Certified Trading Chains in Mineral Production: A Way to Improve Responsibility in Mining

Gudrun Franken, Jürgen Vasters, Ulrike Dorner, Frank Melcher, Maria Sitnikova, and Simon Goldmann

Abstract

Mining in Central Africa has been associated with violent conflict, mistreatment of artisanal miners, illegal trading and the diversion of state funds. In 2002, the UN Group of Experts on the Democratic Republic of the Congo stated that the plunder of natural resources and other forms of wealth of the Democratic Republic of Congo was fuelling conflict in the region. Especially the sector of artisanal and small-scale mining, which provides livelihood for millions of people in Central Africa, is part of the informal and illegal trading chain of minerals. In November 2006, the eleven member states of the International Conference on the Great Lakes Region (ICGLR) signed the Protocol against the Illegal Exploitation of Natural Resources, which includes the aim of implementing a mechanism for the certification of natural resources in its Article 11. The Federal Institute for Geosciences and Natural Resources (BGR) developed two initiatives aiming at transparency and responsibility in the trading chains of metal ores linked to financing conflicts: first the development of a geochemical fingerprint for coltan ores and second a concept for a chain of custody assurance system (Certified Trading Chains – CTC), based on the establishment of transparent, traceable and ethical trading chains. Since the year 2000, on the one hand Central African coltan (tantalum ore concentrate) has developed into a significant supplier for the world market, on the other hand profit from ore production and trade has been financing military groups. The fingerprinting method aims at identifying the origin of a concentrate by comparing its mineralogical and chemical characteristics with samples of known provenance that are stored in the BGR coltan database. Adaption of the method to tin and tungsten ores, and application either as a forensic instrument, or in conjunction with certified trading

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chains, would allow for the control of a significant portion of mineral exports from Central Africa's conflict region. The geochemical fingerprint is imbedded in CTC as an additional checking instrument for traceability (beyond the documentary system). The concept of Certified Trading Chains found entry to the protocol of the G8 summit in Heiligendamm/Germany in 2007 as part of efforts in the mining sector to assure greater responsibility for reducing poverty and preventing conflicts. As a result, a CTC pilot project in Rwanda commissioned by the German Government was initiated concerning the feasibility of a certification system for selected raw materials (tin, tantalum and tungsten). Consultations with stakeholders from Rwanda paved the way for national implementation currently underway, however integrated in the regional policy of the International Conference of the Great Lakes Region. Major features of CTC are a set of five principles with 20 standards based on OECD guidelines to be applicable in the artisanal and small-scale mining sector and which were adapted to local conditions by a national consultation process in Rwanda. Key elements are the voluntary participation of the companies, the lead by national governmental institutions as well as an independent audit of an internationally accredited auditor. The proper implementation of certification will foster good governance, where mineral resources are produced and traded legally and transparently and in ways, which protect workers, communities, and the environment. Certification will also progressively transform and formalize informal mining. Formalization is a precondition for achieving transparent recording of production and trade, to improve governance and reduce conflicts associated with the mining sector.

Keywords

Mineral certification • CTC • Conflict minerals • Coltan • Analytical fingerprint • AFP • Due diligence • Artisanal mining • ASM • Democratic Republic of Congo • Rwanda

Resources and Conflicts

Introduction

Natural resources can play a key role in triggering, prolonging and financing conflicts. Since the mid of the 1990s, there has been growing research on this topic. Recent findings show that natural resources are never the only source of a conflict. Poverty, ethnic or religious grievances, unstable governments and rebel financing play major roles. Natural resources often linked to civil conflicts are largely oil and high-value minerals like coltan, diamonds, gold and gemstones. In most of the conflicts, multiple resources are involved.

Resource-related conflicts are especially relevant for African countries (Bannon and Collier 2003). Three of the world's worst wars of recent years were related to natural resources and took place in Sierra Leone, Liberia and the Democratic Republic of Congo (DRC). The eastern part of the DRC (North and South Kivu) has been suffering from armed conflicts for more than 12 years. In North and South Kivu, armed groups and the Congolese national army control the trade of cassiterite (tin ore), gold, columbite-tantalite (coltan), wolframite (tungsten ore) and

other minerals. The warring parties have unrestricted access to these minerals and have been able to establish lucrative trading networks because of a lack of state control and the unregulated nature of the mining sector.

