

RADIATING AFRICA

The Menace of Uranium Mining

Case Studies on Cameroon, Mali and Tanzania



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LIST OF ABBREVIATIONS AND ACRONYMS

- AEA:** Atomic Energy Act
- AEO:** African Economic Outlook
- AFCPF:** Association of the Faléa Council People and Friends (Mali)
- AMCFE:** Association Malienne Pour La Conversation de la Faune et de L'Environnement, Mali
- ANRP:** Agence Nationale de Radioprotection, Cameroon
- ARSEL:** Agence de Régulation de l'Electricité du Cameroun, Cameroon
- ATN:** Administrative Transmission Network, Mali
- CCM:** Chama cha Mapinduzi (Party of the Revolution), Tanzania
- CESOPE:** Civil Education is the Solution For Poverty and Environmental Management
- CHADEMA:** Chama cha Demokrasia na Maendeleo (Party for Democracy and Progress), Tanzania
- CIRIR/CRIIRAD:** Commission for Independent Research and Information about Radiation / Commission de Recherche de d'Information Indépendantes sur la Radioactivité
- CSO:** Civil Society Organization
- CUF:** Civic United Front (political party), Tanzania
- DF:** Drill Faléa (Mali)
- EC:** European Commission
- EIA:** Environmental Impact Assessment
- EITI:** Extractive Industries Transparency Initiative, EITI Cameroon Committee
- EMA:** Environmental Management Act
- ESIA:** Environmental Social Impact Assessment
- FEMAPO:** Foundation for Environmental Management and Campaign against Poverty (Tanzania)
- GDP:** Gross Domestic Product
- GNP:** Gross National Product
- GREDEVEL:** Groupe de Réflexion et d'Action pour le Développement Rural, Cameroon
- GST:** Geological Survey of Tanzania
- IAEA:** International Atomic Energy Agency
- IBRD:** International Bank of Reconstruction and Development
- ICP-AES:** Inductively Coupled Plasma Atomic Emission Spectroscopy
- IUCN NL:** International Union for Conservation of Nature, National Committee of The Netherlands
- LACs:** Least Advanced Countries
- LHRC:** Legal and Human Right Centre
- MACWE:** Malian Association for the Conservation of Wildlife and Environment, Mali
- MEM:** Ministry of Energy and Minerals (Tanzania)
- MINEPAT:** Ministry of Economy, Planning and Regional Development (Cameroon)
- MINMIDT:** Exchange with the Ministry of Mining and Technical Development, Cameroon
- MP:** Member of Parliament
- MRM:** Mineral Resource Management
- MRP:** Mkuju River Project (Tanzania)
- MVIWATA:** Mtandao wa Vikundi vya Wakulima (National Network of Farmers' Groups in Tanzania)
- MW:** Megawatt
- NCCR:** National Convention for Construction and Reform (Tanzania)
- N.d.:** no date is known (regarding references)
- NDGM:** National Directorate of Geology and Mines (Mali)
- NEMC:** National Environmental Management Council (Tanzania)
- NGO:** Non-governmental organization
- NRPA:** National Radiation Protection Agency / Agence Nationale de Radioprotection (ANRP), (Cameroon)
- NSJP:** National Service for Justice and Peace, Cameroon
- P.:** Page

PHC: Population and Housing Census
Pp.: Pages
RM: Radioactive Minerals
SAL: Soil Analysis Laboratory (drilling of the samples derived from core-samples)
SGR: Selous Game Reserve (Tanzania)
SNJP: Service National Justice et Paix de la Conférence Episcopale Nationale du Cameroun (Cameroon)
Sv: Sievert
TAEC: Tanzania Atomic Energy Commission
TMAA: Tanzania Mineral Audit Agency
TMMTF: Tanzanian Mineral Mining Trust Fund
TNBS: Tanzania National Bureau of Statistics
TRA: Tanzania Revenue Authority
UDOM: University of Dodoma
UGF: Undendeule Game Reserve
UK: United Kingdom
UKAWA: Umoja wa Katiba ya Wananchi (political party in Tanzania)
UN: United Nations
UNDP: United Nations Development Programme
UNESCO: United Nations Educational, Scientific and Cultural Organization
URENCO: URanium ENrichment COmpany
URT: United Republic of Tanzania
USA: United States of America
USD: United States Dollars
UTL: Uranex Tanzania Limited
WHC: World Heritage Committee
WISE: World Information Service on Energy
WNA: World Nuclear Association
WNN: World Nuclear News

1| INTRODUCTION

More and more uranium – the fuel for nuclear power plants – comes from Africa. In Europe, uranium mining is made very difficult, mainly due to legislation. Also countries as Canada and Australia face an increasing pressure to comply with stricter environmental and social standards. That is understandable as uranium mining is an environmentally highly hazardous activity and can lead to social injustice. African countries as Niger and South Africa already deliver uranium to the world market. Cameroon, Mali, Tanzania and other countries are now facing the menace of uranium mining.

The disasters of the Fukushima and Chernobyl nuclear power stations are forever in the collective memory of human kind. But where does the nuclear fuel chain actually start? And which impact does it have on countries in Africa and on other continents? Exploration and exploitation of uranium is the starting point of the nuclear fuel chain. Uranium mining has a tremendous impact on environment and society in the respective regions. But do we actually know where the respectively extracted uranium has its origin and which players are involved in the whole nuclear fuel chain? Who has and who takes responsibility in e.g. Europe? Is there actually transparency in the supply chain?

These and other questions are addressed in the project *Enhancing transparency in the uranium chain and supporting responsible practices; uranium mining: a comparison of producing and near-producing countries*. This project is a joint effort to address critical issues around uranium mining and its impact. Legislation concerning uranium mining in western countries is getting stricter and stricter. At the same time uranium mining exploration licenses in many developing economies are rapidly increasing whilst objective information provision on this type of mining and governance implications are strongly lagging behind. URENCO, the uranium enrichment company, enriches fresh uranium for at least 170 nuclear power stations (Nuclear Nederland, 2014). Fresh uranium comes from at least Niger, Namibia, and in the future potentially from Malawi, Mali, Cameroon and Tanzania. Full transparency over the whole fuel chain would make it possible to influence both end users (in this case Europe) and producers (in this case African countries) to take responsibility. This responsibility refers to environmental governance and security as well as civil society issues that are tied to nuclear energy and uranium mining, workers' rights, empowering civil society organizations (CSOs) in the participating countries in Africa, democracy, health and fair prices.

This report forms an important part of the aforementioned project. It combines the Case Studies of each of the African project partner countries. Each African project partner from Cameroon, Mali and Tanzania prepared a Case Study on the situation in the respective country. This report combines all three Case Studies presenting the situation of some of the African countries facing potential uranium mining from different perspectives and yet very similar. The project aims to enhance the capacity building and cooperative learning of the involved project partner organizations, to stimulate the interaction between the project partners as well as raising awareness for more transparency in the fuel chain and demanding the corresponding stakeholders to take responsibility.

The content of the Case Studies of each country is the responsibility of each organization of the respective country. The views expressed and methodologies used in this report may not necessarily reflect those of WISE and IUCN NL.

This publication is meant to encourage governments, CSOs, citizens and international bodies to encourage respective uranium mining companies, governmental institutions and other involved parties to act and take responsibility or to formulate requests and policy recommendations.

World Information Service on Energy, November 2014

2 | MALI

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AMCFE thanks all local actors (the citizens of Faléa, administrative and municipal authorities of Faléa and Kéniéba) for their availability, accompanying us and for their willingness to execute this part of the project with us.

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Again, a big thank you to WISE.

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ABSTRACT

The present Case Study on Mali submitting the findings on uranium exploration in Mali has been funded by World Information Service on Energy (WISE) for a 15 months period.

It provides information on five main aspects, namely:

- 1) General information on Mali and on the region where uranium is being explored;
- 2) Presenting the uranium exploration project in Mali and a general description of exploration sites and the description of proposed infrastructures;
- 3) On-going activities and possible impacts of the exploration;
- 4) Submission of a few CRIIRAD's (CRIIRAD's) scientific findings in the framework of the cooperation between AFCPF and the civic European Forum of the Swiss Session;
- 5) Recommendations and Conclusion

2.1 Introduction

2.1.1 Brief introduction to Mali

Mali is a Sahelian country living mainly on the development of its natural renewable resources (soils, vegetation, wildlife, water). But today, the production capacity of these resources is undergoing a very strong depreciation due to many factors ranging from the vagaries of the weather to anthropogenic actions. These anthropogenic actions due to tillage practices (slash and burn cultivation, inadequate tillage methods), illegal logging of green wood, destructive distillation of wood, bush fires, mining and more nowadays impose a great strain on resources and endanger the life of many rural communities.

To improve on information and sensitization around uranium production zones in Africa, Wise and its NGO partners from Mali, Cameroon, Niger and Namibia are implementing the project entitled: *Enhancing transparency in the uranium chain and supporting responsible practices; uranium mining: a comparison of producing and near-producing countries.*

2.1.2 Methodology of the survey

- A literature review has enabled us to gather information on the project zone as well as on the stakeholders intervening in that region in order to help us prepare an interview guide.
- Field visits were organized to collect genuine information from local involved parties.

2.1.3 Overview of Mali

Mali is a vast African country of 1 241 231 km², situated between the 10° and the 25° of the Northern latitude and the 4° of the Eastern longitude and the 12° of the Western longitude.

As a continental country, Mali belongs to the Sudano-Sahelian zone with diversified vegetation ranging from spiniferous steppes in the north to woodland savannas and even open woodland forests in the south.

Mali's population is about 14 517 176 inhabitants living in 2369866 households (General Census of the Population and Habitat, 2009). The average population density is 7 inhabitants per Km². 50.4% are women and 49.6% men. This population is very young. 54% are less than 20 years of age.

The population has increased by 1.5 since 1998, thus showing an average annual growth rate of 3.6 % (G.C.P.H, 2009). The birth rate is 50 per thousand and that of mortality 13 per thousand.

Mali is ranked by the United Nations as a Least Advanced Country (LAC) and by the World Bank as semiarid low-income country.

The urban population has reached 20%. 80% of the active population is farmers or animal breeders (Ministry of Land Property and Statistics, 2009, pp. 20).

The gross national product (GNP) of Mali was:

\$18.26 billion in 2011;
\$17.34 in 2010 and
\$16.42 billion in 2009

(Source data are in 2011 US dollars)

The growth rate of the real average gross domestic product (GDP) was 5.5% in 2011, 5.8% in 2010 and 4.5% in 2009. The breakdown of that indicator shows that the growth rate of the primary sector was 4.3% (against 7.3% scheduled), that of the secondary sector 5.3% (against 6.2% scheduled) and that of the service industry 4.8% against (5.9% scheduled).

2.1.4 Energy situation of Mali

Access to energy: the national coverage ratio by the electricity power supply system in Mali is 8%. Very few rural households have access to the power grid. The demand will increase considerably in the next years.

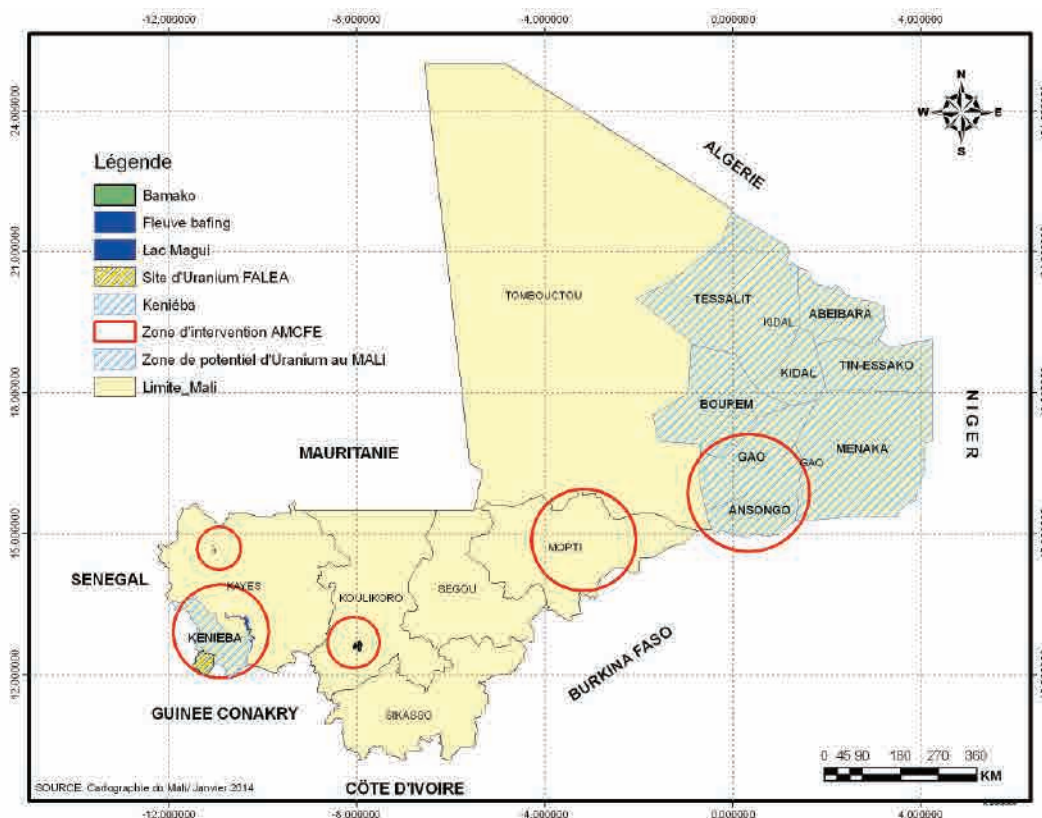
The electricity net consumption is: 0.48TWH (2013). The net electricity generation was 0.52 TWH in 2013, all electricity put together (US Energy Information Administration, 2013).

2.2 Information on the uranium mining region

2.2.1 Overview of the Faléa Council

The Council of Faléa is located in the western region of Mali, next to the boundaries with Guinea and Senegal. Integral component of Cercle de Kéniéba and the Region of Kayes, it is bounded in the north by the Councils of Dabia and Kéniéba, in the east by the Council of Faraba, in the south by the Republic of Guinea, in the West by the Republic of Senegal. The geographic coordinates of Faléa, its main town and headquarters are 14° 44' "0" north and 11° 13' "0" west. It is a small agglomeration 350km away in the west of Bamako and 240 Km in the south of Kayes and some 100 km in the north of Kéniéba which is the closest town (Kamara, 2010, p. 24).

Locations of potential Uranium zones in Mali (AMCFE, 2014)



2.2.2 Administrative and institutional Framework

Created by law n°96-059/AN-RM, that Council is managed by an 11 member municipal council headed by a Communal Bureau topped by the Mayor. It is a grouping of 21 villages, any of them administered by a Chief of village assisted by a village council. Its administrative tutelage is ensured by the Senior District Officer (Préfet) of the "Cercle de Kéniéba". The State representative in the Council is the District Officer (Sous-Préfet) residing at Faléa.



Meeting with the Faléa Municipal Council (AMCFE, 2013)

2.2.3 Main geographical features

The geographic size of the Faléa Council is about 400 Km². Its water erosion-induced relief is made up of plateaus, hills and plains with cohesionless, arenaceous, sandy-argillaceous, cobbly and stony soils. The continuation with the Tambaoura Cliff (600 m) is the culminating point of a landscape having striking resemblance with the foothills of the Alps.

Its climate is of Guinean type, characterized by three seasons: a dry season (March- May), a rainy season (June-October) and a cold season (November-February). Its pluviometry is high, with an annual average of 800 to 1100 mm. The council is criss-crossed by many rivers, among which the most important tributary of the Senegal River on the left bank, the Falémé which has its source in the northern region of Fouta-Djalou in Guinea and which flows into Mali to build a natural boundary between Mali and Senegal.

Every year, from July to January or February, the region is landlocked and isolated from the neighbouring councils and the rest of Mali because of the very unpredictable seasonal flow of that river which is very difficult to cross when in spate. The greater part of the communications is therefore achieved through the Administrative Transmission Network (ATN) equipment from the SDO's Office, the Town Hall or the Community Health centre.

2.2.4 Wildlife and flora

Wildlife is abundant and diversified: lions, panthers, cobas, antelopes, hinds, porcupines, boars, dog-faced baboons, monkeys, boas, caimans, guinea fowls, partridges, sparrowhawks, vultures, silurid, cocoons, etc. The vegetation, of Sudanian type, is made up of arboreal forests and wooded areas, shea trees, bombax, baobab trees, jujube tree, frost grapes, kapok trees etc.

2.2.5 Population

The Council of Faléa is made up of 21 villages inhabited by 17 455 people, thus showing a 2.6% increase rate (GCPH, 2009). The majority of the population is young (over 50% is between 15 and 40 years old) or female (about 62%) and is broken down between the dialonké, malinké, peul and diakhanké ethnic groups.

All the populations of the Council are exposed to the adverse effects of mining, through various forms of pollutions: surface and underground water pollution as well as air contamination.

2.2.6 Economic Activities

The populations here are mainly farmers (cereal growers, fruit-growers), traditional animal breeders, fishers or gold washers.

2.2.6.1 Agriculture

The agricultural practice is slash and burn shifting cultivation and therefore, land reclamation is neglected. What is mainly grown is sorghum, groundnut, maize, acha, rice, cassava, sweet potatoes, etc. Fruit growing is mainly based on mangoes, bananas, papayas, citrus fruit, etc.

Agriculture faces a lot of problems among which its shifting nature, absence of farm credits, lack of technical coaching, absence of other activities and traffic facilities due to the rugged landform of the Council.

In order to improve on the agricultural yield, the populations have suggested following solutions:

- Mobilization of savings and credit;
- Training and coaching of farmers and breeders;
- Supply of farm machinery and equipment;
- Improvement of agricultural practices ;
- Establishment of cereal Banks.

2.2.6.2 Animal husbandry

The traditional breeding is based on cattle of Damant race, sheep, small sized goats, poultry, etc. It is a range-type animal production confronted with problems such as straying of animals, poor medical care, assaults by big cats, etc.

The populations think such animal breeding could be improved through:

- Awareness-raising;
- Establishment of a code of conduct for the breeders;
- Livestock guarding;
- Regular medical follow-up and
- Development of pondages, etc

2.2.6.3 Fishing

It is a traditional fishing practice in the Falémé River. It is carried out seasonally (during the dry or cold season), individually or collectively. It targets fresh-water fish such as carps, tilapias, Nile perches, silurid, etc. There is also hunting and handicraft (blacksmiths, shoe-menders and shoe-makers, woodworkers, jewelers, etc.)

The equipment level in modern manufacturing facilities is very poor, even rudimentary. In spite of the availability of important potentialities (countless plains can be adjusted and tapped). No hydro-farming reclamation has been achieved and the council has so far relatively remained unchanged.

