful of white land-owners holding a vacation home near Valencia Farm (see map 2). These came here out of appreciation of nature and the beauty of wilderness. As one of them told us: "look at the view and see what it was like years ago; no paths, no telephone, we want to keep it like this for those after us" (Interview#157). They perceive that the mine "will have an impact not only on the water, but on the animals, on the air, on the landscape, (...) people will come to the area to work, it will stop being the way it is now"(Interview#157). The Valencia Farm owner negotiated with Forsys granting them access to his land (Interview#149), and only one challenged in court the groundwater permit that was given to the mine for its construction phase (Court Case, 2008). The Supreme Court has now returned the case to the High Court allowing the plaintiff to put the case forward. In the meantime the water permit has been on hold; together with the fall in uranium prices, and the water shortage problem, this has slowed down the plans of Forsys for the area.

How can we make sense of these differences in perception and reaction? Looking first at the spatial geographical context, all projects are located in the remote arid territory of Erongo, yet there are different degrees of conflict with alternative uses of the territory. Whereas the Spitzkoppe barely subsist and do not use extensively the local environment, the Topnaars rely on herding and the melons that grow on the riverbed, their survival intimately linked to the river. For Swakopmund, the mines are something happening far away, though it will impact visually a considerable part of the territory that provides them wealth through the tourism industry. These are still tentative links, and there is hope that given the vastness of the area, tourism can continue unimpeded avoiding the mines; more worrisome are the changes that might take place in the city itself given the possible influx of workers, but these are also uncertain and not immediate. In the Valencia farms, the conflict is more direct between the leisure use of the area by the rich white land-owners which is evidently incompatible with a mining operation of a radioactive substance.

Secondly, each of these communities have different degrees of power to challenge mining development. The Spitzkoppe belongs to the Damara ethnic group who were used as slaves by the Nama and Herero for centuries and as a result did not experience the process of ethnic self-definition and coherence of other tribes (Henschel and Wenning, 2009). As part of German and South African colonial policies of dispossession, the Damara (as other tribes in Namibia) were disposed of their land 40 years ago, which passed to whites for farming and they were confined to native reserves in marginal, semi-deserted lands (called the "Police zone"). Their community remains economically marginalised even by Namibian standards with an average annual income per person of US$150 - US$300 with more than 75% being unemployed or living by small-scale mining. The literacy rate is considerably lower than the average for the region with more than 50% not completing primary education (Areva, 2008).

Although education levels and incomes are low also in the Topnaar, the latter are a much more ethnically cohesive and politically empowered community with a strong

attachment to their land in the vicinity of the mouth of the Kuiseb River, where they've lived for centuries. Although, the area was declared a Game Reserve in 1907 by the Germans and a National Park in 1979 by the South Africans, the Topnaar resisted repeated plans for their eviction and were eventually granted semi-permanent communal land tenure rights in 1979 and a recognition of their Traditional Authority with a legal Act in 2000 (Henschel and Wenning, 2009). In later years many Topnaars have emigrated succumbing to government harassment and in search of jobs to the coastal cities, but those who remain maintain a subsistence-based living relying on local resources and a strong communal structure, controlled hierarchically by the Chief and his family.

The Valencia land-owners and the Swakopmund tourist operators live a world apart from the Topnaar and Spitzkoppe. They form part of the educated, wealthy white-elite of Namibia and this explains why the former have been the only who have successfully accessed the Courts and managed to stop, at least temporarily, a mine. The same reasons have allowed few tourist operators to access national and international press. However, during SWAPO rule, the position of whites in Namibian society has changed, and although most of the privileges have been maintained, and whites control a great part of land and the economy, many of them are also hesitant to confront unnecessarily the SWAPO government and its development plans, prefer to stay in their own turf. Partly, this might explain why in the case of Swakopmund, the tourist operators are less willing to challenge head on the mining plans and why they retain a more fatalistic, "wait and see" approach. Similarly in Valencia court case, this might explain why the demand was put forward only by one land-owner only and others hesitated to join the legal process.