The Case of the Democratic Republic of Congo

Mineral production in the DRC depends to a large amount on the artisanal and small-scale mining (ASM) sector. Current estimates indicate that about two million people are working in this sector and about ten million people are depending on the earnings generated here – this is 20% of the total Congolese population. In the early years of this decade, the artisanal mining sector in the DRC produced between 80% and 100% of the total Congolese mineral production (Garrett and Mitchell 2009) due to difficult operating environments for industrial mining operations and lack of infrastructure.

The Congolese population suffers not only from reprisals of the warring groups but also from wanting working conditions in artisanal mining. Beyond that, in the initial phase of operation, artisanal miners commonly receive a trader's credit. During the pay down of the credit, they are forced to sell their production under unfavourable conditions to the lender. This results in a long-term dependency of the miner and resembles modern peonage.

The two main warring parties, the Forces armées de la République du Congo (FARDC, Congolese national army) and the Forces Démocratiques de Libération du Rwanda (FDLR), the predominantly Rwandan Hutu armed group, control highly mineralised areas (North and South Kivu) where they benefit from mineral production and trade. They impose illegal 'taxes' on miners and traders. The FDLR obtains a significant proportion (up to 75%) of its income from gold mining and trading. Informed estimates suggest that the Congrès National pour la Défence du Peuple (CNDP), a political armed militia engaged in the Kivu conflict, earns up to 15% of its revenue from the mineral trade, and the FARDC up to 95% (Garrett and Mitchell 2009).

The analysis of export data from the Kivu provinces suggests that under-declaration and smuggling are the major problems. The trade starts at remote sites, from where the minerals are transported by foot, car, truck and plane to the main export centres. From there, the exported material passes through Burundi, Kenya, Rwanda, Uganda and/or Tanzania. Differences between Congolese and Rwandan statistics suggest that traded minerals are either declared as transit goods or untaxed at the DRC border and then declared in Rwanda. Independent research (Garrett and Mitchell 2009) indicates that 28,700 ton of cassiterite has been exported from the DRC and Rwanda in 2008, with 87% originating from the DRC.

The conflict dynamics in Eastern DRC are more complex than a simple cause and effect connection between military groups, mineral production and the trade in minerals. Weak institutions and a dysfunctional army enable military groups to pose security problems to mining and trade for their benefit. Stopping or interrupting mining and trade is less promising than figuring out how to tackle the insecurity problems and formalise the sector. On the other hand, it is essential to improve the situation of the workers depending on ASM in order to strengthen their position.

The Role of Artisanal and Small-Scale Mining

In our modern post-industrial society, the importance of the artisanal and small-scale mining sector is frequently underestimated. However, it is a worldwide reality. In addition to large-scale mining, ASM production contributes significantly to the raw materials supply of industrialised countries. There is no general accepted definition of artisanal and small-scale mining yet. In the following context, the term artisanal and small-scale mining is used to describe extraction that is manual and very labour-intensive, using only shovels and basins or somewhat mechanised, using heavy machinery on a small scale (Fig. 1).

Artisanal and small-scale mining provides livelihood to an unprivileged part of society in

Fig. 1 Artisanal cassiterite mining, Nemba (Rwanda)