The fact that the council is landlocked and isolated hampers the development of trade possibilities and therefore those of a monetary economy. By way of proof, we can raise the absence of modern mechanism to fund economic activities. There is no institution of microcredit and the incomes of the populations are extremely low.

(AMCFE, 2003, p.23)



Slash and burn cultivation practices, illegal clearing and cultivation on the slopes and in the swamps
(Photo: AMCFE, 2013)

2.2.6.4 Traditional gold washing

Traditional gold mining in placer deposits is also carried out by natives and strangers from everywhere.



Traditional gold washing site (crushing machine and cyanide hole to harness gold)
(Photo: AMCFE, 2013)

Semi-modern or modern gold mining in the bed of the Falémé River.

- The modern gold mining form with the use of dredgers in the deep areas of the River.
- The missions of the MACWE have carried out inspections on various mining sites and the findings are that in the long run, the river will purely and simply disappeared. The pollution rate has reached such an extent that no form of fish wildlife is visible in the neighbourhood of the mining areas.

(AMCFE data collection, 2013 and AMCFE, 2003, p.23)



Mankoungué Site, FAMETAL, Chinese enterprise (Photo: AMCFE, 2013)

2.2.7 Mineral Resources

In spite of the absence of industrial activities, numerous mineral explorations have been carried out for decades because of the existence of huge quantities of various mineral resources. Since the years 1970s, the multinational company GCAM which has become AREVA (French Industry Group in the energy sector, specialized in nuclear and renewable energy) discovered deposits of uranium, copper and bauxite. But the prices on international marketplaces were not interesting enough to prompt their optimal mining.

An overview of the attribution of various prospecting and mining concessions show that mining at industrial level is imminent. In 2007, the Delta Explorations Inc. Company (based in Kamloops, Canada) obtained from the Malian Government a larger scale prospecting and mining permit of these raw materials for the future. From January 2009, Delta Exploration, operates like a Rockgate Capital Corporation (RGT) subsidiary, another Canadian company which has taken a 60% equity stake against 40% for the first company, thus becoming the Vancouver (Canada) based project manager. We are not in the position to check this change, because the companies do not communicate with the public, namely the associations interested in uranium issue in Mali (Kamara, 2010, p. 24).

In 2010, Rockgate issued a preliminary report entitled ***“Advice in the related field of energy”*** rounded out by the international company Golder Associates, indicating that *“Mali provides for a world class environment for uranium mining”* (Rockgate, 2010).

Since 2011, Rockgate has mandated the Marseilles-based and listed on Toronto Stock exchange French Company FORACO to help expand the Faléa uranium exploration drills.

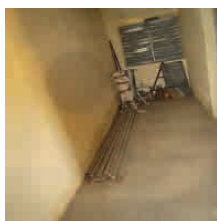
The latest news informs us that Rockgate Capital Corp. has sold the greater part of its shares to Dennison Corporation, a Canadian Company having businesses in Canada, Zambia, Namibia and Mongolia.

This chronological account of events seems to identify a certain commitment of France in the uranium files since Mr. Christian Rouyer, the then French Ambassador once declared that *“Areva would be the future operator of the Faléa uranium mine”* (Vahine, 2013).

2.3 The Faléa Uranium Exploration and Mining Project

The Faléa Project is a joint venture between Rockgate Capital Corp. (RGT) and Delta Exploration. The Malian Government is holder of 10% of the shares. For the time being, RTG is busy carrying out feasibility studies underlying the process in compliance with the Malian requirements and the International Finance Corporation (IFC) performance standards as well as the Ecuador principles. The project area is located next to the village of Faléa (about 1.5 km away from Faléa). The populations deplore the fact that the site was chosen without referring to them, what for a while led to a deep misunderstanding between the populations and the company. But with time and the absolute refusal of the populations to accommodate, the company came back to finer feelings and got in touch with all the stakeholders present in Faléa, namely the Chief of the village, the district officer and the Mayor to apologize and to ask for cooperation.

Today, the Company assists the populations in some of their urgent needs, notably as concerns health care (support in critical medicaments, transport of patients to main hospital centres), water supplies (mending of manual motricity pumps), education (school equipments and repair of classrooms).



Stock of spare parts for the water pumps
(AMCFE, on-site data collection, 2013)



Poll posts on the site (AMCFE, 2013)

2.3.1 Exploration site

The drillings are very deep, from 227 to 350 m. According to the populations, certain drillings were carried out in the fields and fallow lands of the council. Prospections have shown that there are 06 mineralized zones in the north of Faléa, in a depth oscillating between 125 m (Bodi sector) and 350 m (Central Deep sector).

In 2012, Rockgate entrusted the DRA Group, a South-African Company, with a feasibility study related to the Faléa Project referring to about 12,000 tons of uranium, four times the production of the AREVA mine in Arlit (Niger) in 2012.

The 2009 (RO1) report's estimates rather talk of 469 000 tons of 0.076% U₃O₈ ore concentration (sure estimates) and 8.5 million tons of 0.089% ore concentration (most hypothetical estimates). According to the computations of the Commission for Independent Research and Information on Radioactivity (CIRIR / CRIIRAD in its original French term), this accounts for a 6 720 uranium deposit. But these figures could vary with more and more exploratory drilling. The same report reveals that between 1980 and 1981, GCAM has achieved 86 drillings (for a total length of 24 kms) and that between 2007 and May 2008, Rockgate has achieved 149

additional drilling corresponding to 40.9 Kms core drilling. According to other sources, in the end of March 2011, over 315 boreholes were achieved for Rockgate. Moreover, another document issued by Rockgate in November 2011 rather mentions more than 440 boreholes (Rockgate, 2014).

It is in the framework of cooperation between AFCPF and the European Civic Forum of the Swiss Session that CRIIRAD has been requested for scientific support in the Faléa zone (European Civic Forum, 2014).

Thus, with the financial backing of the City of Geneva, AFCPF has been able to purchase professional radiation meters (Novelec gamma DG5 scintillation meter) to launch a civic radiation survey programme in Faléa in 2010 in a bid to record the natural radiation levels before the disturbances of the mining companies. The company has just made propositions related to the infrastructures (Studer, S., 2013).

2.3.2 Infrastructures suggested

Underground mining is considered with following infrastructures:

- Hole or entry pit
- Crushing and grinding facilities;
- Concentrator;
- Water dam;
- Waste storage pond;
- Waste rock piles;
- Pollution control dam
- Fuel and reagent storing area
- Water and power supply facilities;
- Access roads;
- Staff's accommodation and offices.

(Rockgate Capital Corp., 2013)

2.4 On-going activities

RGT has hired Digby Wells Environmental (DIGBY WELLS) to carry out an environmental assessment report in order to identify impacts likely to result from suggested operations as well as mitigation measures.

AUTHORIZATIONS/PERMITS:

For the time being, RGT has no mining authorization or permit. It must conduct a series of studies related to the feasibility of the mining project and to assess the environmental and social consequences of the activity. Such studies do not seem to have progressed much because of Denison Mines Corporation's overentry with over 80% of the shares.

2.4.1 Other contacts

2.4.1.1 Kéniéba:

At Kéniéba, the team went to meet the Mayor, the gold washers and the District Officer (DO). During all these meetings, people showed their eagerness for the mining of uranium in the Cercle Kéniéba with emphasis on economic benefits. This showed that they have been wrongly informed and that they were not aware of the adverse effects of mining on the populations and their environment.



Meeting with gold washers at Kéniéba (AMCFE 2014)

2.4.1.2 Bamako: National Department of Geology and Mine (NDGM)

The team met with the Head of quarries and mines at the National Department of Geology and Mines. It was mainly question of issuing a mining permit so far depending on the submission of the feasibility study report and that of the assessment of environmental and social impact.

2.4.1.3 The Association of Natives and Friends of the Council of Faléa

The meeting took place on the 22nd of March 2014 at the AFCPF's headquarters. The members were joined with a Civil Society delegation which came from Niger to debate with its Malian counterpart on the issue of mining in general and uranium mining in particular.

That was also the opportunity for the participants to commemorate the Nuclear Week and to call on African decision-makers to lay emphasis on human safety as concerns uranium exploration and mining as well as on the equitable distribution of resource revenues. The participants also stressed the necessity of synergy work between the civil society organizations of all the African uranium producing countries

2.4.2 Potential Impacts

According to Rockgate, the potential impacts will be perceptible at the level of:

- Soils (lands): deforestation, reduction of land potential etc.,
- Animals and plants: contamination, loss of biodiversity etc.,
- Dust and noise: air quality;
- Underground and surface water: pollution;
- Populations: migration, health, destruction of heritage etc.

(Rockgate, 2013)

These impacts are not yet documented. Anyhow, Rockgate and the Malian State monitor the quality of drinking water following the raise of core samples affecting groundwater.

2.5 Overview of CRIIRAD's scientific findings

On-site data collection missions and various visits to Malian authorities and technical services have not enabled us (AMCFE) to gather scientific data related to the uranium exploratory phase for many reasons among which the following:

- Lack of appropriate equipment to take samples and conduct analysis in laboratory.

This is why we had to fall back on desk research to discover the 41 page scientific report (N° 11-78 of March 2011) prepared by the Commission for Independent Research and Information on Radioactivity (CIRIR/ CRIIRAD), a French non-governmental and non-profit organization. Thus, independent scientific data, differing from Rockgate's, were drawn from that report. It is so far the only existing independent scientific reference source to have measured radioactivity in Faléa during the uranium exploration phase. Certain data have been synthesized and the greater part of the details are found in the original report (CRIIRAD, 2011).

CRIIRAD's team, made up of Christian Courbon and Bruno Chareyron, went to Bamako and to Faléa between the 19th and the 30th of March 2011 to take samples.

Various findings have been recorded in the N°11-78 CRIIRAD's report bearing on:

- Radiation survey measures carried out by CRIIRAD in March 2011 at Faléa.
- Analysis in the CRIIRAD laboratory of the samples collected in March 2011 at Faléa (water, soils, sediments)
- Visit of the SAL (crushing of the samples from core taking) at Bamako in March 2011 (CRIIRAD, 2011).

Compared to the usual radiation quantity at the ground level, gamma rays output measured with the DG5 scintillation counter on open ground and at ground level generally vary between 30 and 300 c/s depending on the soil content in natural radionuclide of the lines of uranium-238, thorium-232 and potassium 40. When the concentrations of these radioactive elements in the soil are comparable to the mean values of the crustal structure, figures usually vary between 50 and 300c/s (DG5).

At the natural base level in Faléa, gamma radiation outputs measured at ground level and on open ground are commonly in a 150 to 300 c/s (DG5) bracket, thus showing soils with natural radioactivity quite higher than the mean of that of the crustal structure.

Sharp variations are recorded depending on the characteristics of soils. They are higher in the rocks on river shores than in the river bank lands. In GCAM's drilling zones in Dologo 300c/s have been recorded and 330-350 c/s in the older drillings at Biribodie.

Numerous assessments have been carried out in various areas at ground level and 1m above the ground (CRIIRAD, 2011). In the following chapter some findings resulting from these assessments are presented.

2.5.1 Analysis of soils and sediments

The presence of following uraniferous elements has been evidenced:

- **Uranium and its radon daughters** the uranium 238 specific activity is 64Bq/kg. This value is between that of the mean activity of the crustal structure (40 Bq/Kg) and the value commonly recorded in the granitic rocks (200 Bq/Kg). In most of the samples taken, the activity of uranium 238 and that of radium-226 is inferior or equal to 120 Bq/Kg, except

- In the banco of kotore (200 Bq/KG and
 - Above all in the Kanya uranium show (10 700 to 11 300 Bq/kg) thus corresponding to a uranium content of 0.09%.
- **Radionuclide of the thorium 232** line in its radioactive decay cycle shows that actinium-228 and the lead-212 are in comparable levels in most of the cases (balance line).
 - **Potassium 40:** Measured values are inferior or equal to the mean activity of the crustal structure (300 to 600 Bq/Kg) except in two samples:
 - Sediments from the bottom of the Foukoura pit (960Bq/kg) and
 - The rocks on the banks of the Kangouroume River (2830Bq/kg).

NB: According to the authors, the construction of these differences falls out of the scope of the present study.

- **Artificial radioactive elements:** Only one emitting radionuclide has been detected, the cesium-137, the physical half-life of which is 30 years, meaning that its radioactivity is divided by two every 30 years.

However, the cesium 137 has not been detected in the rocks, in the banco from the quarry, nor in the sediments from the bottom of the pits, thus confirming its cleaning out in March 2010.

(CRIIRAD, 2011)

2.5.2 Analysis of surface and sub-surface water

Nine water samples have been considered, four of which from surface water used for watering or irrigation (Kouregoe River at Faléa) or as drinking water (Siraya River, Kangouroume River at Toureta, resurgence of the bed of the river (backwater) used for potable water.

- 4 subsurface water sources used for drinking water: artesian well water at Faléa (ME12), Borehole water, School (ME14) and at the Sous-préfecture (ME15) at Faléa, well water at Foukoura (ME17) which is no longer in use because of contamination by water from a Rockgate prospecting borehole;
- A non-consumed surface water (ME9) but located next to the Kanya uranium site.

Uraniferous elements discovered:

- Uranium 238:

The concentration in uranium-238 is inferior to the lower limit of detectability (<0.2µg/l or microgram per litre) in all the water samples except in the surface water close to the Kanya showing. Even in this case, the concentration in uranium (0.6µg/l) remains inferior to the values recommended by WHO as concerns human drinking water which is (15µg/l).

In Kanya, drinking water is fetched more downstream in a backwater of river fed by river resurgence. At that level, the concentration in uranium is inferior to the detection limit (<0,2µg/l).

- Dissolved Radon-222:

Radon-222 is a radioactive gas soluble in water. It is related to the decay of radium 226 associated with uranium 238. Its physical half-life is 3.8 days, which means that in a closed vial, radon activity concentration will be divided by two every 3.8 days. CRIIRAD therefore expresses the findings by reconstituting the starting value from the time that has elapsed between the sampling and the analysis.

Due to elapsed time between the sampling and the laboratory test, the lower limit of detectability is relatively

high (9 to 20 Bq/l. Radon-222 is detected in four of the nine samples, but with detection capability limit values, tainted with very strong uncertainty (next to 50% and even more).

The assessments carried out in an artesian well and a drill water at Faléa are respectively 14 to 34 Bq/l, 35Bq/l, and 72Bq/l in the surface water close to the Kanya showing in the resurgence used for drinking water at Kanya. Only this last finding is really weatherwise meaningful.

On the 20th of December 2001, the European Commission (EC) made recommendations on the protection of the populations against exposure to radon in drinking water, specifying that *“small quantities of radon are so omnipresent in water that no remedial measure should be required if the concentration is less than 100 Bq/l”*

Radon-222 activity in surface and subsurface water tested in Faléa is less than 100 Bq/l, but at certain points, it is of many tens of Bq/l, which could provoke a serious exposure. Considering the great natural fluctuations of dissolved radon-222 activity concentration in surface and subsurface water, only a long term monitoring could lead to significant findings.

Radium-226 and lead-210 is inferior to the detection limit in six water samples taken (see CRIIRAD’s report). (CRIIRAD, 2011)

2.5.3 Visit to SAL laboratory in Bamako and concerns about the risks related to treatment of radioactive core drilling at Faléa and Bamako

In line with the exploratory works carried out at Faléa, Rockgate Company achieved many boreholes and core drillings in the soil in order to specify the locations and ore content of uranium and other metals in the deposits.

According to the (RO1) report, in 2008, Rockgate achieved 149 boreholes for a total length of 40 900m (40.9 km). From a first communiqué issued by Rockgate in 2011, this number has risen to 441.

The first tests carried out on 149 boreholes, 131 of which intersecting the six mineralized zones were used for resource evaluation. The mineral depositions were 0.5 to 13.5 meter deep. Each drill is marked by the initials DF (Drill Faléa) followed by a three figure code.

Core drillings are conveyed to Rockgate’s site at Faléa where they are washed, photographed, and marked at every one meter. The modal length of a sample is 0.5 to 1.5 meters. Core samples are sawn and the samples to be analyzed are fitted into plastic bags by a Rockgate geologist. The bags are then put into plastics and sent to SAL Chenex Company in Bamako. The shipment is made by truck or plane. SAL carries out pretreating of the samples and the ore pulp is then conveyed to Eco Tech Lab in Canada for Inductively Coupled Plasma Atomic Broadcast Spectroscopy (ICP-AES) analysis of the 35 elements. Part of it is sent to Vancouver SAL Lab to be examined by X-rays. The wastes are sent back to Faléa for long term storing.

The report indicates that at the beginning of the programme, part of the samples was taken to SAL Bamako before being sent to ALS South Africa for analysis. Besides, a load of 150 semi-cores have been sent straight away from Bamako to Eco Tech (Canada for analysis).

The remaining half-cores and non sampled cores are stored in metallic crates on the Faléa site.



Photo: AMCFE, 2013

2.5.4 Assessments carried out in Bamako by CRIIRAD

The CRIIRAD team toured SAL Lab in Bamako in March 2011. According to an SAL technician, as soon as received, core samples are controlled by a Ludlum survey meter. If the contact dose rate is above $5\mu\text{Sv/h}$, the samples are not treated on the spot, but conditioned and sent to the laboratory in South Africa. SAL Lab in Bamako can treat only the samples whose radioactivity is inferior to that value. SAL technician offhand disclosed that the highest values were $19\text{--}20\mu\text{Sv/h}$, 170 times higher than the on-site radiation level recorded by CRIIRAD ($0,115\mu\text{Sv/h}$).

CRIIRAD has been able to record some dose rate flows ((LB123 Berthold proportional counter tube) in the workshops and in the buckets storing zones before their dispatching. On contact with a barrel of samples in Faléa, the Hp10 dose rate was $8.5\mu\text{Sv/h}$ and $1.94\mu\text{Sv/h}$ on contact of a bucket. These figures are respectively about 74 and 17 times higher than the ambient natural dose rate recorded on the site.

- **Necessity to assess radiation risks.**

Because of the exploratory nature of the visit, CRIIRAD has not been able to scrutinize the core treating process and simply recommended to the Company to be vigilant with the issue of radioactive dust and radon.

The CRIIRAD measurements with a radiameter confirm the fact that some cores from Faléa received in Bamako show a radioactivity rate many times higher than the standards (over 170 times according to the testimony of the SAL Representative mentioned above).

A press release (R03) issued by Rockgate on the first of November 2011 claims the discovery in the northern zone of the Faléa deposit, in the depth of 292 m, of mineralizations with 1.51% U_3O_8 content which, according to our computation, correspond to 160 000 Bq/Kg for uranium 238 or more than 2.2 million Bq/Kg, taking into account its short-lived daughters (see report).

Another Rockgate's document (R02) reveals that certain mineralizations contain 6.45% of U_3O_8 which, according to CRIIRAD's computations, correspond to 684 000 Bq/kg for uranium-238 or over 9.5 million Bq/Kg, taking its short-lived daughters into account.