Thirdly, links with external actors also influence the differing levels of reaction. While Spitzkoppe has remained largely isolated and people there have heard nothing about uranium or nuclear energy, awareness by the Topnaar owes a lot to a 'tour' presentation in 2008 by two foreign environmentalists who gave several public talks on nuclear energy and uranium mining and showed dramatic pictures of health impacts of radioactivity elsewhere. Many of our interviewees remembered the presentation and although they did not fully comprehend the nature of the impacts, they understood that uranium mining would pose a health threat and decided to oppose it. In the Valencia case also, the success of the plaintiff to reach the Supreme and High Court would not have been possible without the collaboration with the Legal Assistance Centre, an independent legal NGO based in the capital, and which takes on legal challenges against human rights abuses.

If we were to predict the prospects of resistance, we would state that Namibia as a whole is a country of "least resistance", given its geography and social structure, and this explains the ease with which the global uranium rush expands in the territory, driven away from more developed countries, with more and better reserves. Save for the Valencia farms, where a strong white individual with the help of an NGO managed to mount the only legal challenge to a uranium mine, the only other case where resistance may challenge the expansion of the frontier is the Topnaar, where the dependence of the community on local resources that stand to be impacted by uranium, suggests for a potential "environmentalism of the poor". Internal community power dynamics will be

important in the Topnaar case. Some Topnaars questioned to us the honesty of the chief, claiming that he 'is in favour of the mines because he receives money from them' given that he let the companies drill for prospecting (Interviews #77,78,84 and 85). Moreover the Chief's rule is disputed by contender King Khaxab, who opposes the mine expansion. In the Swakopmund case, not much resistance should be expected, though given the importance of the tourist economy, we can speculate that if the first mining activities in the Park start having an impact on the sector, this might slow down subsequent ones. Another limiting factor for the expansion of the uranium frontier in Namibia is the sheer amount of infrastructure, especially for water, that needs to be mobilised, the cost of which is prohibitive for most private operators, and difficult for the State to take up. The financial crisis, the Fukushima event, coupled with the declining prices of uranium, may do more to halt the uranium frontier, than local resistance, though the two may at some point coalesce, making some investments too expensive to undertake.

4. Conclusions

The world's growing social metabolism is producing new geographies of extraction and resistance in different parts of the world. This article investigated the expansive geographies of a vital energy resource for powering modern society, uranium, and the forms of resistance it meets in a specific territory, Namibia. Our task was both empirical and theoretical: empirical in terms of collecting information about the expansion trends of the uranium mining industry and in documenting the forms and consequences of this expansion in a specific place, Namibia; theoretical in terms of formalizing and using accumulated knowledge from previous political ecological studies to understand the conditions under which resistance is likely to emerge to this expanding frontier, the forms it can take and the ways in turn that it may shape the frontier and the territory.

It is through the dialectics of expansion and resistance that the new uranium landscape, in Namibia and the rest of the world, will be determined. Local communities increasingly challenge corporate and government projects. In 2006, the Navajo hosted the first Indigenous World Uranium Summit with indigenous delegates participating from various parts of the world, calling for a ban of uranium mining in native territories. It is in fact a coalition of anti-mining, anti-nuclear and indigenous movements in North America and Australia, coevolving with a strengthening environmental regulation, that has resulted in delays of uranium mining projects, sending corporations to Africa in the search of a deregulated "El Dorado". Given its geographical, socio-economic and governance conditions, Namibia offers itself as a path of least resistance and one may expect it to be at the tip of the expanding global uranium frontier.

This is however no pre-determined trajectory. The recent nuclear disaster in Fukushima changes once again the dynamics of the nuclear industry, and by extension its commodity "tail", uranium mining. Even if the effect on uranium production expansion and prices is not to be as dramatic as in the preceding Chernobyl and Three Mile Island incidents, given the inexorable increase of electricity demand in Asia, still the uranium rush is likely to slow down, and the most expensive, more problematic, or more resisted, projects are likely to be trimmed off. An important related development is the

reawakening of the anti-nuclear movement and the strengthening organizing between movements along the uranium chain. An expression of this is the recently created African Uranium Alliance, which brings together several NGOs working locally, part of which are Earthlife and LaRRI, which staged the renewed campaign against Rössing and the impacts of uranium mining on the health of workers. The Uranium Alliance is reinvigorating alliances with anti-mining movements elsewhere as well as nuclear energy campaigners like the International Physicians for the Prevention of Nuclear War. It remains to be seen while the, largely middle-class and environmentally-minded mobilization will build effective bridges with marginalized workers, tribal communities at the local level, and the growing indigenous movement, to challenge the industry and re-shape the uranium frontier.

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