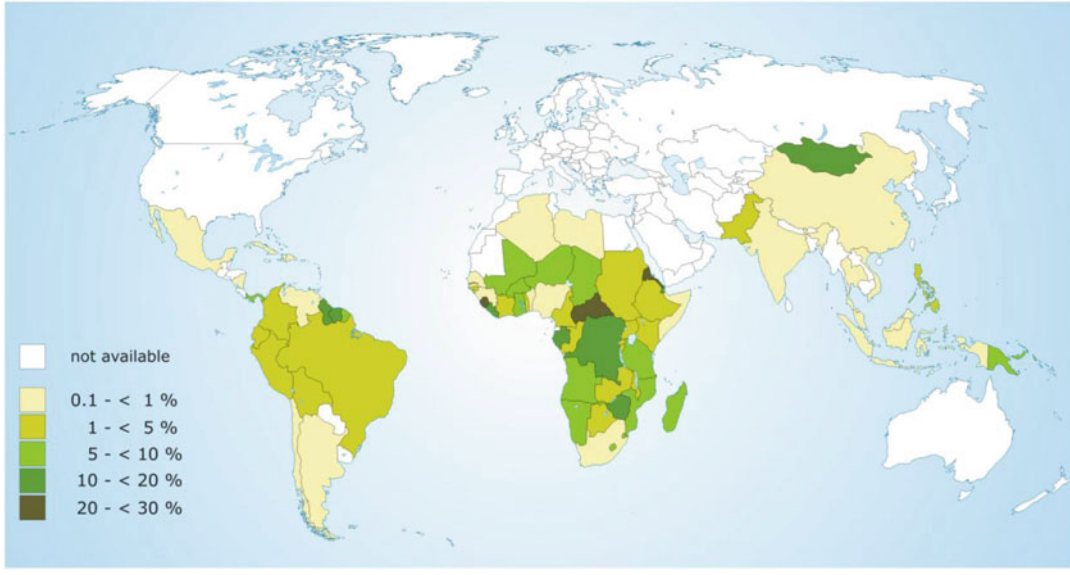

Fig. 2 Percentage of the population depending on ASM (CASM 2009)

many developing countries. Worldwide, about 15 million people make their living in the ASM sector. About 100 million people – workers and their families – depend existentially on ASM (Fig. 2) compared to about seven million people worldwide in industrial mining. Earnings in the ASM sector – at least in gold and diamond extraction – are considerably higher than the average income of comparable agricultural regions (about 3 USD/d in ASM, against about 0.6 USD/d for a farmer in central Africa).

The share of mineral production by ASM differs considerably between different raw materials. Gold as well as the high-tech and electronic metals tin, tantalum, tungsten and cobalt are produced to a high degree in ASM operations.

Nevertheless, the redistribution of income from ASM shows that only the smallest part of the extracted wealth eventually reaches the miner. This is also due to the fact that ASM is part of the informal and illegal trading chain of minerals. Although artisanal and small-scale mining is dealt with in most mining regulations, the actual surveillance of this sector by the mining authorities is low. Working conditions are generally poor, and child and forced labour are particularly abundant in weak governance regions. Missing or neglected mine safety procedures are the cause of frequent work accidents; environmental impacts can be devastating.

In addition, the lack of free market access for artisanal mineral production, caused by insufficient infrastructure or by legal restraints, is another obstacle for the thriving of this sector. It is commonplace that mineral buyers and traders can determine their prices. Because the local and intermediary trade of minerals needs a secure business environment especially in conflict areas, the traders have to buy security support from local political and military rulers or private companies. Part of the revenue from mineral trade is lost by means of corruption or is used to finance conflicts.

Up to now, there exists no generally accepted mechanism to ensure transparency in the mineral production of high-value minerals in ASM (apart from the so-called Kimberley Process for diamonds) and also to ensure adherence to internationally accepted minimum standards. Both are the prerequisite for responsible mining and production and due diligence also for the consumer industries.

A differentiation of the production regarding compliance to internationally accepted standards would add value to the ASM production and provide direct access to the mineral markets in industrial countries. For industrial countries, the access to ASM production without fearing of reputational loss would help to improve the supply security since the flexibility of the sector with regard to price changes would help to reduce the consumer's need for stock-keeping of minerals.

A new certification mechanism developed for the mineral trading chain, which is described in detail in section "Certified Trading Chains (CTC) – Background and Objectives", addresses the problems mentioned above. A pilot project has been conducted in Rwanda (see section "CTC in Practice") and focuses on artisanal mining of tantalum, tin and tungsten. Besides gold, these are the minerals of interest in central-east Africa.

Resources of Interest: The 3 T´s – Tin, Tungsten and Tantalum

High-commodity value metals such as gold and the 3 T´s, tin, tungsten and tantalum, are especially linked to financing conflicts in Eastern DRC. Artisanal mining of tin and tantalum significantly adds to their world supply (Table 1). Tantalum, tin and tungsten deposits are abundant in the Kibaran orogenic belt of central-east Africa (a major orogenic belt of Mesoproterozoic age extending from Katanga in the south to Uganda in the north), where they are extracted exclusively by artisanal mining.