In short, it is certain that radioactive materials are carried from Faléa (Bamako), treated in Bamako in the SAL Company and sent to other sites in Canada or in South Africa.

2.6 Impacts of prospecting activities

Prospecting activities have a significant impact on environment. Besides the evident disruption of populations' ways of life, there are risks of water source contamination and pollution. Extracted radioactive materials are treated, shipped to Faléa for storage. The impact of such activities needs to be supported with documentary evidence.

2.6.1 Impacts of treating and coring operations

As concerns core drilling, CRIIRAD raised a certain number of concerns about radiation safety of the personnel having carried out boreholes, handling, sorting out, washing, sawing of radioactive core drillings and their shipment to Bamako. The same concerns are still valid concerning the Bamako staff that treats the samples in SAL Company.

Another aspect of CRIIRAD's preoccupations is to know whether the staff in Bamako and Faléa has received an appropriate training on radiation safety such as evaluation of external and internal exposure through inhalation of radon and other radioactive dusts. The visit to the site shows for instance that for the time being nothing has been done to assess the risks induced by inhalation of radon or dusts.

2.6.1.1 Impact of core treatment operations on environment in Faléa

According to CRIIRAD (2011), the radiological impact of the Faléa Rockgate core drilling storing site must be assessed:

- 1). Is there any mechanism or device to harvest rain waters likely to stream on the radioactive core samples stored in free air at Faléa? The answer is initially "no" when one looks into that picture (see report)
- 2). How are waste waters managed after core washing? Is there any contaminated water and mud reclamation mechanism?
- 3). What are the values of gamma radiations rates as well as the radon-222 and radioactive concentration next to the storing zone and in the buildings in the camp where the samples are stored (see picture).
- 4). How is Rockgate planning to ensure the storing of radioactive cores and other samples in Faléa, knowing that radioactivity of these materials is eternal (uranium-238 half-life is 4.5 billion years)? In the event of Rockgate's bankruptcy how will the wastes stored in Faléa be managed?

2.6.1.2 Impact of core treatment operations on environment in Bamako

The radiological impact of the activities carried out on the SAL site in Bamako must also be assessed.

- 1). What are the values of gamma radiation rates as well as those of rado-222 and radioactive dusts concentrations in the vicinity of the site?
- 2). Is there any waste waters reclamation or control mechanism before their dumping on the environment?

From the foregoing, everything leads us to believe that in Faléa and Bamako, there are real environmental contamination risks through spreading of radioactive dusts and radon-222 in the atmosphere.

It is proven that, even when natural, radioactivity is not innocuous. At the international level, it has recently been established that there is a close relation between lung cancer death rate and the inhaled dose of radon, a radioactive gas and indirect decay product of thorium or uranium. This relationship between the risk and the dose is straight-line, without threshold, and the risk appears even in very low dosage (a few mSv/year).

This is why, in order to reduce natural radioactivity-related health hazards, some countries have implemented an ad hoc regulation and triggered concrete actions (monitoring of radon build-up in the habitat, regulation on building materials natural radioactivity).

In the knowledge of these various results and findings recorded, CRIIRAD (2011) has suggested specific recommendations concerning the Faléa case, namely to identify uraniumiferous showings and inform the populations of Kanya so as to prevent them from staying unnecessarily close to that irradiating mineralizations (dose rate $1.2\mu\text{Sv/h}$ in a distance of one meter and $6.38\mu\text{Sv/h}$ on contact, thus amounting to radiation rates which are 06 and 30 times higher than the standard background level).

Spending cumulatively ten hours or so in a year one meter away from that mineralization would account for an external irradiation superior to 10 microsieverts, value acknowledged by the May 96/29 Euratom assessment guideline as threshold between “negligible and non negligible irradiation”. According to that assessment guideline, this $10\mu\text{sverts/year}$ value applies to the impact analysis of nuclear practices or activities and not to the management of the natural radioactivity-related hazards. As concerns the other spots assessed by CRIIRAD, the dose rates one meter above the ground are between 0.13 and $0.24\mu\text{Sv/h}$.

Radioactive mineralizations are likely to rise on the surface on the spots which have not been controlled. It would be desirable if companies carrying out radiometric records make their mapping available so as to check if there are other places where radioactive minerals are raising to the surface.

The independent radiometric work carried out by AFCPF volunteer teams on site in Faléa using professional scintillation counter one meter above the ground and on ground contact should be equally encouraged. The knowledge of these data will enable the authorities to take appropriate safety measures, if other uraniumiferous showings were detected on the surface.

2.6.1.3 Control of radon rates in the habitat

Besides external exposure to gamma rays, another exposure route of the populations to natural radioactivity is the inhalation of a radioactive gas, the radon gas given off by soils and building materials containing uranium and which is likely to build up in confined habitats. In this respect, it would be useful to carry out radon control in Faléa, primarily on banco houses, with regard to uranium and thorium ore content of this natural material.

In March 2011, CRIIRAD provided AFCPF with specific detectors to help the Association carry out campaigns of radon assessments in the habitat (CRIIRAD, 2011).

2.6.1.4 Monitoring the quality of waters

As concerns consumed waters, the first results collected in the framework of CRIIRAD’s survey show that uranium ore contents are very low and more often below detection limits ($<0,2\mu\text{g/l}$). Furthermore, there is dissolved radon-222 with activity concentrations of many tens of Bq/l in some of the samples (mainly in the water from the river used by the Kanya village (72 Bq/l)).

It would be advisable to monitor radon rates in the waters of the region to confirm the first measurements, since dissolved radon concentrations may vary strongly in the course of the year with climatic and hydrological conditions (CRIIRAD, 2011).

2.7 Recommendations to reduce prospecting activities-related hazards

It is urgent to raise awareness on the impact of prospecting activities of boreholes achieved by Rockgate since 2007. The implementation of these in-depth boreholes/drill-holes is actually likely to alter underground water circulation and to bring together low radioactive waters and rocks tainted with uranium and other radioactive heavy metals. Uranium is associated with 13 other radioactive materials, 12 heavy radioactive metals and a radioactive gas, the most radiotoxic by ingestion being lead-210 and polonium-210.

Boring is likely to make contaminated water rise to the surface at the radiological and chemical level as well as other radioactive solid substances (muds, drill cores). Cases of boring impacts have been reported by the populations, among which the following:

- At Foukoura, a Faléa village where waters from a wildcatting have flown into a traditional well which has since been considered as tainted and contaminated. In spite of Rockgate's denials, this accusation has been implicitly acknowledged through the three-time cleaning out of the well and the regular grant of a water tank vehicle to make up with the desertion of the traditional well.
- On another drilling site implemented on behalf of Rockgate, waters have overflowed long after the end of the works. The populations report that three of their livestock that drank that water died. Questioned on that issue, the geologist representing Rockgate said he could neither confirm nor invalidate that testimony. But, Rockgate sent an observer to meet the populations.

2.7.1 Other recommendations

- Urgent need to revisit the regulatory framework in cooperation with the State Engineering Department. The talks between CRIIRAD and competent authorities resulted in the conclusion the regulation in force in Mali did not make environmental impact assessment binding at the exploratory phase. The engineering Department does not cooperate efficiently and exploration permits are issued on protected areas. This is why CRIIRAD has required the publication of the convention binding the State and the Enterprise.

CRIIRAD has asked for a regulatory reform making compulsory the:

- exploration permit
- hydrological and hydro-geologic studies (ground zero);
- impact assessment of boring/drilling operations;
- description of drilling techniques to be implemented and the precautions taken to reduce underground and surface water pollution risks, to securitize boreholes, to manage liquid effluents and solid wastes generated by mining operations.
- The exact detailed composition of substances used by mining companies as injection water adjuvant ;
- Comprehensive radiological and chemical assessments of representative samples of various drill types;
- Need to empower and to reinforce independence of the administrative services;
- Need to carry out regular field controls of radon in ambient air (visual, using radiometer)
- Sampling of drill water in order to analyze chemical parameters (negative and positive ion, heavy metals, hydrocarbons etc) or radiological parameters (alpha and global beta activity index, dissolved radon-222, uranium, radium-226, lead-210 and polonium 210;
- Need to improve on dialogue with the populations and to remediate to Rockgate's deficit of transparency in communication, to carry out appropriate studies and make the findings public (radiological ground zero, hydro-geological studies, assessment of the impact of prospecting activities etc.)
- Need to reinforce competent State services supervisions, namely the Malian Radioprotection Agency (MRPA) which has carried out three missions to Faléa, even though they did not generate specific scientific data. It

has never been able to answer the query on the impact of hundreds of samplings on the radiological and chemical quality of local waters.

In brief, CRIIRAD study (2011) was aiming at drawing an inventory of fixtures in Faléa in order to have independent data which should differ from those of the manufacturer and the State services.

Radiological assessments carried out by CRIIRAD in March 2011 in the Faléa region and analysis of soil samples, sediments and water do not reveal any preoccupying radiological situation (for the moment). In Faléa and its surrounding areas, natural radioactivity is more often superior to the mean of the crustal structure, but comparable to that recorded in France, etc.

According to Rockgate, uranium deposits in Faléa are in-depth (125 to 350 m). As long as they will not have outcropped, radiological risks will be limited for the populations, except for the rare places where they float to the surface. In such a case, as what happens in the Kanya showing at the edge of the plateau, radioactivity increases sharply (contact radiation rate 20 times higher than that of surrounding lands). This shows the threat the populations and environment would face in the event of thousands of tons of radioactive rocks rising to the surface.

These risks are even already there since the prospecting activities implemented on behalf of Rockgate cause the outcrop of highly radioactive materials (Over 9 million Bq/Kg in some cases). Radioactive cores from over 440 boreholes are stored in Faléa and the wastes generated by their treatment and analysis in the labs in Bamako, South Africa or Canada, according to Rockgate, would be brought back to Faléa to be stored on surface in prospection camp. But what is the future of that storage? (CRIIRAD, 2011, p. 41)

The prospecting phase of uranium in Mali by Rockgate has not been transparent, neither from the State nor from that mining company. The drills carried out have not been managed with professionalism, hence mudflow slides carried by runoffs into a traditional well and the death of a number of animals.

Another important aspect is the lack of framework for concerted actions between the State, the company, civil society organizations and the resident communities, which has resulted in:

- Poor involvement of technical services;
- Insufficiency of the existing regulation;
- Lack of transparency in the implementation of exploration activities;
- Lack of information and sidelining of the populations in the decision-making process and their safety;

In addition to various recommendations and findings drawn from this case study, we find it necessary to appeal to all walks of life to warn decision-makers in uranium-producing and consuming countries to take up their responsibilities as concerns uranium prospection and mining.

AT INTERNATIONAL LEVEL:

- Highly uranium intensive-consuming countries must acknowledge their responsibilities for the degradation and disadvantaging of ecological, socio-economic and cultural conditions of the communities living in mining areas.
- These consumer countries and users should establish compensation funds for African uranium-producing countries.
- These countries should generate renewable energies and invest in renewables, also taken into account the nuclear accidents which happened in Chernobyl in April 1986, Harrisburg in March 1979 and Fukushima in March 2013.

AT REGIONAL LEVEL:

- To reinforce the emerging networking and synergy of actions between various actors in African countries concerned with uranium exploration and mining.

AT NATIONAL LEVEL:

THE LEGAL FRAMEWORK:

The Government should review the mining code with emphasis on:

- The Environmental and Social Impact Assessment prior to the establishment of mining projects;
- The putting in place of financial mechanisms to ensure the waste disposal, the protection and compensation of the resident communities and regarding the reclamation of sites after mining;
- The involvement of resident communities in the decision-making process,

CAPACITY BUILDING ON ALL LEVELS

- Reinforcement of capacity building of Malian stakeholders (State, respective organizations and individuals, civil society, etc.);
- Organization of information, awareness and education campaigns for the population groups interested in the project
- Setting up of a civic and advisory watch committee in Faléa, which should act as interface between uranium mining companies and all the other stakeholders in the civil society.

3| URANIUM EXPLORATION IN CAMEROON



Both photos: David Bayang, 2009, Poli



Photo: Thorsten Nilges, 2013, Teubang

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ABSTRACT

This case study on Uranium exploration in Cameroon is based on information collected on the field, online and in the capital of Cameroon since 2008, as well as on an analysis by the Commission for Independent Research and Information on Radioactivity (CRIIRAD) ordered by the National Justice and Peace Commission in 2014. Sites visits for this specific study have been undertaken in May and August 2013 in Poli (Northern Region) and February and August 2014 in Teubang (as well in Chad).

Cameroon is very rich in natural resources such as timber, oil, gas and ores. In 1977, with the extraction of the Rio del Rey hydrocarbon pool oil, it has been acknowledged as an oil-producing country. Cameroon experienced its most active period between 1980 and 1985 when it achieved the peak production of 182,000 barrels per day and thus became an oil-exporting country (Chauvin 2012, p. 1).

Apart from petroleum development, geologic field investigation works carried out since the colonial times and other mining inventory works carried out after 1960 have revealed the existence of many other ores throughout the country. Cameroon's subsoil is therefore extremely rich in various natural resources; three ore deposits of worldwide importance have been acknowledged (cobalt, nickel, rutile and bauxite) as well as a potential of gold, sapphire, diamond and even significant deposits of iron, uranium etc.

For a very long time, these mining resources have not been really put into production at the industrial scale and have thus been of marginal importance for the country's economy. But things have evolved and mining perspectives are becoming more and more attractive to mining companies and foreign investors. Better prospects for big industrial extraction projects are looming large.

From 1977 to 2014, Cameroon population has tripled to become 20 million inhabitants to-day (Ministry of Economy, Planning and Regional Development (MINEPAT), n.d., p. 17). Energy deficit has become crucial. The field season has been reopened. No stone should be left unturned, provided the resources discovered supposedly bring Cameroonians wealth and improved their living conditions. The mining sector is one of the most important pillars of the Cameroonian government's plan to become an emergent country in 2035 (MINEPAT, 2010, pp.58-59). We have decided to focus our attention especially on the exploration of uranium.

Let us recall that exploratory expeditions in 1958 consisted in a radiometric flight over the zones which were likely to reveal uranium deposits but the explorations were cancelled in 1987 because, according to the Cameroon Government, of the drop in uranium prices (Meadon, 2006, p. 8).

In 2006, « Nu Energy Corporation Cameroon » Company, Mega Uranium Limited branch, a Toronto-based mining corporation, took interest in Cameroon uranium ore and was granted a prospecting license. Nu Energy Corporation Cameroon (NECC) then started its uranium exploration activities in Poli, Teubang and Lolodorf (NU ENERGY CORPORATION, 2006, p.43). On the way, Nu Energy Corporation Cameroon changed its name and became Mega Uranium.

In 2013, prospecting once again went to a stop as backlash of the Fukushima disaster in Japan. Uranium ore was no more attractive (CRIIRAD, 2014, p.1). Mega Uranium closed down and some 500 workers became jobless (GREDEVEL, 2013). At that time, about a hundred drillings and ditches were completed. Fatal accidents happened at the worksites and there was environmental stress due to mining operations (SNJP, field visits 2009-2013). Resident populations were torn between potential economic benefits generated by the mining of uranium and the psychosis of the consequences of an ore which is dangerous for mankind.

3.1 Brief introduction of Cameroon

Cameroon is a sub-Saharan African country situated between the 1°40 and 13°05 of the northern latitude on the one hand and the 8°30 and 16°10 of the eastern longitude. Its general shape is a triangle whose basis follows the 2nd northern parallel in the equatorial basin and with the summit in Lake Chad. It stretches on more than 1250 km. At the centre of the Gulf of Guinea, Cameroon is the junction between Central and Western Africa. Its geographical situation, the diversity of its ecosystems, of its populations and culture make Cameroon an Africa in miniature.

Cameroon stretched out on a surface of 475 650 km², from the steppes to equatorial forests. It has a 300 km long coastline to the Atlantic Ocean and shares 1700 km long border line with Nigeria. The other neighboring countries are Chad in the north-east (1100km), the Central Africa Republic in the east (800 km), Congo (500 km) and Gabon (300 Km) in the south and the Equatorial Guinea (200) in the south-west.

According to estimates from the National Department of Statistics, its population was about 18 467 692 inhabitants in 2008 with a density of 38.8 inhabitants per square km. Francophones are predominant with 80% of the population against a minority of 20% of Anglophones. There are about 53% of Christians (35% of Catholics and 18% of Protestants), 25 % of animists and 22% of Moslems.

At the socio-economic level, the GDP (Gross Domestic Product) per capita was about 1.327 US dollars in 2011 (IBRD, 2014, p.34). Further social (human) development indicators are life expectancy at birth, which still remains at 55 years, and an alphabetization rate at 67.9 %. The 2013 UNDP Human Development Report ranks Cameroon 150th out of 177 countries and classified it as “Low Human Development” (UNDP, 2013, p.15 and p.18).

The institutional and political organization of the Republic of Cameroon is based upon law n°16/06 of January 18, 1996 amending the June 02, 1972 Constitution.

The preamble of that Constitution proclaims Cameroon’s attachment to the fundamental and universal democratic principles, to the principles of the African Union and those provided for in the Charter of the United Nations. The people of Cameroon affirms its attachment to the fundamental freedoms enshrined in the Universal Declaration of Human Rights, the Charter of the United Nations and the African Charter on Human and Peoples’ Rights, as well as all duly ratified international conventions relating thereto.

3.2 Energy generation in Cameroon

With 994 terawatts per hour, Cameroon is endowed with an important hydroelectric potential, the second already explored in Africa, after the Democratic Republic of Congo with 1000 terawatts per hour. Cameroon is said to be now growing into becoming an energy power with its important hydroelectric resources and renewable energies. But on the contrary, its hydrocarbon resources are rather low.

According to various administrations, official statistics reveal that the country's deficit in energy generation flickers between 520 and 650 megawatts (about 40 GWH annually).

The capabilities of the existing plants are only up to some 1 337 megawatts, with a commitment to reach 5 000 megawatts by the years 2020. Cameroon is the second hydroelectric potential in Sub-Saharan Africa valued only by less than 5% (less than 1000 MWH of the power installed in 2010).

Unfortunately, the country suffers a deficit of about 3000 MW, while generating only 900. To generate electricity, Cameroon has:

- Three hydroelectric plants which generate 720 W: Edea: 264 MW; Songloulou: 384 MW; Lagdo: 72 MW;
- 11 thermal power plants and other isolated ones generating 213.6 MW. Thus, the total wattage of energy generation in Cameroon is about 993.6 MW (Sources: Arsel: (Electricity Regulatory Agency).