Within the past 10 years, tantalum production (ca. 1,900 tons in 2008) was mainly focused on Western Australia (30–40%), Brazil (12%), Asia (13%) and Africa (35%) (Fig. 3). The economic

Table 1 Estimation of the share of ASM in the global production of selected minerals and metals (Wagner et al. 2007)

Metals	
Antimony	4%[a]
Beryl	5%
Lead	2.5%
Chromite	5%
Iron	4%
Gold	10%
Cobalt	30%
Copper	0.5%
Manganese	11%
Platinum	1%[b]
Mercury	18%
Silver	7%
Tantalum	40%[c]
Tungsten	6%
Zinc	1%
Tin	30%

[a]Exclusive PR China
[b]Supposed production of ASM in Russia and Colombia
[c]Mining in African countries (DRC, Mozambique, Rwanda, Ethiopia and Burundi)

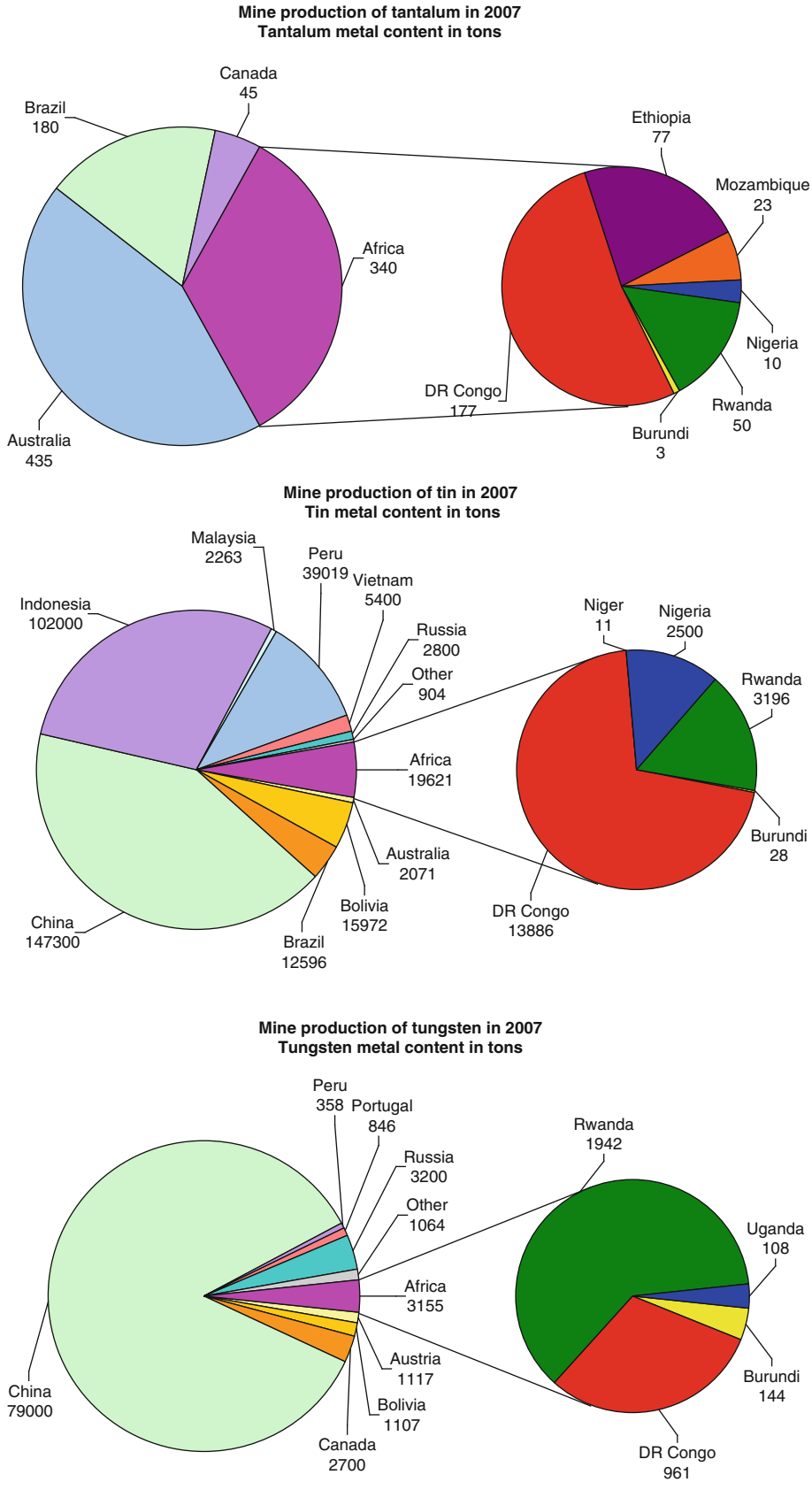

Fig. 3 World mine production (metal contents) and African production of tantalum, tin and tungsten according to the USGS (2009) and the BGR (2009b)

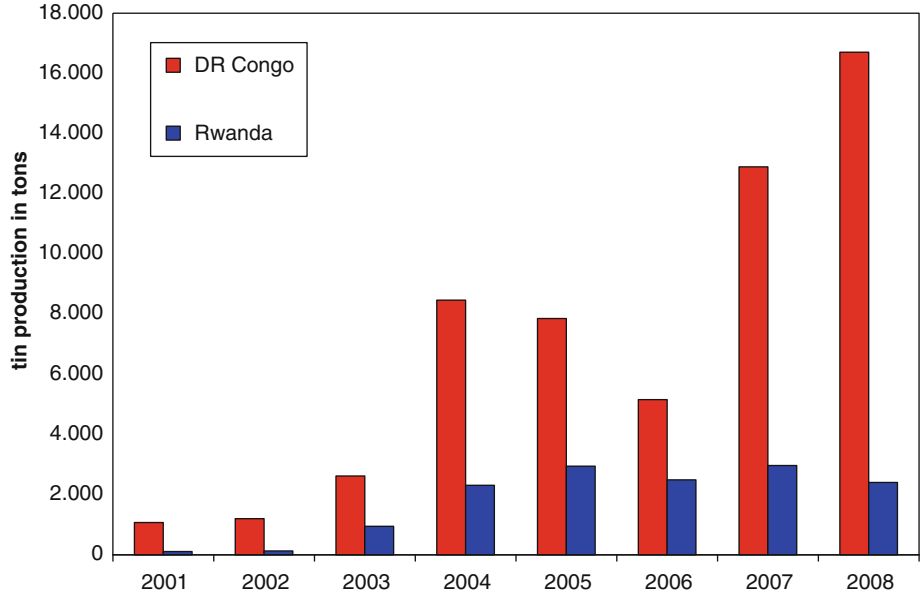

Fig. 4 Production of tin from Rwanda (*blue columns*) and the Democratic Republic of Congo (*red columns*) from 2001 to 2008. Tin production was calculated from exports of cassiterite concentrates, using a grade of 65% tin metal in concentrate