In the next 20 years, Cameroon Government is planning to generate 15-20 000 MW to be sold to neighbouring sub-region countries. Besides the electric power distributed by AES Sonel, Cameroon also resorts to new energies, referred to as renewable, among which the following:

- Biomass which accounts for the 65% of all the quantity of energy consumed by sectors I, II and III as well as the households;
- Alternative energy, namely solar energy which is abundant and available throughout the whole territory and wind energy with very favourable sites in the North and Far north regions;
- The minihydraulics with the capabilities of less than 10 MW provides an exploitable potential of 1.115 TWH, particularly in the eastern and western regions. They are able to supply the regions which do not have access to interconnected network, at a low cost;
- The wattage of the Kribi natural gas-fired Plant is 150 MWH;
- The Logbaba gas-fired plant in Douala is operational since 2011. Cameroon has not found it necessary to carry out the gas mining initiative called "gaseous hydrocarbons Development Project";
- Cameroon is also a small oil-producing country. The hydrocarbon sector in Cameroon is mainly managed by the National Hydrocarbon Company (SNH).

(ARSEL, 2014, pp.1-3)

3.3 Cameroon mineral potential and leasing of uranium sites

The wealth of the subsoil makes Cameroon very attractive (a). About twenty companies in search of uranium deposits are now prospecting in Cameroon (EITI, 2013, p.17) (b). According to Cameroon EITI Reports (2009, 2010, 2011) none of the later on mentioned prospecting companies is paying more than 55,000,000 FCFA (100,000 US \$) per year to the Government.

3.3.1 Cameroon's mineral potential

Cameroon abounds in at least 52 mineral substances already acknowledged with more or less important mining targets for any type and a ratio of studies to find out indicators. Cameroon subsoil comprises:

- **Precious substances:** gold, diamond, sapphire and platinum.
- **Energetic substances:** oil, natural gas, brown coal, kerogen shale and uranium.
- **Metallic and connected substances:** titanium, aluminum, cobalt (52 million of tons, according to investor/explorers), nickel, chrome, manganese, lead, zinc, copper, tin, tungsten, pyrophorus columbotantalite, barium, arsenic, antimony, zirconium, exceptional lands.
- **Industrial minerals:** disthene, nephelinite, kaolin, phosphate, pyrites, salt, mica, olivine, asbestos, talc, garnet, topaz, graphite.

No exhaustive assessment of potential has been carried out on any of these substances. But 18 of them have undergone at least an evaluation likely to qualify them as deposits: oil, bauxite (sixth resource worldwide), titanium, disthene, cobalt/nickel, natural gas, gold, tin, uranium, iron, limestone, marble, pozzolan, sand, clay, stones as material, water.

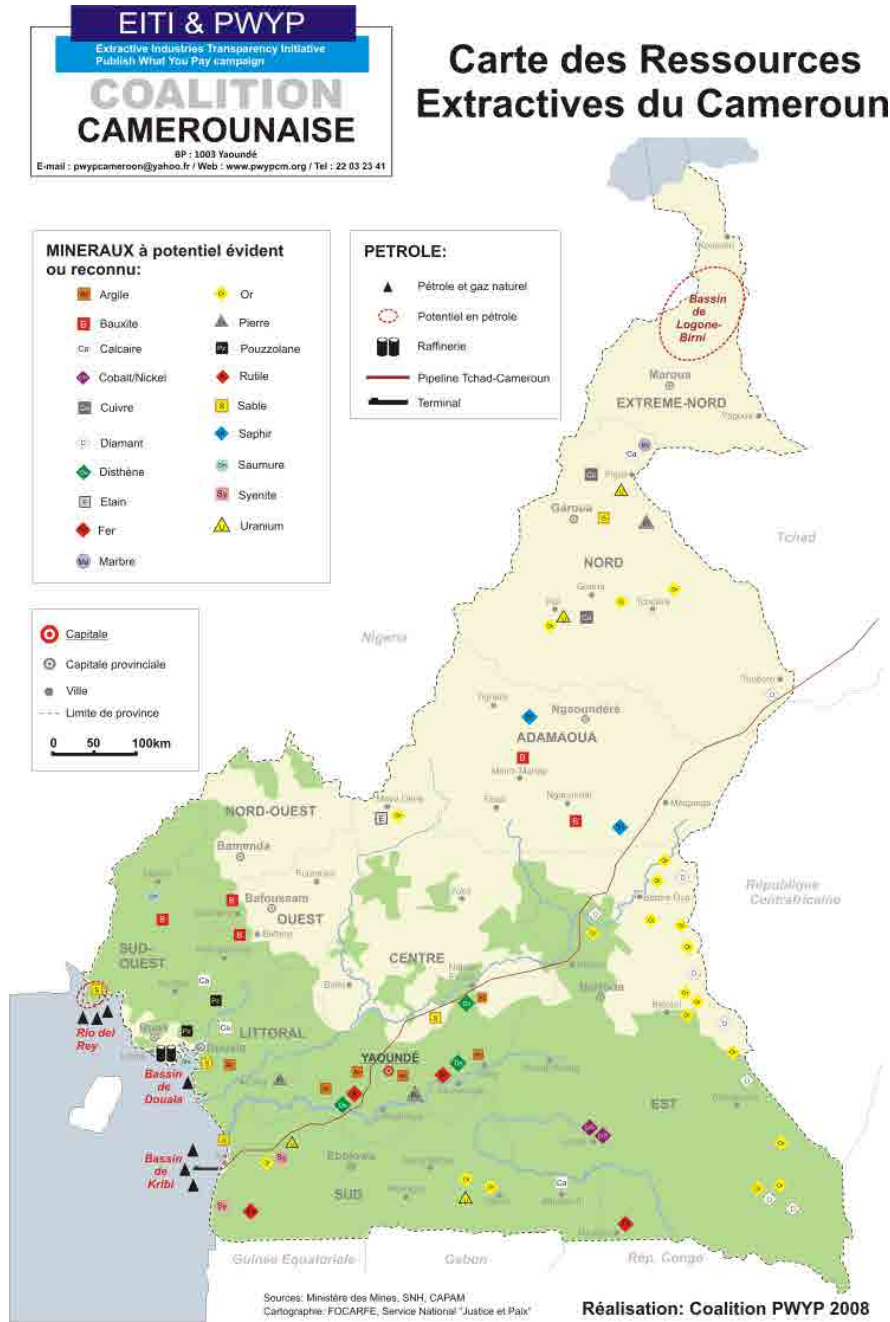
Cameroon has currently three acknowledged deposits of worldwide importance: bauxite, cobalt/nickel and rutile. Its gold potential seems very important. This mining potential is located in 40% of the national territory on which exploration has been conducted. The remaining 60% still have to be prospected. "The development of the mining sector, with its spill-over impact on the rural sector and its relative importance in the economic structure of the country, represents a significant foothold for the creation of wealth, employments and for the fight against poverty". Information collected from the Ministry of Mines, Industry and Technological Development reveal that the Government has already granted 166 prospecting licenses, 05 mining licenses, 70 quarrying licenses (MINMIDT, 2014).

(MINEPAT, 2010, pp. 24-27)

3.3.2 Location of uranium exploration sites

The trail of uranium is picked up in all the ten regions of Cameroon: Centre, Littoral, South, East, North-West, West, South-West, Adamawa, North and Far-North. Uranium is found almost everywhere in Cameroon. In some places, it is found in detectable presence or in deposits (Lolodorf in the south), Poli (in the north).

Map of Extractive Resources in Cameroon



Map of extractive resources in Cameroon, PWYP Cameroon, 2008

(NU ENERGY CORPORATION, 2006, pp. 8 – 12)

3.4 Uranium exploration in Cameroon

Mining operations are preceded by prospection/exploration activities aiming at discovering and giving evidence of the existence of ore deposits, locating and mapping them out, assessing their importance, the feasibility and viability of their commercial development. The legal framework governing such agreement is based upon a special legal instrument, the Mining Code, as well as other related regulatory texts.

3.4.1 Global exploration Context

Talking of uranium frightens. Just to think of the adverse effects of nuclear makes people shiver. Niger is now the fourth uranium-producing country in the world, Namibia the fifth, Malawi the eleventh and South Africa the twelfth! The African continent is therefore an impressive potential of uranium deposits (WNA, 2013).

The recent rediscovery of important deposits has breathed in a new impetus as well as a new national development policy. Many investors have already initiated talks for the conclusion of a mining agreement in order to obtain a mining license.

Cameroon has been carrying out uranium exploratory prospections for quite a long time. For the time being, there is no uranium extraction project in Cameroon. There is only an intense prospection activity going on over the national territory. It is therefore difficult to give a reasonable estimation of the reserves of mineable uranium ore.

There are at the moment two main uranium projects in Kitongo (in the north) and in Lolodorf (South) whose reserves are estimated as follows:

- Kitongo: 13 125 tons
- Lolodorf: 11 000 tons
- Minimal ore content of the deposit: 0.10%. The ore concentration of the uranium deposits acknowledged worldwide flickers between 0.05 and 0.5% (Mega Uranium, 2014).

3.4.2 Situation of other uranium ore titles in Cameroon

34 mining exploration licenses have been so far issued to various companies.

List of uranium ore exploration permits granted to various companies

N°	Holder	Location	N°	Nature of Substances	Surface area (km ²)	Award / Renewal/ expiry date	Country of origin
01	AFRICAN AURA RESOURCES SARL PO Box 14364 Yaoundé	BATOURI	101	Gold, silver, Cu, Pb, Zn, u, diamond, platinum group metals	296,45	15/03/11 – 14/03/13	Great Britain
02		POLI	95	Uranium, gold and base metals	402	25/05/11 – 24/05/13	
03		LOLODORF	98	Uranium, gold and base metals	152	25/05/11 – 24/05/13	
04	MEGA URANIUM PO Box 14 055 Yaoundé	TEUBANG	127	Uranium, gold and base metals	216	24/04/12 - 23/04/14	Canada
05		GOUNA	148	Uranium and mineral associated substances	91	10/11/10 - 09/11/12	
06		SALAKI	149	Uranium and mineral associated substances	404	10/11/10 - 09/11/12	

07		NKI	206	Uranium, gold and base metals	991	07/07/10 - 06/07/13	
08	CAMERICAN MINING PO Box 3789 Douala	MONGUELE	207	Uranium, gold and base metals	980	07/07/10 - 06/07/13	Australia
09		BADEKOK	208	Uranium, gold and base metals	964.2	07/07/10 - 06/07/13	
10		AKONOLINGA	112	Or, uranium, MGP base metals	241.6	18/07/11 - 17/07/13	
11	CAMINEX PO box 14 36 Yaoundé	DJOUM III	115	Gold, uranium, MGP base metals	242.5	18/07/11 - 17/07/13	Great Britain
12		NTEM	138	Gold, uranium, MGP base metals	245	26/07/12 - 25/07/14	
13	RIDGEWAY ENERGY LTD PO Box14364 Yaoundé	ESSONG	134	Uranium, gold, iron, MPG, diamond	252	26/07/12 - 25/07/14	
14		MBANGA	172	Molybdenum, u, gold, iron, base metals, PGE, diamond	1000	16/08/08 - 15/08/11	Great Britain
15	EAST MINING CORPORATION B.P. 442 Bertoua	MEDOUM	142	Cobalt, nickel, gold uranium, iron and other base metals	839	06/08/10 - 05/08/12	Cameroon
16	FER DU CAMEROUN PO Box 6650 Yaoundé	BATEKA	137	Iron, uranium, gold and other base metals	1000	09/07/10 - 08/07/12	Cameroon
17	XPLOR – TECH PO Box 1921 Yaoundé	TEUBANG II	161	Uranium and related substances	1000	08/12/11 - 07/12/13	
18		MAYO OULO	160	Uranium and related substances	1000	08/12/11 - 07/12/13	
19		ENDOM	169	gold, iron, uranium, base metals and other related substances	363	16/11/11 - 15/11/13	
20		DJA	168	gold, iron, uranium, base metals and other related substances	1000	16/11/11 - 15/11/13	
21	VENTURE CAPITAL PLC PO Box 15 167 Yaoundé	MVANGAN	167	gold, iron, uranium, base metals and other related substances	1000	16/11/11 - 15/11/13	
22		BENGBIS	166	gold, iron, uranium, base metals and other related substances	1000	16/11/11 - 15/11/13	
23		LOKOMO	184	gold, iron, uranium, base metals and other related substances	1000	24/02/09 - 23/02/12	
24		EKOK	185	gold, iron, uranium, base metals and other related substances	1000	24/02/09 - 23/02/12	

25	CAPAM HOLDING PLC PO Box 15620 YAOUNDE	KRIBI SUD	204	Uranium and related substances	882.32	06/07/10 – 05/07/13
26		BIPINDI	222	u, Cu, gem, metal, base PGMs, mo and TR.	1000	16/09/10 – 15/09/13
27	G-STONES RESOURCES SARL PO Box 20119 YDE	AKOM 2	223	However, u, Cu, gem, base metals, PGMs, mo and TR.	1000	15/09/10 – 14/09/13
28		BAGANGTE	224A	However, u, Cu, gem, base metals, PGMs, mo and TR.	178	16/09/10 – 15/09/13
29		BANDJOUK RI	227	Gold, diamonds, uranium and associated minerals	500	08/11/10 – 07/11/13
30	OPTIMUM MINING INC SARL PO Box 530 YDE	NWANGALE	228	Precious stones, gold, copper, lead, silver, iron, uranium, cobalt, and nickel	985.60	08/11/10 – 07/11/13
31	SOCIÉTÉ COAST INVESTMENTS INTERNATIONAL SARL PO Box 35387YAOUNDE	BEK	256	Uranium and related substances	468	05/07/11 – 04/07/14
32	ZAMBA GOLD CORPORATION SA PO Box 152 YAOUNDÉ	DJOUR 2	263	iron, uranium and Related substances	1000	23/08/11 – 22/08/14
33		NKOUT 2	264	iron, uranium and Related substances	1000	23/08/11 – 22/08/14
34	CAMEROON STEEL PO Box 15255 YAOUNDE	BATEKA	286	Iron, gold, uranium and other	818	09/11/11 – 08/11/14

(EITI Cameroon Committee, August 2013, pp. 64-75)

3.5 Legal and institutional exploration framework and possible mining

Because of its radiations, uranium mining is particularly dangerous for human beings and the environment.

3.5.1 Mining legislation in Cameroon

Many legal instruments govern uranium mining:

- The Mining Code
- The framework law on environment
- The Investment Code
- The Budget Law
- Law on Radioprotection
- The Labour Code
- Etc.

(Republic of Cameroon, 1996, 1995, Ministry of Mines & Industry and Technological Development, 2013)

3.5.2 Role of the National Radiation Protection Agency (NRPA)

Cameroon became member of the International Atomic Energy Agency (IAEA) in 1964 (ANRP, 2011, p.19). The Convention on Nuclear Safety had asked any of its member States to draft and maintain in force a legislative and regulatory framework to regulate safety of nuclear facilities and to create a regulatory board and control device with legal means and operational capabilities to ensure the protection of the populations and environment against the risks of mishaps or a careless use of ionizing radiations sources.

The NRPA is therefore the institutional framework in charge of ensuring safety and security in such cases. The year 1995 will be remembered as a decisive turning point, with the promulgation of law n°95/08 of January 30, 1995 on radiation protection. On the 31st of October 2002, the President of the Republic signed the decree n°2002/250 creating and organizing the NRPA, whose main mission is to protect the citizenry, property and environment against the adverse effects of ionizing radiations.

The first policy-making bodies were put in place in 2007 through presidential decrees n°2007/102 of November 05, 2007 appointing the members of the Board of Directors. One of the most important large-scale actions was the first seminar on radioprotection organized in December 2010. The Agency seized that opportunity to meet the users of ionizing radiations sources, with the core message of the promotion of the culture of radioprotection and the sharing of information.

Let us also point out that the NRPA had taken stock of ionizing radiations sources throughout the national territory and had deplored:

- The poor application in actual facts of radioprotection measures, notably of the dosimetric follow up of people working under ionizing radiations;
- The withholding of the use of protective equipment;
- The absence of quality control of the equipment used in interventional radiology.

It is important to recall that the minimum exposure corresponds to the ALARA principle (As Low As Reasonably Achievable). There are annual exposure limits which should not be exceeded. Each country determines its regulatory limits in keeping with the recommendations of the International Commission on Radiological Protection (ICRP). Cameroon has not yet determined its own regulatory limits.

(ANRP, 2011, p. 24)

3.6 The case of Mega Uranium Company's exploration

3.6.1 Background of Mega Uranium Company's action in Cameroon

Mega Uranium Limited is a Junior Canadian mining company quoted on Toronto Stock Exchange (Mega Uranium, 2014). Without having carried out the least mining activity anywhere in the world, thanks only to the securitization of uranium ore deposits in Cameroon, it has so far issued 214.1 million securities, more than 187,8 million of which on Canadian Stock Exchange. It has succeeded in acquiring a market capitalization estimated at about 187 million Canadian dollars with a cash flow estimated at approximately 41 million Canadian dollars (Mega Uranium, 2014).

To mine Cameroon uranium ore deposits, Mega Uranium Limited has created two companies. The first, Nu Energy Uranium Corporation, was incorporated on August 13, 2007 in the British Virgin Islands tax haven quoted on Toronto Stock Exchange, then bought out by Mega Uranium Limited after the issue of 28 240 313 common shares, stock options and stock purchase warrants.

The second, Nu Energy Corporation Cameroon SA is a company incorporated under Cameroon laws controlled at the level of 92% by Mega Uranium Limited. That company is used by Mega Uranium Limited as official discussion framework with Cameroon authorities. It manages directly the titles of Mega Uranium Limited's deposits, but has not yet so far shown profits in Cameroon, whereas its Canadian sisters, Nu Energy Corporation and Mega Uranium Limited, speculate on its titles and achieved significant benefits (Les Afriques, 2014).

On December 21, 2005 and February 27, 2006, Nu Energy Corporation Cameroon filed two applications for prospecting licenses. On the 20th of March 2006, Cameroon government issued Nu Energy Corporation Cameroon, Mega-Uranium's subsidiary, a prospecting permit bearing on uranium, gold and other base metals. The Junior Mega Uranium Mining Corporation has mineral leasing on a surface area of 4654 km² in Cameroon (NU ENERGY CORPORATION, 2006, p.43).



Mega Uranium exploration drilling Fields in Teubang, Thorsten Nilges, February 2014.

From the 31st of December 2012, Mega-Uranium's exploratory activities have been slowed down. On the 29th of January 2013, the General Director of the said company tabled an application for the suspension of its exploratory activities at the Ministry of Mines and Energy.

In the letter n°000648/MINIDIDT/SG/ of March 27, 2013, the Minister in charge of mines agreed on the suspension of Mega-Uranium's prospecting activities as concerns Poli, Lolodorf, Gouna and Salaki's permits. The suspension was for one year, period at the end of which the international context would be assessed by the technical services of the ministry of mines, in cooperation with Mega-Uranium.

Mounts Kitongo and Salaki uranium ore deposits were located for the first time in 1958. At that time, researchers' expeditions were limited to radiometric overflights to map out the area and to achieve drillings on the mountain.

In 1987, the surveys were abandoned for the third time, officially due to the drop in uranium prices on the international market. In March 2006, in the highest of the world energy crisis, Nu Energy Corporation Cameroon was granted a prospecting permit on a surface area of 1 000 m². Prospecting methods and techniques used were airborne (planes) and subsurface - adits and drillings (NU ENERGY CORPORATION, pp. 8-12).

According to the latest scientific analyses, health risks might have already been caused by uranium exploration since there is a significant relationship between lung cancer and the dose of radiation inhaled. Radioactive gas is associated with uranium. Epidemiologists state that the risks for lung cancer increases when one is exposed for a long time, even to lower doses (100-200 Bq/m³) that is just some millisiverts per annum.

From our field visits in Teumbang and Poli, radiation zones are neither declared nor analyzed and populations are not aware of the danger. They have not been informed that materials collected from the sites should not be used for construction. Radiation in habitations has not yet been assessed. Water quality and food staples have not been controlled. In this regard, at the moment 34 (!) companies are already on the field exploring, we cannot refrain from stating that Cameroon exploration and mining legislation is inadequate.

The environment impact assessment of some hundreds of drillings has not been carried out in Teumbang. Deep drillings might have already stained underground water streams with radioactive minerals, since uranium is associated with to 13 other radioactive substances, such as lead 210 and polonium 210 which are very radiotoxic. No hydrologic and hydro-geologic study has yet been conducted to measure those prospection impacts.

Furthermore, in order to carry out the said analysis, chemical substances added to the water injected into the drilling holes by Mega Uranium have to be known. For now, nobody can tell where Mega Uranium will store core drillings taken for analysis, nor the radioactive dust generated by the exploration, and whose samples will remain radioactive for 4.5 billion years.

3.6.2 Disturbances caused by uranium exploratory working

In the Poli area where a prospecting permit had been issued, Salaki village became the scene of important sound nuisance during the exploration period, and the behaviour of animals was thereby perturbed in the hunting area managed by the Voko-Bantadjé community. That area surrounds a great portion of the Park. The Voko-Bantadjé hunting zone is jointly managed since seven years by Mr. VISSE (a German) and the Voko-Bantadjé Development Committee.

It should be pointed out that the existence of a disturbance exceeding the acceptable threshold of normal living together between Mega-Uranium researchers and the species in the Park would have resulted in a legal action, because it was a glaring breach of the obligations of any licensee to contribute to quiet enjoyment of the hunting zone. Thus, the prejudice caused by the noise and roaring of the Mega-Uranium prospecting machines needed compensation since they trespassed upon normal inconvenience.



Bunded uranium liquid waste Mega Uranium, David Bayang, Poli 2009

But unfortunately, Cameroon laws never explicitly provided for the limits and the nature of what should be considered as “trouble of enjoyment” or “quiet enjoyment” and therefore, the owners of the Voko-Bantadjé hunting zone had no legal standing to take Mega-Uranium to court. The Minister in charge of the management of national parks and the minister of mines should seriously look into that issue as to forbid noise output and other severe disturbances caused by mining companies in our parks. It has been noticed that all the noise stress has nothing to do with sustainable animal life. On the sites, open cuts and ditching have been abandoned without been backfilled and the lands have not been rehabilitated by uranium miners. Many animals have fallen into those ditches and excavations and have died or suffered severe broken legs and other injuries.

(SNJP: Data collected on field visits in 2010 to 2013)

- **Spill-over impact on the populations at the exploratory phase**

A corporation needs labor force to operate. From 2008 to 2012, Mega-Uranium has employed five categories of workers: managers, supervisory officers, manual workers, laborers and driver mechanics. 95% of the personnel were paid and evaluated by “Onyx”, a sub-contracting company which had with Mega-Uranium an agreement as service-provider bearing on human resource management.

Between 2008 and 2012, Onyx hired 292 people: 12 managers, 10 driver-mechanics (02 Poli natives), 08 cooks (02 Poli natives), 160 workers (95% Poli natives, 4% from the rest of the northern regions and 02 supervisory officers natives of Poli). The workers’ monthly wages ranged from 55 000 to 150 000 FCFA (229€). Driver-mechanics earned more than 400 000 FCFA (610€) per month.

None of the managers was native of the Poli area. By manager, we refer to geologists, heads of service units (logistics and procurement) and project leaders. Hundreds of millions of CFA francs have poured on the town of Poli during the whole phase of exploration.

The food basket suffered severe inflation and there was hardship among the middle class and the destitute people. Prices of commodities suddenly tripled on the local markets. Traders made good business as well as a lot of money. Young graduated in search of employment invaded the town of Poli. Those who had not been recruited by Onyx settled there to create indirect jobs.

Poli native workers built houses, took one, two or even three wives, bought cows to boost their agro-pastoral output. Unfortunately, some also died at the work sites. Their families and other beneficiaries are still desperately waiting to be compensated.

(SNJP: Data collected on field visits in 2009 to 2013.)

3.7 Dispute on the delimitations of the borders between Chad and Cameroon

URANIUM EXPLORATION IS THE BONE OF CONTENTION!

The problem of the observance of the limits of land, river and lake boundaries between Chad and Cameroon has once again been tabled before Chad and Cameroon’s authorities. Many cases of violation of the Chadian territory have been pointed out. In the Lake Lere Division, Chadian authorities complained that in May 2008, the Canadian Corporation “Mega-Uranium”, holder of the prospecting permit N° 127 issued by the Republic of Cameroon, established boundary markers A and F in the outskirts of Kahinra, Biparé and Zibifaing villages and also undertook uranium explorations in Teubang village, in the Chad township of Léré. Confronted with those complaints, the SDO of Mayo Louti convened a meeting to be held in Figuil on May 12, 2009. The maps handed out then showed the disputed areas as belonging to Cameroon. The protests of the Chadian authorities lead to the suspension of the exploratory activities conducted by the Canadian corporation on the Chadian territory. But since those boundaries are not clearly delimited by concrete markers, further encroachments cannot be avoided.



Geographical position of the disputed area

At the Teubang site for example, as far as the eye can see, there is about a hundred of platforms on which drillings will later be carried out. Between March and July 2009, the company had constructed 100m long and 2 to 4 m deep ditches.

(SNJP: Information collected during field visits in 2013 and 2014)

3.8 Role of the civil society in the protection of the rights of the populations

3.8.1 Indirect stakeholders

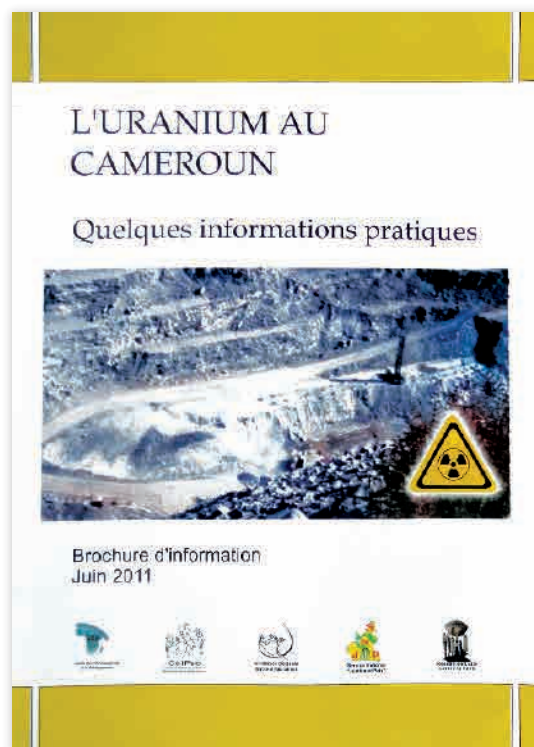
Many stakeholders from the Cameroon civil society are strongly involved in advocacy activities to protect the rights of the riparian populations at the uranium exploration sites. Among others, we can name:

- The Center for Environment and Development (CED)

It is an independent and apolitical Organization created in 1994 by a group of Cameroonians and foreigners in reaction to the Cameroon forest management crisis of the early nineties, characterized by a strong increase in timber industrial production, the development of illegal logging, the recrudescence of poaching, ecological, social and economic problems caused by the expansion of the forest sector. CED's area of concern has been gradually extended to extractive industries issues (oil, and then solid ores), perceived as threatening the rights of populations and environment. As years go by, CED has developed an expertise on advocacy issues, especially in relation with the World Bank.

- The National Commission "Justice and Peace" of the Catholic Church of Cameroon

It is a service related to the *National Episcopal Conference of Cameroon* and whose objective is to promote Justice and Peace in keeping with the social doctrine of the Church (Apostolic Constitution, Pastor Bonus, sect. 142). Its main missions are: the promotion of the social doctrine of the Church, surveys on justice and peace, training grassroots people on human rights, follow-up of the democratic process, fight against corruption, legal support and counseling to disadvantaged people and groups, advocacy for amicable settlements of conflicts. The National "Justice and Peace" Commission is also deeply involved in the monitoring of the activities of extractive industries to ensure that exploration and mining be conducted in fair contexts and conditions as well as in transparency so as to let the populations benefit from their natural resources to improve their living conditions and to fight against poverty. Its main target is all the people, men, women and youth who are victims of injustices.



Example of our common work :

a brochure on uranium published in 2011 by SNJP, CED, RELUFA, CelPro Poli and the Diocesan Justice and Peace Commission of Garoua.

- Association Network For the Fight against Hunger (RELUFa)

It is a network of civil society associations whose scope of action is mainly the fight against hunger, poverty, economic, social and environmental injustices. That network is particularly concerned by four major issues: the follow-up of the extractive industry activities, food sovereignty, micro-credits and fair trade. Created in 2001, the network is now represented in almost all the ten regions by members (NGOs, associations, churches, grassroots community groups) all very active in the above-mentioned domains. RELUFa had actually monitored the Chad-Cameroon Pipe-line Project, notably in its social and environmental aspects, and the rights of the populations concerned or impacted by the project.

3.8.2 The direct stakeholders: creation of control and watchdog associations around exploration areas

Since 2007, the riparian populations have come together to create dialogue structures with the government and mining companies. The local structure named CelPro, an Association for the protection of the victims of mining activities, which is based in Poli has mobilized his followers to force Mega-Uranium into signing employment contracts with its workers as well as in registering them at the Social Security Fund (CNPS). Let us underline that it is the local association which is strongly involved in the defence of the rights of the riparian populations in the uranium exploration sites of the Poli area.

It was created on September 09, 2008 in Poli. Its main objective is to promote mutual dialogue in a bid to build a fairer society and to defend the environment for the preservation of a healthy biodiversity. Its main mission is to combat abuses and disturbances caused to the populations by mining activities.



Training sessions for members of Celpro Poli, 2011. Photo: Axel Müller (2011)

In that respect, it is planning to carry on capacity building activities on the monitoring of mining activities and the protection of environment. The discontinuance of Mega-Uranium's activities has not dampened its enthusiasm and determination to forge ahead. It now wants to give its contribution in the management of the Faro protected area by getting mining and craft operators organized.

3.9 Conclusions and Recommendations

3.9.1 Cameroon: State of the Art

Cameroon's history as timber and oil exporting country has proven that the exploitation of non-renewable natural resources does not automatically lead to development, neither economic nor human development (Chauvin, 2012, p.3).

Poor and non-transparent governance seems to be one of the internationally recognized reasons for the low human development stated by the UNDP. Since having been under the most corrupt government at the beginning of the century, Cameroon has improved on governance, but is still among the quarter of the most corrupt States in the Transparency International Corruption Perception Index (2013: Country 144 of 177).

Multilateral Initiatives like the Extractive Industries Transparency Initiative (EITI) to which Cameroon adhered in 2005 are slowly bringing more transparency into a sector, which has so far only been robbing the wealth of the underground, without bringing improvements to the citizens themselves. After several steps backwards, Cameroon has significantly improved its EITI conciliation reports of 2009, 2010 and 2011 (all published in 2013 only) to become a compliant State in October 2013. Nowadays, a small number of semi- or professional NGOs is able to exploit the information provided by the report about exploration and mining permits, production figures as well as governmental revenues the extractive sector is generating.

Nearly all information regarding exploration titles and the surface areas allotted to prospecting companies have been found in the EITI reports. Unfortunately the money flow is so low and insignificant that it has not been reconciled in the reports.

3.9.2 Cameroon and Uranium Mining

Cameroon's nuclear track records are basically written by the exploring former colonial powers and the new exploring investors. The law 95/08 of 1995 is concerned about "Radioprotection", but it addresses uranium mining and uranium utilization within the same law of only 15 articles.

The Cameroon NRPA does not seem to have much experience on cooperation with riparian communities in uranium mining sites. The least we can say is that they have not taken part in a civil society capacitating workshop on the issue of uranium mining and its impact in Africa, held in Yaoundé in January 2014.

3.9.3 Uranium Mining in Africa, how to handle its impact?



Crates containing the uranium rocks analyzed in laboratories in Europe, David Bayang, Poli 2009

3.9.3.1 Conclusions and Recommendations to the Government of Cameroon

According to our understanding the transportation of radioactive material needs to be improved. The transport of prospectors, maybe tomorrow's exporters is not yet regulated. It's the same for other radioactive material.

The legal framework of the Economic and Monetary Community of the Central African States (CEMAC) needs to be harmonized, not only as concerns uranium mining, but also other sectors related to the exploitation of natural resources in the sub-region since specifically, as concerns uranium, the impact of exploration and mining drillings is likely to be the same in all the member States, especially regarding health problems.

If uranium exploration and its future mining do not lead to nuclear energy for Cameroonians, we do not see the necessity to tap it. Cameroonians' energy needs can easily be covered through hydro-energy, as Cameroon has the second biggest hydrological potential in Africa.

3.9.3.2 Recommendations to Mega Uranium and the National, Regional and Local Administration of Cameroon, as well as the end users of uranium minerals in the industrialized countries



Uranium Workshop in Poli, 2011. Photo: Axel Müller, 2011

Our Uranium Research Partner CRIIRAD formulated the following specific recommendations for the case study of uranium exploration by Mega Uranium in Poli and Teubang.

First of all they state and repeat that natural radioactivity is not inoffensive (CRIIRAD, 2014, p.7). Therefore Mega Uranium, the Government and all other investors should carry out the following measures at every site:

- Sectors with radiation like Teubang need to be identified;
- To protect local populations, radiation measures have to be carried out in Poli and Teubang;
- Populations have to be informed and aware that they should not stay for a long time at those sites;
- Populations should be told not to use materials from uranium sites to build houses;
- Prospecting companies have to share their radiation cartography with the local administration and local population (CRIIRAD, 2014, p.7);
- The level of radiation in habitations should be checked;
- Water Quality as well as the level of radiation in food staples should be controlled (CRIIRAD, 2014, p.8).

Assessment of Uranium Exploration Impact

- Especially for Teubang, the impact of some hundred drillings on the environment must be assessed;
- Hydrologic and Hydro-geologic studies should be carried out to measure the prospecting impact in Teubang;

- The (chemical) substances added to the water injected by Mega Uranium into the drilling holes need to be known to enable such analysis. Regular inspections should be carried out at exploration sites: (Water management, radiation around the drillings...)
- Local populations, Non-Governmental Organizations and staff at all levels should be trained (CRIIRAD, pp. 8-9).

3.9.3.3 Recommendations to the international community

To comply with the treaty the international community signed on the non-proliferation of nuclear weapons, the UN Security Council has established an entire system called the International Atomic Energy Agency (IAEA). This is why several civic nuclear nations like Japan are investing billions of US Dollars to handle their nuclear wastes and to protect their citizens against the impact of uranium industrial use and energy production. Germany, one of the most developed nations, in terms of industrialization and human development (UNDP HDR Rank 5 in 2013), considering the adverse effects of uranium, has even decided to abandon nuclear energy (UN, 2014).

Cameroon is obviously suffering from bad governance and corruption. It is ranked 144th out of 177 countries in the Transparency International Corruption Perception Index, with the same score as its neighbors, the Central African Republic and Nigeria. Norway is ranked 1st and Somalia, Afghanistan and Korea (North) are ranked last - 175th (Transparency International, 2013).

Many other African Uranium Exporting Nations experience bad governance as well. In Africa, Uranium is mostly extracted to be exported. We would like to raise the responsibility of “civic nuclear industry nations” for the impact of uranium mining in Africa. We really think that a multilateral agency should be put in place to govern uranium mining. It should be advisable for the IAEA to monitor uranium mining financed by nuclear industries, since as stated above, Africans bow under the burden of uranium mining adverse effects, while the benefits are channeled into foreign companies’ coffers. Mining corporations should not be allowed to take advantage of bad governance to swindle the developing nations out of their dues. IAEA is a good example from the International Community to curb the proliferation of nuclear weapons. EITI is another good Initiative to improve transparency in the extractive sector. Uranium mining can have even worst impacts than other extractive industries. Mining activities should be undertaken in weakly governed States with high corruption rates, only prior to international regulatory and executive support. So far, at least in Cameroon, the prospecting investor seems to be really aware of the danger.

3.9.3.4 International civil society cooperation

As shown in our analysis, many NGOs and civil society organizations working in the field of uranium mining in Cameroon, even in Africa, do not really have the required skills and experience. European NGOs have already stored good track records with regard to nuclear energy. Experience sharing and capacitating platforms have to be developed and encouraged. African activists can learn from European experience while European NGOs learn more about the reality of advocacy and lobbying activities in circumstances where freedom of expression, of association and media are not taken for granted. Anyhow, this Case Studies Report can already be considered as a good example of successful cooperation between European and African civil society.

4| TANZANIA - MKUJU RIVER, BAHI/MANYONI AND LAKE JIPE

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Many thanks for your multiform support!

CESOPE, Oct 2014

4.1 Introduction

When uranium prices spiked around 2005, Tanzania, like many other African countries, got into the focus of exploration companies in search of new reserves. Tanzanian government welcomed this development as in Tanzania, like in other African countries, political leaders regard uranium mining as a solution to poverty and economic development. On the other hand, the capacities to handle side effects like pollution or health risks in terms of laws and regulations, skilled staff, know-how, financial power and institutional factors are low.

The scope and goal of the study is to describe the actual situation of uranium exploration/ mining in Tanzania and provide politicians, institutions and organizations with recommendations from a civil society perspective and raise awareness on the topic in Tanzania and abroad.

The study was conducted by *Civil Education is the Solution for Poverty and Environmental Management (CESOPE)*, technically supported by WISE, uranium-network.org (Germany) and University of Dodoma with the financial support from WISE International and IUCN NL.

4.2 Research background

African countries have been involved in the nuclear fuel cycle for many years. The Democratic Republic of Congo for instance, provided the Manhattan Project with uranium used for the bombs which were dropped on Japanese cities in August 1945. South African uranium fed the US and UK nuclear weapons programmes during the 1950s and 1960s (Fig, D. 2014).