crisis in 2009 has lead to temporal mine closures in Australia and Canada, with Africa, Brazil and China remaining the principal producers. Major African producers are Ethiopia, Mozambique, Rwanda and the DRC, followed by Nigeria, Zimbabwe and others (Fig. 3). After a tremendous rise of tantalum prices in 2000, African production increased from <20% to >30% of the world market share.

The global tin production strongly increased from 1990 until today, with 350,000 tons of metal content mined in 2007 (Fig. 3). Major producers are China and Indonesia, accounting for more than 70% of the production, followed by Peru. Africa's mine production in 2007 was estimated to contain approximately 20,000 tons tin, representing a 6% share of the world production (Fig. 3). Tin exports as cassiterite concentrates from central Africa have strongly increased from 2001 to 2008 (Fig. 4); especially in 2008, about 17,000 tons of tin content were produced in the DRC and 2,400 tons in Rwanda (Fig. 4).

With 52,000 tons of tungsten and 81% of the market share, China is by far the largest producer of this commodity, followed by Canada, Russia and Rwanda. Austria and Portugal have a 3.2% market share (BGR 2009a, b) (Fig. 3). Only 3% (3,155 tons of tungsten metal content) were originating from Africa in 2007. The tungsten production in Africa is restricted to Kibaran deposits in the Great Lakes Region with Rwanda (61%), the DRC (31%), Burundi (4%) and Uganda (4%) as the major producers.