In Tanzania where uranium and radioactive mineralization was identified since pre-independence era, it is believed that the systematic airborne survey for radioactive occurrences of the 70s provided the blueprint for the recent uranium exploration (Stucchi, A. et al 2012). Since 2005, massive uranium exploration activities have been taking place in different areas in Tanzania.

Various literatures provide information on the effect associated with uranium mining, including environmental and health impacts which require maximum attention. In his speech at the opening of the “*International Conference on Uranium Mining*” in Dar es Salaam on the 5th of October 2013, Dr. Hussein Ally Mwinyi, the former Minister for Health and Social Welfare in Tanzania, while stressing on the need for that attention, declared:

“Uranium is known to be highly toxic, including the products of its decay. We are committed to ensure that the local populations and miners will be adequately protected, through measures which will be required of the developers, who are expected to comply with provisions applicable in the national legislation. The government will strengthen enforcement of the application of the regulations and guidelines will be strengthened, including monitoring to ensure compliance” (Mwinyi, Dr. H. 2014)

Having the experience of what happens in terms of environmental protection, benefits for residents and health impacts at various gold mines located in different parts of Tanzania, it is still questionable if uranium mining in Tanzania will make a difference.

4.3 Research methodology

This study employed a case study research design. “A case study is an empirical inquiry that investigates a contemporary phenomenon within its real life context, using multiple sources of evidence” (Yin, R. 1989). The rationale of using this type of design is that it enables to gain a holistic view of a certain phenomenon or series of events and can provide a round picture since many sources of evidence are used.

The data for this study were gathered through literature review, CESOPE observations and documentations and active field research through questionnaires with questions to various respondents such as community members and village leaders in Bahi/Manyoni, Illindi, Agondi, Likuyu and Sekamaganga and government officials from local governments, ministries and authorities like TAEC, NEMC, MEM and GST. Most of the fieldwork involved interviewing was conducted by Dr. Damas K. Mbogoro and Mr. Anthony B. Lyamunda from the 13th of November 2013 to the 14th of February 2014.

4.4 Country profile Tanzania

4.4.1 General Information

Tanzania occupies an area of 942,600 km² (URT 1997). The country is famous for having the highest mountain in Africa, namely the Kilimanjaro Mountain, and natural reserves that provide habitat for different types of animals and bird species. Among others, we can name the Serengeti National Park, the Mikumi National Park and the Selous Game Reserve.

According to the National Bureau of Statistics, the 2012 population and housing census (PHC) showed that Tanzania has a population of 44,928,923 inhabitants (URT 2013, p. 1). A large proportion (80%) of the population lives in rural areas and depends mainly on subsistence agriculture. Tanzania is sparsely populated, with a population density of 51 inhabitants per km² which varies across regions. In the most densely populated areas such as Dar es Salaam and Mjini Magharibi regions, there are as many as 3,133 and 2,581 persons per km² respectively. Regions with lowest population densities are Katavi with 12 inhabitants/km² and Lindi with 13 inhabitants/km² (URT 2013, p. 1).

4.4.2 Economy

Tanzania's economy has continued to perform strongly in the year 2013 to 2014. The current GDP is 33.23 billion dollars, with the annual growth rate of 7%. This growth has largely been driven by communications, transport, financial intermediation, construction, agriculture and manufacturing (AEO 2014). Despite a high growth rate averaging 7% over the past decade, the recent household budget survey results indicate that 28.2% of Tanzanians are poor and poverty remains more prevalent in the rural than in urban areas (TNBS 2013, p. 1).

4.4.3 Energy

Major sources of energy in Tanzania are petroleum, hydropower and coal. However, in the residential sector, 90% of the populations depend on traditional solid fuels like wood and charcoal. Only 2% of rural and 39% of urban population have access to electricity. Energy import makes up for only 8% of energy consumption in Tanzania consisting mainly of oil import (Aurela, B. 2012). Tanzania has a large potential for various renewable energy sources like solar, wind and geothermal power which until now are widely untapped.

4.4.4 Mining

The situation challenges the Government of Tanzania to make the best out of the economic and development opportunities which mining industry offers. The experience from gold mining shows that the country does not benefit automatically from exploiting valuable resources: *"Tanzania is Africa's third largest gold producer and possesses around 45m ounces of gold which is extracted at the rate of over 1.6m ounces a year, but the country is still one of the ten poorest countries in the world with a large proportion of its people surviving with an average income of US \$ 307 a year"* (Curtis, M. and Lissu, T. 2008, p. 7). It is the responsibility of the Tanzanian government to ensure that the country's resources are properly exploited and managed for the benefit of the citizens. Tanzanian government generally fails to fulfill its duty to manage the extractive industry properly due to lack of capacity and problems with corruption (SID 2009, p. 56).

4.4.5 Political situation

Tanzania is still suffering from the hangover of single party rule (CCM) since independence and can be described largely as a "one party state within a multi-party political system" (Shaba, R. 2009). There has been a gradual increase in political pluralism, but still CCM remains dominant in the government and parliament - not because of its popularity in terms of policy programs but rather through its muscle power and intrigues. Majority votes in the parliament deprive democratic power of other parties' MPs like CHADEMA, CUF and NCCR in addressing critical development issues for the benefit of Tanzanians. A lot of efforts have been made by opposition parties' MPs who have revealed various blunders made by the government such as financial mismanagement (UFISADI) and acts of corruption related to mining contracts. This resulted in the resignation of former Prime Minister Hon.

Edward Lowasa and others. It has actually been observed that the domination of CCM ruins the democratic process of reviewing/re-writing the Tanzanian constitution, which caused the opposition parties (UKAWA) to quit the parliament sessions for the exercise. Basically, the political situation of Tanzania still does not allow opposition parties to fully exercise their roles.

4.5 Characterization of envisaged Uranium Mining sites

Uranium mining is foreseen in several parts of the country which are at different levels of study. The Karoo sediments in southern Tanzania have received the highest level of study so far. Here the Mkuju River project in the Namtumbo District of the Ruvuma Region has reached the most advanced stage and is close to implementation. Also the superficial deposits around Bahi wetland in central Tanzania (Bahi and Manyoni districts) have attracted systematic exploration by several companies. Another focal point of exploration is Lake Jipe in Mwanza district, Kilimanjaro region in the north of Tanzania. More exploration licenses have been issued to other areas. As it is not possible to consider all of them in this case study the focus is restricted on the three areas mentioned above.



Map showing Mkuju River and other Uranium Exploration Projects

Source: Mantraresources, Mkuju River Project – NI 43-101 Technical Report – 15th December, 2011

4.5.1 Lake Jipe

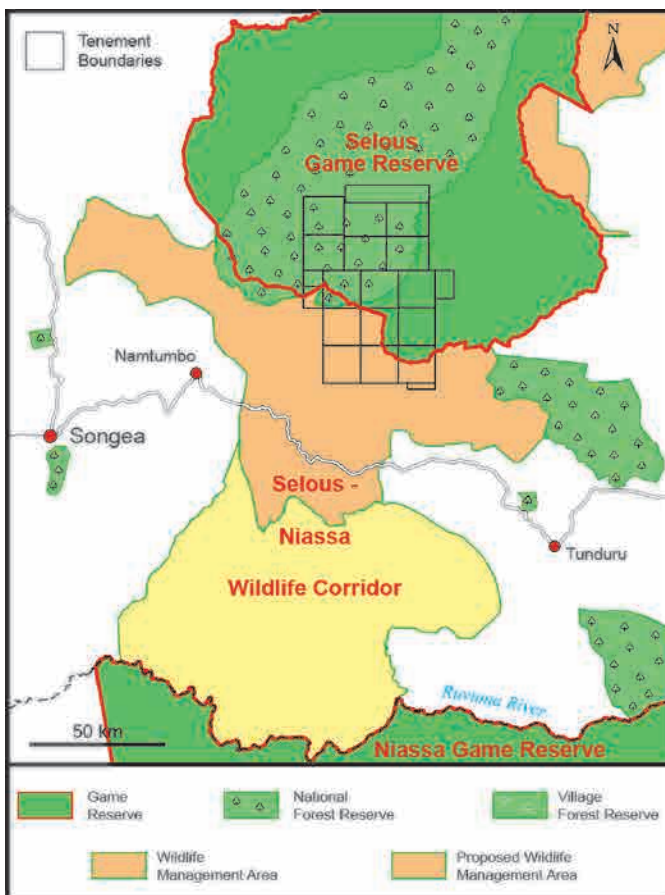
Lake Jipe is located in Northern Tanzania near the border with Kenya and is partially situated in a wildlife habitat known as Tsavo National Park. The preliminary findings from ongoing exploration activities confirm the existence of uranium deposits in the area. This is backed by Mr. Julius Moshi, the TMAA planning and research development manager, who declares: *“At the moment, geologists are making efforts to establish the quantity and economic viability of the uranium”* (Ihucha, A. 2014). This new finding will boost the country’s profile as the world’s third largest producer of radioactive minerals.

The discovery of uranium in this area raises concern on the safety of people, environment and wild life in Tsavo National park. Moreover, it potentially will lead to trans-boundary conflicts as pollution may affect a water body shared between Tanzania and Kenya.

4.5.2 Mkuju River project area

The Mkuju river projects targets the Karoo sediments in southern Tanzania where several exploration projects are driven forward by various companies. The most advanced one is the Mkuju River Project which was started by Mantra resources. The tenements cover an area of more than 3.250 km² according to company information. The MRP is accessible by road along the Dar es Salaam- Songea highway which covers a total distance of 980 km and 180 km from Songea town. According to the 2012 general report of the population and housing census of Tanzania, Namtumbo district has a population of 201 639 inhabitants, by which male population is 98 335 and female population 103 304. The vast majority of this population depends mainly on farming, fishing and animal breeding (URT 2013, p. 96).

The project site contains measured and indicated resources of 36 000 U plus inferred resources of 10 000 U. The company foresees production of 14000 U per year (WNN April 8, 2013).



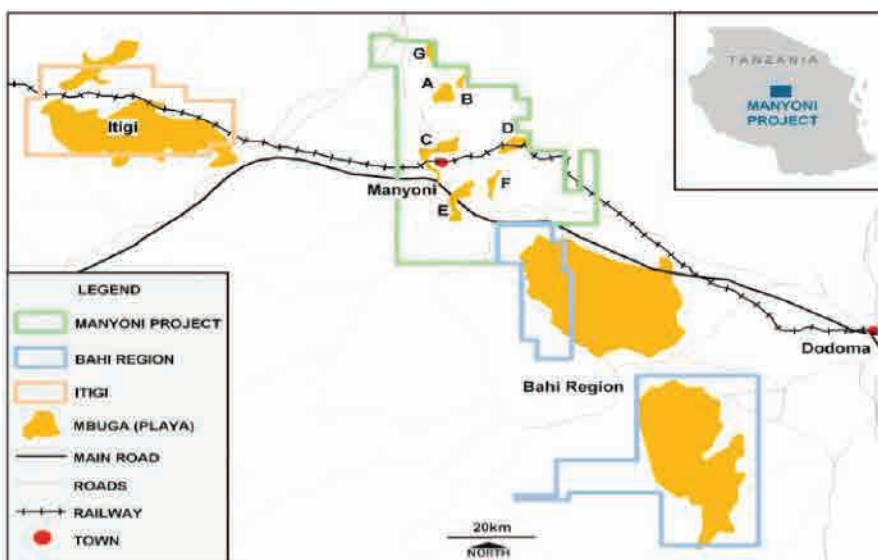
The map shows the boundaries of Mantra Tanzania Ltd (respectively Uranium One and ARMZ) exploration tenements in relation to the Selous-Niassa-Conservation areas. Sources: company homepage, Shand cartography, University of Glasgow, 2012

The major concern in the Mkuju River Project (MRP) is that it is located within the Selous Game Reserve (SGR), which is protected as UNESCO world heritage site (<http://whc.unesco.org/en/list/199/>). With its vast size of 5 120 000 hectares, this reserve retains relatively undisturbed ongoing ecological and biological processes which sustain a wide variety of species and habitats. In addition, it is functionally linked with the 42 000 km² Niassa Protection area in Mozambique through the Selous-Niassa-Corridor. In spite of protests from local and International NGOs in July 2012 the UNESCO World Heritage Committee approved Tanzania's request to modify the boundary of the game reserve by 0.8 per cent to pave the way for the Mkuju River Project. The decision means that some 19 793 hectares (nearly 200 km²) to the south of the Selous will be excluded (The Citizen July 3, 2012).

Additionally there are number of concerns from the local community, civil society and experts about land grabbing, lack of people’s involvement in decision making about the project, lack of awareness on the impacts of uranium mining on their health, environment and economic activities as well as water pollution resulting from the exploration and mining processes. “In Namtumbo district (Likuyi Sekamaganga, Likuyi Mandela & Mtonya Vilages), exploration activities are located 60 km from the Mkuju, Lwengu and Mbalangandu rivers which are the main sources of water in these vilages and many parts of the district. The vilagers’ concern is that water is polluted by uranium exploration and, in the long run, a struggle to find clean water will take place” (Rubara, E. 2012, p. 13).

4.5.3 Bahi/Manyoni Mining project area

The other important uranium prospecting area in Tanzania is the Bahi/Manyoni Area in central Tanzania located 56 kilometers west of Tanzania’s capital city of Dodoma. The characteristic feature of this area is the Bahi geologic depression with its wetlands. The wetlands are a peculiar ecosystem, known for their birdlife and fish resources. The area is part of the East African Flamingo habitat network and fulfills the 1% rule of the Ramsar criteria in terms of Phoenicopterus minor / lesser flamingo (Wildlife Division 2010). Moreover the wetlands are of enormous value for food security and income generation for those living in the landscape of central Tanzania and beyond (Mbogoro, D. and Mwakipesile, A. 2010). The area covers approximately 7000 km2 with a population of about 221 645 people. Major economic activities are farming, fishing, livestock keeping, traditional salt making and forest product harvesting (URT 2013 p. 17). Inferred uranium resources are estimated at 6 900 metric tons of uranium oxide (The East African Sep. 14, 2009).



Map shows Bahi / Manyoni Uranium mining project area

Source: Uranex exploration update 2010

Various companies were involved in uranium exploration and other prospecting activities at Chikuyu in Manyoni district, and Magaga, Chali, Ilindi and Naguro in Bahi district. These companies include Mantra resources, Uranex NL, Atomic resources Ltd and International Gold mining/Central iron ore joint venture (Mbogoro, D. and Mwakipesile, A. 2010).

The exploration by the mining companies in the Bahi and Manyoni areas has widely disregarded minimum safety standards.



Pictures: showing Bahi Swamp Area. Source: CESOPE, 2009

4.6 Short history of Uranium Mining plans in Tanzania

Uranium and radioactive mineralization in Tanzania was identified since the pre-independence era. *“As long ago as the 1950s, uranium mineralization occurrences were identified in the Bahi swamp”* (Rubara, E. 2012, p. 4). After the independence, various parts of the country were subjected to a systematic airborne survey, ground research, scanning and drilling for radioactive occurrences by number of companies, namely that of the German Uranerzbergbau GmbH in 1979 and the Geosurvey of 1981 and 1982. It is believed that the efforts of the 70s provided the departure point of the current status of uranium exploration in Tanzania (Stucchi, A. et al 2012).

Even though Tanzania was identified to have the potential for uranium or radioactive minerals mining five decades ago, it was not until the late 1990s that the commercial interest to explore became evident and later in 1992, the Africa Strategy for Mining Technical Paper developed by the World Bank and the International Monetary Fund were instrumental in financing and developing a blueprint for the mining sector in Tanzania, through a mineral sector development program aiming to oversee the privatization and liberalization of the state-controlled mining sector to facilitate the entry of foreign mining corporations. The mining department was restructured to accommodate these changes and the Mineral Policy Act of 1997 and later the Mining Act of 1998 reflected the direction charted by the reform process (Stucchi, A. et al 2012). Since then, an influx of multinational investors has been carrying out exploration activities in villages all over Tanzania.

“In 2005, the Ministry of Energy and Minerals (MEM) opened its doors to issue prospecting licenses (PL). Subsequently, 70 prospecting/exploration licenses have been issued to companies and individuals. Of the 70 or more licenses issued, 50% are for exploration activities in Namtumbo’s Mkuju area and adjacent Bahi and Manyoni area considered to be viable for commercial exploitation” (Rubara, E. 2012, p. 5).

Even though many other companies had been issued prospecting licenses, only two companies such as Uranium one and Uranex Tanzania Limited (UTL) are prominent in the uranium mining preparatory activities in the Mkuju River Project and Bahi/Manyoni Project respectively.

Since then, a number of concerns had surfaced from the local community members, media voices and NGOs (CESOPE, TMMTF and LHRC) with international support from various parts of the world. The concerns associated with the imminent processing of uranium products in these locations include the fact that local communities were not consulted about the introduction of exploration, the lack of awareness among the local communities on the adverse effects of uranium, the concerns on the livelihood of the local communities in the project areas as well as the lack of transparency in uranium activities.

The status of Mkuju River uranium mining project under the operation of Uranium One and ARMZ has reached a quite advanced stage. Exploration has been completed and all the necessary documentation that can allow them to get a mining license has been completed. Even UNESCO’s World Heritage Committee (WHC) agreed to excise the area required for mining from the Selous Game Reserve in mid-2012. The operators have already received a “Special Mining License” (WNN, 8 April 2013). In order to start mining operators and the government have to negotiate a “Mining Development Agreement”.

In Bahi/Manyoni area e.g. Uranex has been given the go ahead by the Tanzania government to mine uranium after fulfilling all environmental conditions as mandated by the National Environment Management Council (NEMC) (The East African Sep. 14, 2009). A phase of active field exploration was completed recently. However the actually low uranium prices seem to cause some discouragement among the mining companies. So Uranex was reported to shift its focus from uranium to graphite (Robert, G. 2014).

4.7 Companies involved in Uranium Mining projects in Mkuju River and Bahi/Manyoni areas

For the Mkuju River project in the Namtumbo district in southern Tanzania, the Ministry of Energy and Minerals has issued a license to Mantra Tanzania Limited, the Tanzanian daughter of Mantra Resources, Australia. Once the exploration had shown the value of the project ARMZ, the mining arm of the Russian State Nuclear Company ROSATOM took over. However, the mine will be operated by Canadian Uranium One, of which ARMZ is a majority shareholder. After exploration processes, the company foresees an annual production of 1400 tU from the project (WNN 2013).

With regard to corporate social responsibility, field visits reveal so far that this company has been installed solar power in a boarding secondary school in a neighboring village. They have also provided the village dispensary with four hospital beds. In addition, they promised to dig water wells for the village but the promise is yet to be fulfilled. With regard to employment policy, those who had worked with Mantra Resources report that it takes a long time for local individuals to be employed in the company and in most of the cases, they are hired as cheap laborers.

In the Bahi/Manyoni project area, various companies were involved in uranium exploration and prospecting activities at Chikuyu in Manyoni district and Magaga, Chali, Ilindi and Naguro in Bahi district. These companies include Mantra resources, Uranex NL, Atomic resources Ltd and International Gold mining/Central iron ore joint venture (Rubara, E. 2012, p. 10). Little information is available regarding their corporate social responsibility, maybe because they were still at the exploration stage. But local leaders and individuals in respective areas, indicated that there had been a number of misconducts during exploration, including leaving exploration pits opened, violations of human rights and lack of public involvement and transparency, illness of workers due to the lack of protective gear and rising of concerns on environmental, health and livelihood of the local communities from exploration and mining of uranium as documented by NGOs such as CESOPE and FEMAPO.

Apart from the mentioned companies, there are several other companies that are interested in uranium mining in Tanzania, but can't be analysed here in detail. More exploring and prospecting companies are: Korea Resources Corp., East Africa Resources Ltd., Uranex NL and many more (Diehl, P. 2014).

4.8 Impacts on the affected regions

In this chapter the focus is laid on two prospected mining areas: the Mkuju River and the Bahi/Manyoni/Itigi/Handa exploration areas. The major distinguishing feature of these two areas is that while mining uranium in the Mkuju River area will take place in an territory which is highly important for wildlife conservation, but not intensively used for human activities, mining in the latter area will take place in a comparatively densely populated region which is crucial for economic activities like farming or fishing.

4.8.1 Mkuju River

4.8.1.1 Democratic processes

As mentioned above the UNESCO world heritage committee at its 36th session held in St. Petersburg from June 24 to July 6, 2012 approved an application made by the Tanzanian Government to excise the project area from the protection site (WHC 2012). This decision has been taken in spite of protest from civil society and the World Heritage Committee found it necessary to emphasize the “unique and exceptional manner” of the decision. It remains questionable what made the responsible state parties in St. Petersburg to approve the decision in that way.

However the project is also affecting local population: by building of infrastructure through villages bordering the project area (Participatory wildlife management areas) and by potential environmental effects like contamination of drinking water, dust, gaseous emissions or noise. Field observations and survey revealed that local people and NGOs in the surrounding project area were not involved in and not well informed (ignored) about the whole process since the stage of exploration. During a field visit conducted by Martin Kurz from uranium-network.org in 2012 villagers confirmed to keep “uranium stones” in their houses waiting for potential customers - this illustrates the poor level of awareness.

Local NGOs trying to air out community concerns on the uranium mining report that they have been ignored, intimidated and threatened by government officials.

Moreover, the social economic impact assessment reports are treated as confidential documents, only accessible within the office of NEMC. Partners from uranium-network.org in Germany had a look on the ESIA documents in NEMC office and reached the conclusion that it is questionable if the public meetings which are obligatory for an SEIS have been announced and conducted properly and also there is an impression that they preferred one-to-one meetings with officials to real public meetings involving the grassroots people. Also there are doubts if all procedures required for proper SEIS have been adhered to.

4.8.1.2 Land grabbing/land use

The mining plans and the connected infrastructure projects affect the integrity of the SGR and the wider Selous-Niassa-Ecosystem. The WHC linked the permission to excise the project area from the world heritage protection site to strict conditions. Obviously Tanzania is not very committed this obligations. Exploration licenses are maintained in the whole area and large infrastructure projects are pushed forward. In its 2014 State of Conservation report Tanzanian government confesses itself that “*the adding of valuable forestland to the property is hindered by overlapping uranium prospecting licenses*” (WHC 2014a). WHC under the leadership of IUCN conducted a Reactive Monitoring Mission in 2013. In 2014 the SGR was put on the List of World Heritage in Danger (WHC 2014b). While the main reason for this decision where severe problems with poaching also the Mkuju river project and other mining and infrastructure plans are seen with deep concern and government is urged again to show its commitment to protect SGR in its integrity.

Also land used by the local communities will be affected by infrastructure projects connected with the mining plans. Experience from various mining projects in Tanzania shows that community interests are mostly disregarded when it comes to compensation.



Picture: Likuyu village – houses along road to Mkuju River Project (MRP) marked for demolition.
Source: Martin Kurz, 2012

4.8.1.3 Environmental impacts

Radioactive materials will definitely be set loose in the area where uranium mining will take place. If the uranium mining tailings, the dust produced in crushing and grinding the ore, drying, calcifying and packaging of the ‘yellow cake’ will not be well managed and these radioactive materials will be carried far afield in particular downstream in the direction where the river flows. The radiation that will be carried downstream will affect the health of the people who will drink the water from the river and local wells, who will eat the fish caught in the river and who will eat/drink anything related to the water that has been contaminated with radioactive materials. “In Namtumbo district (Likuyi Sekamaganga, Likuyi Mandela & Mtonya Vilages), exploration activities are located 60 km from the Mkuju, Lwengu and Mbalangandu rivers which are the main sources of water in these villages and many parts of the district. The villagers’ concern is that water is polluted by uranium exploration and, in the long run, a struggle to find clean water will take place” (Rubara, E. 2012, p. 13).

Mining works will involve activities such as clearing of the area for building necessary infrastructures such as roads, houses, dams, landfills etc., removal and stockpiling of any usable soil. All these activities, will impact on the landscape (changes in the landscape) on natural resources (disappearance of some plants

and animal species) and on local populations in the neighbourhood of the mining area: available land for cultivation, air pollution, water pollution, noise pollution.

4.8.1.4 Impacts on other energy sources and how sustainable development in the country is hindered

The existing policy is that uranium will be mainly mined for export. Although electricity from nuclear power is proclaimed as a cheap and clean source of energy by some officials, it is not a realistic option for Tanzania: to install the facilities for processing uranium into nuclear fuel and nuclear fuel into electricity takes a long time and costs a lot of money. These two facts coupled with the possibility of nuclear fuel leakage would place electricity generation through nuclear energy an expensive source compared with other sources of energy in the country.

As the mining projects are interfering with SGR they will negatively affect tourism and participatory wild life management initiatives which would represent a long term and sustainable source of income for the country and local populations. These initiatives have been supported by German government for a long time.

4.8.1.5 Financial impacts

For the Mkuju River project, the government is expected to benefit very little from the payment of royalties of about 5 percent, possible corporation taxes and various fees that will be payable for application to do various activities necessary for uranium mining. Compared with tourism activities, where many people can get a chance to participate and to derive some profit from mining will offer only few jobs to local people and limited local purchases of inputs for the operation.

4.8.1.6 Transport

Both the Mining (Radioactive Minerals) Regulations 2010 and the Atomic Energy (Radiation, Safety in the Mining and Processing of Radiation Ores) Regulations 2011 emphasize the need for the uranium mining companies to produce an acceptable plan for the transportation of the radioactive material. If the radioactive material is transported by roads, it will be hazardous to expose the general public to radioactive materials either through accidents or mishandling during transportation. In another way the improvement of transportation infrastructure has to be acknowledged since roads will be of great importance to the public.

4.8.2 Bahi/Manyoni area

Uranium mining in this area faces serious concerns since it is an area with more than 250 000 people depending on agriculture salt making, fishing and livestock keeping.

4.8.2.1 Democratic Process

Field visit and survey carried out by CESOPE reveal that the villagers in these areas were not consulted, not involved or even informed properly on the exploration and uranium mining plans in the area. For instance, in Manyoni, Ilindi and Agondi villages, many farmers just found exploration pits or exploration teams digging holes in their farms. Sometimes people were deliberately misinformed: In the beginning of exploration activities villagers were made to believe that groundworks were part of construction of new antenna masts for mobile phone network. Local politicians in respective areas denied ongoing exploration and intimidated NGOs' concerns on the issue, until former head of MEM, Hon. Ngeleja proudly revealed to the press that 20 sites had been identified in 2009.

Various efforts made by NGOs like CESOPE to sensitize the residents in the project areas on the issues related to Uranium mining, faced challenges from local authorities such as lack of transparency, threats

and intimidations. People who wanted to stand up for their rights and defend their land were threatened with imprisonment. Cases of people jailed under the pretext of disturbing peace and of local authorities and police authorizing exploration activities in peoples' farms against their will have been reported in Bahi-Makulu and Illindi. Police forces pressed through exploration in Bahi and Illindi against the will of the people. Incidents at Bahi and Illindi have been documented by CESOPE and uranium-network.org and forwarded to UNO at Geneva.

4.8.2.2 Land grabbing/land use

During the exploration phase, there was lack of communication with the local people on the exercise, since other people in Bahi, Illindi and Agondi, just found exploration holes in their farms. Experience from various mining areas in different parts of Tanzania shows that relocation and compensation for local people's properties is not always smooth and fair. The local populations are always on the losing side. To make things worse, a large dam is planned to be constructed near the village of Farkwa, in the same area. CESOPE suspects that this dam will be linked to the uranium mining plans and will occupy large areas of land used by local people for farming and pasture. It also threatens the Bahi swamp since it could divert the river Bubu, one of the main tributaries feeding the wetland.

4.8.2.3 Environmental impacts

Uranium mining inevitably comes with the increase in the mobility of toxic and radioactive substances. Especially, tailings dams containing giant amounts of solubilized uranium rock represent a legacy for millions of years. In Bahi/Manyoni the risks are enhanced by the density of the population, desiccating winds in dry time and large scale flooding during rainy seasons. Moreover, Bahi swamp is a closed drainage basin – whatever pollution ultimately will find its way to the core area of the wetland in these areas that are inhabited by people will contribute in radiological health problems, as the results of the dust produced in crushing and grinding of the ore, drying, calcifying and packaging of *yellow cake*. The hazard that exists is the release of the radionuclide products into air and water sources.

Already during exploration phase the recklessness of companies and inability of authorities to control them has led to severe environmental incidents. During numerous field visits CESOPE and other NGOs witnessed that

- Exploration pits are left open.
- Upwelling groundwater has been allowed to flow out for long time without any measures being taken.
- Villagers and their cattle have been disturbed by drilling activities. When they protested against the behavior of companies and local authorities, exploration was pressed through by force.
- Leftovers of sampling were disposed of in the environment and other waste, including packages of chemicals were buried in shallow pits – farmers later on tore them up during plowing and scattered the material on the fields-.
- Skin and other body irritations have been reported by the community to local authorities, possibly caused by drilling chemicals - all of this has fallen on deaf ears (Lyamunda, A. 2013).

So far after exploration, no single government authority has taken any measure in the proposed area in spite of numerous complaints

4.8.2.4 Impacts on other energy sources and how sustainable development in the country is hindered



Picture: Rice Harvest in Bahi Swamp. Source: CESOPE 2009

Bahi swamp with its natural resources offers great potentials for sustainable development. People in the area have been taking profit of these privileges traditionally. With international support during the last decades e.g rice farming was intensified and extended successfully. Uranium mining puts all this promising development strategies at risk.

4.8.2.5 Financial impacts

Little is expected from uranium mining in Bahi/Manyoni area compared to the benefit and sustainability obtained from the current existing economic activities such as farming, fishing, salt making and livestock keeping in the area.

4.8.2.6 Transport

Any method of transportation of radioactive materials, road, air, railway or water, if not carefully planned, poses a great risk to the general public. Experiences gathered from mining activities in Tanzania shows that road is the major means of transportation which may result in exposing the general public to road accidents or mishandling of the radioactive materials during transportation of radioactive materials, because the vast majority of people use road and in most cases, the route path borders or crosses, or are very close to people's settlements.

4.9 Special focus: economic aspects of Uranium Mining in the proposed areas



A Photo showing fishing activities at Bahi Swamp Uranium mining project area
Source: CESOPE, 2009

Taking into account that uranium mining plans in Bahi area interfere with a highly valuable ecosystem which is an indispensable lifeline for economic activities and food security in the region it is crucial to consider the economic aspects, risks and sustainability of the project.

A study commissioned by CESOPE and carried out by Dr. Mbogoro of the University of Dodoma to compare the expected economic output of uranium mining with the value of current economic activities in Bahi Swamp revealed that: *“Introducing uranium mining in the area would take land necessary for agriculture and pasture, would also pollute water for domestic use and for fishing activities. Moreover, the benefits that the country and the Bahi Swamp area communities will get from uranium mining, including few employment opportunities and a royalty fee of revenue paid to the government and from corporate responsibilities are derisory compared with the loss of current value of the Bahi swamp”* (Mbogoro, D. and Mwakipesile, A. 2010). It can be concluded that in respect to uranium mining, there is a serious risk and high probability that the costs to the local people and the Tanzania’s economy will by far exceed the benefits compared to the economic gain from the current major economic activities operating in the area.

4.10 Stakeholders in Uranium Mining in Tanzania

4.10.1 Governmental institutions

4.10.1.1 President/Prime Minister

Top government leaders responsible for making various decisions on natural resources, for wellbeing of all Tanzanians and for National development as a whole. Their decision of opening up the doors for investors in uranium mining influences the decision to be made in all other sectors and Ministries.

4.10.1.2 Office of Vice President

It has a Minister of state (Environment) responsible for coordinating environmental management for the improvement of the welfare of Tanzanians as reflected in the National Environmental Policy (1997), Environmental Management Act (2004) and its Regulations, programmes and projects (<http://www.vpo.go.tz/environment/ujumbe.php>). In relation to uranium mining, it continues to push through the political interest while neglecting democratic rules. For instance, the Vice-President, Dr. Mohamed Ghalib Bilal recommended mining uranium as a tool to remove hazardous mineral: *“Much talk has been said about this project, but the truth is that human beings are being exposed to radiation on a daily basis. People with ill-intentions say uranium is dangerous, but why should they worry since we have got someone to take away what they perceive to be dangerous to our lives?”* (The Guardian 2012)

4.10.1.3 National Environmental Management Council (NEMC)

NEMC was established under the 2004 Environmental Management Act, with the role of collaborating with relevant sector ministries to carry out environmental audits and surveys, to coordinate research and disseminate information about the findings of research to review and recommend for approval of EIAs and to enforce and ensure compliance of the national environmental quality standards (www.nemc.or.tz). NEMC does not have adequate experience in uranium mining regulations and operations since it does not have specialists in the nuclear physics field and does not have facilities to monitor radioactive mineral mining projects. It also lacks political support, funds and equipment to deal with the impacts of uranium mining and the influence of top leaders in decision-making.

4.10.1.4 Ministry of Energy and Minerals (MEM)

Energy and Minerals resources play an important role in poverty reduction and in supporting socioeconomic development in Tanzania. The Ministry of Energy and Minerals (MEM) is mandated to facilitate the development of energy and mineral sectors, to set policies, strategies and laws; to regulate mineral exploration, production, trading, value addition and cooperation with other stakeholders for sustainable development of mineral resource (<https://mem.go.tz/>). In relation to uranium mining, in most cases, top leaders/political agenda hinder the local levels of administration

4.10.1.5 Tanzania Mineral Audit Agency (TMAA)

Tanzania Mineral Audit Agency (TMAA) is a semi-autonomous Institution under the Ministry of Energy and Minerals. Among other roles, TMAA is in charge of monitoring and auditing the quality and quantity of minerals produced and exported by large, medium and small scale miners, of determining revenue generated to facilitate collection of payable royalty, of auditing capital investment and operating expenditure of the large and medium scale mines for the purpose of gathering taxable information and providing the same to the Tanzania Revenue Authority (TRA) and other relevant authorities, of monitoring and auditing environmental management, environmental budget and expenditure for progressive rehabilitation and mine closure (<http://www.tmaa.go.tz/>). The experience of the mining sector in Tanzania reveals that TMAA lacks local level administration as the results of decision made by top political leaders.

4.10.1.6 Ministry of Tourism and Natural Resources

The Ministry of Natural Resources and Tourism of the United Republic of Tanzania is responsible for the management of Natural, Cultural and Tourism resources. In most cases, the decision making on resources depends on the political agenda of the party in power such as the decision taken to allow uranium mining in the Selous Game Reserve.

4.10.1.7 Ministry of Communication, Science and Technology

This Ministry was established as the result of the Government Notice No. 20 of February 2008 and is responsible for the: Development of Local expertise in Science and Technology, Communication, Science and Technology Policy and Programmes, Acquisition and Application of Technology, Dissemination of Research Findings Regarding Development of Science and Technology(<http://www.mst.go.tz/>) . It is characterized by the lack of political support, lack of experts, lack of funds and local capacity of local level administration as it is under rule of top political leaders.

4.10.1.8 Tanzania Atomic Energy Commission (TAEC)

Tanzania Atomic Energy Commission was established under the Atomic Energy Act No. 7 of 2003 with the responsibility of providing protection from harmful effects of ionizing radiations by controlling all sources of ionizing radiations, regulating all activities/stages involved in uranium mining, milling and transportation while ensuring that the public is not at risk to gamma radiation exposure, contamination of food and water by dust and particulate matters from heavy metals. (www.taec.or.tz). The concerns in relation to uranium mining are the lack of political support to address the risks, the lack of skilled manpower, financial constraints and the lack of monitoring equipment.

4.10.1.9 Local and regional authorities

Local Government Authorities exist for the purpose of consolidating and giving more power to the people to competently participate in the planning and implementation of development programmes within their respective areas and generally throughout the country. (Shadrack, J. 2010). The experience in Tanzania shows that they are always under pressure of the central government. Together with mining companies, the observance of democratic rules is neglected. The interview with local leaders in uranium exploration and mining initiatives in Bahi, Illindi, Agondi, Sekamaganaga and Lekuyu was held in secrecy and local leaders were ignored.

4.10.2 Parliament and political parties

The Parliament is the Supreme Legislature in Tanzania. It consists of the President of the United Republic and the National Assembly. Its functions are to grant necessary funds to run the administration of the country. It oversees Government programs and plans, the actions of the Executive by being a watchdog ensuring that the government is accountable for its administration and its most important function is to make laws. The feature of the current Tanzanian parliament is that it is made up of few members from opposition parties and the largest proportion of members is from the (CCM), the party in power This composition makes the parliament active in terms of debate on important issues related to resources, but in most cases the voting from ruling party's MPs (CCM) usually decide on which decision is to be taken.

4.10.3 Judicial system

The judicial system in Tanzania plays the role of Interpreting diverse laws and executing administrative decisions, hearing and deciding on cases filed before the courts of law, educating members of the public on their rights and obligations under Tanzanian laws, facilitating maintenance of peace and order through good governance and the rule of law (<http://www.judiciary.go.tz/>). In Tanzania, the challenges facing the system in ensuring observance of laws are corruption among officials and lack of experts on issues related to environmental laws.

4.10.4 Companies

In Tanzania, there is a huge number of foreign companies dealing with mineral acquisitions. Mining experience in Tanzania shows that there is dominance of foreign companies over the local ones in all sorts of mining activities from gold to uranium mining: Barrick Gold Ltd, Uranex, Uranium one etc. These companies are characterized by being reckless in issues related to public safety and environmental management. Such behaviour is due to corruption among government officials and lack of serious implementation of laws and regulations from respective government authorities.