Tin, tungsten and tantalum play a crucial role for our modern society. Tin is mainly used as a solder material in the electronics industry (53%), as corrosion-resistant tinplates (16%), in chemicals and in the manufacturing of bronze. The major use for tungsten is in the production of heat- and corrosion-resistant hard metals that consumes about 60% of the global tungsten consumption. Tantalum is an important electronic metal, widely used for the production of small capacitors that make up about 60% of the current tantalum demand. Such capacitors are used in consumer electronics, e.g. in cars, laptops, cell phones, digital cameras and pagers. In many products of daily use, tantalum may be substituted by cheaper metals such as niobium and aluminium. However, increasing demand is expected mainly due to its use in aerospace and aviation industries.

Certified Trading Chains (CTC) – Background and Objectives

In 2002, the United Nations' Panel of Experts on the Illegal Exploitation of Natural Resources and Other Forms of Wealth of the Democratic Republic of the Congo presented their findings to the Security Council (United Nations Security Council 2002). The Panel had found that the plunder of natural resources and other forms of wealth of the DRC was fuelling conflict in the region. In 2005, the Panel of Experts proposed that enhanced traceability systems should be developed for all important natural resources of the Democratic Republic of the Congo (United Nations Security Council 2005).

Taking up the call for transparency in mineral production, the Federal Institute for Geosciences and Natural Resources, the Geological Survey of Germany (BGR), started two research projects in 2006. The first research project aimed to test the feasibility of 'fingerprinting' coltan samples based on the mineralogical and chemical characteristics of specific ore concentrates (see section "The CTC Principles and Standards"). In the second research project, a chain of custody assurance system was developed, based on the establishment of transparent, traceable and ethical trading chains. This concept of Certified Trading Chains (CTC) found entry into the preparatory discussions for the G8 summit in Heiligendamm in 2007. The summit protocol stressed the need for action in the artisanal and small-scale mining sector and acknowledged the potential of certification systems to increase 'transparency and good governance in the extraction and processing of mineral raw materials … to reduce environmental impacts, support compliance with minimum social standards, and resolutely counter illegal resource extraction' (Article 85). It also expressed support for 'a pilot study… concerning the feasibility of a designed certification system for selected raw materials' (Article 86) (G8 Summit 2007). To this end, the German government has taken the initiative to support such a pilot project for an implementation in Rwanda.

CTC in mineral production is an instrument to implement ethical standards and transparency in mineral production and thereby to improve responsibility in the minerals sector by introducing a concept of voluntary self-commitment among the partners within the value chain. Since highly mechanised and large-scale mining (LSM) operations commonly operate within acceptable corporate social and ecological responsibility (CSER) standards, the approach explicitly focuses on artisanal mining organisations and small-scale companies which use artisanal labour in developing countries.

Export bans on high-quality and low-volume commodities are costly and difficult to enforce. In contrast, certification can be oriented at the same goals, whilst allowing companies to continue mining or buying minerals from the region on the basis that they have demonstrated to achieve their social and environmental responsibilities, as required by the certification system. In this way, responsible buyers can use their buying power to effect positive change by remaining engaged in the mineral supply chains rather than disengaging. By ensuring traceability along the trading chain, CTC serves as an instrument

- to ensure that the trade of certain mineral resources is conducted legally and does not support belligerent groups in the region,
- to assure that process and production methods at the mine site adhere to minimum social and ecological standards.

CTC on the one hand aims to increase the contribution of the mineral sector to poverty reduction and the political stabilisation of developing nations. On the other hand, it aims to improve supply security for the processing industry and fosters responsibility in industrialised economies thus strongly implicating the dual objectives of producer and consumer benefits. The proper implementation of certification will support areas of good governance, where mineral resources are produced and traded legally and transparently and in ways which protect workers, communities and the environment. Certification will also progressively transform

and formalise informal mining. Formalisation is a precondition for achieving transparent records of production and trade to improve governance and to reduce conflicts associated with the mining sector.

Certification can only be regarded as the second best option and would be superfluous in case of total conformity with national and international laws, regulations and standards. However, law enforcement and institutional capacity are often weak in the mineral sector of many developing countries; CTC tries transitionally to fill the gaps between the ideal world and the reality of sectoral governance.