4.10.5 Local NGOs, foreign NGOs, religious communities and Civil Society / Media

Tanzania has a good number of active NGOs dealing with issues related to community wellbeing, safety and environmental issues. NGOs play the role of awareness-raising, creation of platforms to sensitize public concerns on various issues etc. In Tanzania, NGOs are characterized by relying on donors' funds, division, lack of experts, lack of continuous and harmonized activities and their activities can be cancelled by the government. For instance, CESOPE's activities in the Bahi/Manyoni area have been facing a number of challenges from the local and central government eg the July 2014 visit of the officials from the Ministry of Water accusing CESOPE of misleading the people of Bahi on the issue of Farkwa Dam construction and uranium mining.

4.11 Legal framework and criteria for Uranium Mining

In 2009, the Government of Tanzania produced the Mineral Policy of Tanzania. The policy statements that are also relevant to the mining of uranium are:

- 1) Recognizing the fact that the establishment of medium and large scale mining will cause relocation of individuals and disruption of their livelihoods, the government decided to determine effective relocation, compensation and resettlement schemes;
- 2) Recognizing that mining activities can contribute significantly in the development of local communities, the government's policy is to strengthen the relationship between mining companies and surrounding communities and the public in general;
- 3) In order to increase public awareness on mining activities, the government will provide them with accurate and timely information about all matters of concern regarding the mineral sector;
- 4) Since mining activities cause adverse effects to safety and occupational health of mine workers, environmental land degradation, pollution and social disruption of local communities around the mining sites, the government will strengthen management, occupational health and environment safety (URT 2009, pp. 11-24).

A number of Acts of Parliament and their regulations have been enacted to reflect the above-summarized Tanzanian Mineral Policy. These acts are:

- 1) The 2010 Mining Act with its 2010 Mining (Radioactive Minerals) Regulations (URT 2010);
- 2) The 2003 Atomic Energy Act with the 2011 Atomic Energy (Radiation Safety in the Mining and Processing of Radioactive Ores) Regulations (URT 2011);
- 3) The 2004 Environmental Management Act with its Environmental (Registration of Environmental Experts) 2005 Regulations and the 2005 Environmental Impact Assessment and Audit Regulations (URT 2004);
- 4) The 2003 Occupational Health and Safety Act with its Mining (Safe Working and Occupation Health) 2010 Regulations (URT 2003; URT 2010).
- 5) Other Acts that have some relevance to uranium mining in the country include the Land Act (1999) and the Village Land Act (1999).

In Tanzania the prospecting for mining, processing or engaging in radioactive minerals is prohibited unless that person is the holder of a mineral right that conforms to the standards provided by the EMA, the AEA and any other law relating to prospecting, mining, processing, transporting or storage of radioactive minerals, and provides a written declaration that he or she will not directly or indirectly contribute to the production of nuclear weapons or devices in accordance with the Nuclear Non-Proliferation Treaty to which Tanzania is a signatory – section 5 of the RM Regulations (URT 2011, p. 42).

In applying for a licence to prospect, mine or process radioactive minerals, section 6(1) and 6(2) of the RM Regulations provide that applicants are required to adhere to the provisions of the Mining Act. Section 7(1) states once an applicant has been provided with a prospecting licence for radioactive minerals, the holder of the license is not permitted to conduct any prospecting work or any other related activity unless he submits to the Minister for approval the following plans: (URT 2011, p. 42).

- “(A) A Radioactive Operation Management Protection Plan (which sets out measures to safeguard employees, the public and the environment against exposure to radiation during operation);
- (B) A Radioactive Waste Management Plan (to manage all unwanted materials generated during prospecting, mining or processing operations); and
- (C) A plan to transport and Store Radioactive Ores and Products.”

Section 7(2) of RM regulation provides that where a person intends to undertake uranium or thorium exploration, that person shall, in addition to the requirements stipulated under these regulations, comply with the provision of the National environmental management council act, the occupational safety and health

authority act and the mining (safety, occupation health and environmental protection) regulation (URT 2011, pp 42-43).

The Atomic Energy Act (2003) and its regulations seems to be central to the management of the impact of the down side nature of the mining of radioactive ores in the country. TAEC is an institution established under section 5 of the AEA. With respect to uranium mining, TAEC, among other things, is responsible for carrying out regulatory inspections and ensuring that corrective actions are taken if unsafe or potentially unsafe conditions are detected, section 6 of the AEA (URT, 2003).

Prior to starting a uranium mining project in Tanzania, the holder of the licence must, among other things, get permission from TAEC. Following investigation of the area where the project will be taking place TAEC will ascertain whether it is safe for uranium mining. When it comes to uranium exploration, the holder of the licence must comply with the SOHEP Regulations which provide for the importance of observing safety precautions while on a mine site. In doing so, the holder of the licence is required to ensure that the disposal of any radioactive mineral is done in a manner which would not cause any harm or damage to any person, animal or the environment (section 8 of the RM Regulations,URT 2003)

Furthermore, holders of the licence have to comply with the occupational and public dose limits laid down by the atomic energy act (AEA). Section 38 of the AEA provides that the normal exposure of individuals must be restricted so that neither the total effective dose nor the total equivalent dose to relevant organs or tissues caused by the possible combination of exposures from authorized practices exceeds any relevant dose limit specified in the regulations made under the AEA. (URT 2003)

Another important act with regard to uranium mining is the National Management Act 2004 and its Regulations. The major role of this Act is to ensure that the Environmental Impact Assessment is carried out under this Act. NEMC ensures it keeps a register of experts in the area of impact assessment and also ensures the impact assessment is carried out by competent experts (URT 2004).

Other Acts of minor importance on uranium mining include the Occupational Health and Act (2003) and its Regulations (2010) which aims at ensuring that the health of people working in places with radiation hazards be protected. Secondly, the Village Land Act (1999) and its Regulations which provide for that village governments will have to give consent if its land is to be used for other purposes such as mining activities. So, land grabbing is forbidden by that law.

According to these guidelines, one could believe that the country is well prepared to embark for the uranium mining trip. But we cannot help asking these two crucial questions:

- 1)** Do we have enough and well qualified Tanzanians at ministerial level to supervise these requirements?
- 2)** Is there enough political will to support technical supervision of uranium mining?

General observation from the study and experience of mining other minerals in Tanzania indicate that usually, policies, laws and regulations are clear and quite pertinent, but due to lack of adequate scrutiny over policy, the treatment of favour given by the government to mining companies is likely linked to corruption. For instance, the business Anti-corruption website notes that employees of the Mining Department ask for bribes in order to issue mining or prospecting licenses (www.business-anti-corruption.com). Moreover, other than the RM Regulations, the country lacks a specific act to regulate uranium mining activities. A more specific policy for uranium mining and extraction would be advantageous to the Tanzanian economy and would, as a result, help in providing a much clearer framework with respect to uranium mining.

4.12 Summary of the most important findings

The findings from the case study reveal the following in relation to Uranium exploration/ mining in Tanzania.

4.12.1 The Government exerts a lot of pressure to make it happen

The experience from uranium exploration exercise in different parts of Tanzania shows that the Government through top political leaders put a lot of pressure on the local authorities, NGOs and the community to push forward uranium mining plans in the proposed areas such as Bahi/Manyoni and Mkuju River.

- CESOPE's activities have been constrained.
- Exploration activities have been pressed through by police force against the will of inhabitants.
- Cases of people jailed under the pretext of disturbing peace and of local authorities and police authorizing exploration activities in peoples' farms against their will have been reported in Bahi-Makulu and Illindi.
- Moreover, the Government is not well prepared in terms of experts to implement policies, laws and regulations governing uranium mining.

4.12.2 The Public is not prepared for Uranium Mining

Experience with uranium exploration from various parts of Tanzania ie Mkuju River Project and Bahi Swamp Project area revealed that the local community is not well informed on uranium mining in their area and they lack clear information on the adverse effects uranium mining generates on their health, environment and economic activities. The case study has revealed that people continue to steal stones and wastes from exploration camps to keep inside their houses claiming to wait for uranium buyers. Also they use the polluted environment or suffer from misinformation about uranium mining masterminded by political leaders.

4.12.3 Authorities lack competences and power to ensure required standards

Mining activities in Tanzania involve a number of institutions namely NEMC, TMAA, MEM and GST. Concerning uranium mining in the country, interviewing officials has revealed that they are under government pressure, that they lack funds, equipment and experienced experts in the field of uranium mining. Experience from uranium exploration in different parts of the country shows that in most cases, these institutions do not play their role in ensuring the compliance with the required standards. Field visits in Bahi/Manyoni revealed that exploration pits are still left open, that leftovers of sampling are disposed of on to the environment and other waste, including packages of chemicals are buried in shallow pits – farmers later on tore them up during plowing and scattered the material on the fields-. So far after exploration, no single government authority has taken any measure in the proposed area in spite of numerous complaints from the community.

4.12.4 The Parliament and Civil Society are not yet strong enough

In Tanzania, there is still a long way to go to empower the Civil Society and the Parliament to make them strong enough to claim democratic processes as well as to fight for the enforcement of laws. This has been evidenced during the uranium exploration phase in different parts when only few civil society organizations (I.e. CESOPE), tried to air out people's concerns about uranium mining with little support from the Members of Parliament, merely from opposition parties. The NGOs' efforts on civil education on uranium mining still face a lot of pressure and challenges from the government

4.12.5 Uranium Mining plans contradict the primary interests and aims of the Government

Uranium mining in Tanzania contradicts the primary aim of the government to its people which is to ensure safety of the citizens and sustainable economic development. The study finds out that the political interests of the party in power is to deliberately sacrifice the existing sustainable economic occupations such as agriculture, fishing, salt making and livestock keeping in the Bahi/Manyoni area as well as sustainable tourism and participatory wild life management in Mkuju river project. The study observes that the government, through its officials is only interested in forcing through with uranium mining initiatives at any cost.

4.13 Policy recommendations and conclusion

The results of this study have shown stakeholders' direct and indirect need to take action in guiding the practices of uranium mining in Tanzania; and therefore in the light of this study we would like to recommend the following:

- The Tanzanian government should
 - develop an adequate regulatory framework and policy with regard to uranium mining and strengthen its capacity to enforce such regulations.
 - ensure that legal procedures and international standards are adhered to and that civil and human rights are respected.
 - make sure that levels and limits of radiation are determined by independent scientists before the companies start mining uranium in the area.
- Indispensable dialogue and consent between all the interested and affected parties and awareness campaign should be organized.
- Highly valuable areas like natural reserves and areas of special importance for food security like Bahi Wetland must be excluded from uranium mining.
- Perspectives:
 - The Selous Game Reserve area could be further developed into a tourist attraction spot.
 - In Bahi/Manyoni sustainable agriculture and other uses of forest products should be boosted;
- Measures for storage of radioactive waste are required;
- Uranium should be included in the (draft) guideline of the European Union on *Responsible sourcing of minerals originating from conflict-affected and high-risk areas (guideline towards an integrated EU approach)*.
- Involved stakeholders, multinational companies and nuclear energy consuming countries should recognize and take their responsibility and fulfill criteria of corporate accountability;
- The whole fuel chain of nuclear power should be more transparent and more monitored.
- Nuclear energy (with all its negative consequences as e.g. uranium mining) should be abandoned.

5| CONCLUSIONS AND POLICY RECOMMENDATIONS

All three Case Studies state the negative impact of uranium mining for the environment and the society. Consequently, SNJP, AMCFE, CESOPE and WISE agree that uranium mining should be abandoned completely. If uranium mining is already taking place or about to happen, the criteria for such mining should be considerably improved.

5.1 Policy recommendations and important lessons learnt for Africa and the international community

These policy recommendations and important lessons learnt are based on experiences and analyses in Mali, Cameroon and Tanzania and present the situation in African countries, particularly in Mali, Cameroon and Tanzania. They also address local, national and international stakeholders, civil society organizations, mining companies, African authorities, the international community, end users, European policy and more.

- The public and government are not well informed about the situation, conditions and consequences → an awareness campaign should be initiated, aiming at informing society and governmental institutions, capacities should be reinforced
- The civil society should be integrated more in decision making processes
- Recently created emerging national (CSO) networks help networking between different actors of the African countries concerned about the exploration and the exploitation of uranium as well as international networking with European NGOs
- Potential release of toxic and radioactive compounds should not be denied by the respective government
- No uranium mining should be undertaken in states with too small governmental control without international regulatory and executive support
- Respectively threatened areas should be left intact, without uranium mining and contamination, therefore uranium mining should be prohibited there and in any other regions
- Regular controls need to be undertaken at exploration sites: water management and radiation analysis around the drillings
- Measures for storage of radioactive waste are required
- Uranium should be included into the (draft) guideline of the European Union on Responsible sourcing of minerals originating in conflict-affected and high-risk areas (guideline towards an integrated EU approach) as an extractive with very negative and long-lasting impact, the (draft) guideline should be binding and not based on voluntary character
- The IAEA should monitor uranium mining financed by nuclear industries
- A multilateral agency should be put in place to govern uranium mining. It should be advisable for the IAEA to monitor uranium mining financed by nuclear industries
- Involved stakeholders as multinational companies and nuclear energy consuming countries should be informed on the conditions of uranium mining in Africa, recognize and take their responsibility and fulfill

criteria for corporate sustainability and accountability

- These stakeholders should create compensation funds for the uranium producing African countries and reimburse the affected communities
- The whole fuel chain should be more transparent and be monitored more
- Above all: as uranium mining is the first part of the nuclear energy value chain, it should be concluded: Nuclear energy with all its negative impacts (as e.g. uranium mining) should be abandoned
- Renewable energy sources are the future – worldwide and also for the respective African countries – and therefore uranium user countries should focus on renewables

5.1.1 Mali: Additional lessons learnt and policy recommendations

- Environmental Impact Assessments and other analysis and agreements between the state at the mining company should be public, also recommended by CRIIRAD (Commission for Independent Research and Information on Radioactivity)
- The Government should review the mining code with emphasis on the Environmental and Social Impact Assessment prior to the establishment of mining projects, the putting in place of financial mechanisms to ensure the waste disposal, the protection and compensation of the resident communities and regarding the reclamation of sites after mining, the involvement of resident communities in the decision-making process
- Capacity building on all levels
 - o Reinforcement of capacity building of Malian stakeholders (State, respective organizations and individuals, civil society, etc.);
 - o Organization of information, awareness and education campaigns for the population groups interested in the project
 - o Setting up of a civic and advisory watch committee in Faléa, which should act as interface between uranium mining companies and all the other stakeholders in the civil society.

5.1.2 Cameroon: Additional lessons learnt and policy recommendations

- The local population, NGOs and the staff of involved mining companies need training at all levels (with support of experienced countries / CSOs)
- The society, particularly the local population, has to be informed on the situation, impact, possible consequences and necessary changes
- The legal framework of the Communauté Economique et Monétaire de l'Afrique Centrale (CEMAC) should be aligned
- The Transportation of radioactive material needs to be improved (regulation not in place yet in Cameroon)
- Prospecting companies should share information of public interest, e.g. the radiation cartography with the local administration and the local population - in addition to research and awareness raising through civil society organization (CRIIRAD, 2014, p.7)
- Chemical substances used by Mega Uranium should be publically known, affected areas should be

published and analyzed

- The level of radiation in inhabited areas has to be verified, radiation measures have to be taken in Poli and Teubang to protect the local population
- The water quality as well as the level of radiation of food staples have to be controlled
- Hydrologic and Hydro-geologic studies should be carried out to measure the prospecting impact in Teubang;
- The level of radiation in inhabited areas has to be verified, radiation measures have to be taken in Poli and Teubang to protect the local population
- Especially for Teubang, the impact of some hundred drillings on the environment must be assessed

5.1.3 Tanzania: Additional lessons learnt and policy recommendations

- The Tanzanian government should develop its own capacity and consequently an adequate regulatory framework and policy, and supervise the implementation of these regulations that govern the mining of uranium in the country
- The Tanzanian government should ensure that legal procedures are adhered to and civil and human rights are respected
- Particularly, but not exclusively, highly valuable areas like natural reserves and areas of special importance for food security like Bahi Wetland have to be excluded from uranium mining
- The Tanzanian government should determine the levels and limits of radiation before the companies start mining uranium in the area
- Perspectives: the Selous Game Reserve area could be further developed into a tourist attraction spot, in addition to the current economic activities
- The Tanzanian government should respect and protect Civil Society and critical voices in the Parliament instead of keeping the current situation (NGOs, such as CESOPE, MVIWATA, FEMAPO, TMMTF, etc. face a lot of pressure and threats from government officials when addressing people on uranium mining)
- Indispensable dialogue and consent between all the interested and affected parties in Tanzania

5.2 Prospects

There is a strong need for information. AMCFE, SNJP and CESOPE agree that it is essential to inform the government and citizens about the conditions of uranium mining, the impact, potential dangers and better criteria for – if required at all – exploration and exploitation of uranium in the respective areas. A dialogue should be initiated that brings together (potentially) affected and interested parties. Freedom of expression and media is a crucial condition to provide such a dialogue and enhance a democratic development and to raise awareness.

Responsibility, specifically Corporate Accountability / Social Responsibility, and transparency is another issue that the Case Studies of all three countries state. Without these aspects the process is unfair from the start – independent from the fact if uranium mining is suitable or not. On an international level this is also essential that the involved stakeholders take their responsibility – the United Nations, International Atomic Energy Agency, the international community, stakeholders in Europe and other Western areas, are mentioned. If there is uranium mining, the affected communities should be compensated. There is already an unbalance, to say the least, between the international uranium companies that benefit from it and the local population and environment as well as weak governments which are abused. Uranium mining activities taking place or being planned in African countries do not contribute to a sustainable development, do not result in shared profit with the people, nor do they benefit the society of the respective countries, but all the potential benefits go to other stakeholders and do not profit the regions where uranium is being explored and exploited.

Some of the conclusions also describe the kind of negative impact uranium has and can have. It has to be pointed out that uranium can have a lot worse effects than other extractives and deserves more attention – especially as uranium is not perceived as such from the international community.

Apart from the mentioned dilemmas, it is an ethical issue – once again in history, as Nnimmo Bassey states: *“What makes possible the lack of regulation in Africa’s extractive sectors, the open robbery and the incredibly destructive extractive activities? Leading the multiplicity of factors are unjust power relations that follow from and amplify the baggage of slavery, colonialism and neo-colonialism.”*

Not all project partners are as strictly positioned against nuclear power. Yet, WISE states that as – among many other arguments – uranium mining has such a negative impact on the environment and society and is tightly linked to nuclear power, this type of energy should neither be promoted, nor continued nor should African countries be exploited. The future lies in saving energy, more energy efficiency and renewable energy sources. Let’s hope for Africa – and the rest of the world – that we will reach this aim soon.

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