The CTC Principles and Standards

On the basis of company audits at different mining sites in Rwanda, a set of standards was drafted based on a number of international 'integrity instruments' as well as national law. Each standard was derived from specific provisions in the Organisation for Economic Cooperation and Development's (OECD) Guidelines for Multinational Enterprises (2000) and Risk Awareness Tool for Multinational Enterprises in Weak Governance Zones (2006), as well as from some of the International Finance Corporation's Performance Standards and the Voluntary Principles on Security and Human Rights.

The set of standards was drafted with the focus on transparency along the trading chain including certification of origin as well as assuring corporate social and environmental responsibility. Certification of origin on the one hand is based on documentation and plausibility checks related to production, trade and export as well as – in case of doubt – the additional checking instrument of the geochemical fingerprint for certain minerals (see section "Geochemical Fingerprint").

After consultation on the content of this standard at the 8th annual conference of the World Bank's initiative Communities and Small-Scale Mining in Brasilia, Brazil, October 2008, five basic principles (Table 2) were established each referring to a thematic cluster and two additional standards added, one referring to gender issues and the other on handling influx migration.

A further step in the CTC consultation process was a workshop on the revised standard held at the conference of Fatal Transaction and the Bonn International Centre for Conversion (BICC) 'Digging for Peace – Private Companies and Emerging Economies in Zones of Conflict' in Bonn, November 2008. The workshop enhanced the dialogue with the civil society on the content of the CTC. In March 2009, an implementation workshop with national stakeholders in Kigali, Rwanda, started the national CTC implementation. The standards were related to Rwandan legislation as well as revised and adopted specifically for Rwandan conditions.

An important element of the CTC procedure is the traceability of the traded minerals. Therefore, an innovative procedure using geochemical fingerprinting for the identification of the locality of origin of the traded minerals with a high degree of accuracy was developed. In the following section, the method of the geochemical fingerprint is described in more detail.

Geochemical Fingerprint

'Coltan' (a trade name for ores of tantalum associated with columbium from Africa) has been identified as an appropriate object of study to develop a geochemical fingerprint because an estimated 40% of the world's tantalum production originates from African countries, especially from the DRC. Furthermore, rising tantalum prices coincided with civil wars in the DRC, resulting in huge exploitation efforts for raw materials. Sales of coltan, tin, tungsten and gold were used to finance the various armed groups in the region to a significant extent.

In the DRC, coltan is produced by artisanal methods from numerous small-scale mining operations in the Kivu provinces, Ituri, Maniema and Katanga. In neighbouring Rwanda, Burundi and Uganda, artisanal coltan production is smaller but also significant. Heavy mineral concentrates are usually produced by panning

Table 2 Principles and standards of CTC

Principle	Standard
1. Origin and volumes of produced and traded goods as well as company payments to host government are transparent	1.1 Origin and production volume of minerals from the pilot mine site throughout the trading chain are traceable
	1.2 Meet fiscal obligations required by host government law
	1.3 Publish all payments made to government according to internationally accepted standards
	1.4 Actively oppose bribery and fraudulent payments
2. The company does not use child labour and ensures fair remuneration and work conditions as well as continual improvement of health and safety measures for all employees	2.1 Maintain salary or payment levels equal to or greater than those in comparable enterprises within Rwanda
	2.2 Ensure that no child labourers (age under 16) work on company sites
	2.3 Support workers' organisations and collective bargaining
	2.4 Provide essential protective and production services to support the work of artisanal miners
	2.5 Ensure occupational health and insurance in all company operations
	2.6 Provide training for employees and contractors on safety, health and effective use of on-site facilities
3. The company ensures security on company sites whilst respecting human rights	3.1 Provide sufficient and adequately trained security forces
	3.2 Undertake security risk assessments
4. The company consults communities in which it operates and contributes to their social, economic and institutional development taking into account gender-sensitive aspects	4.1 Interact regularly with communities and local governments to address grievances and other common concerns
	4.2 Support local enterprises to supply company operations
	4.3 Implement integrated development programmes in nearby communities for livelihood security, social and physical infrastructure and capacity building
	4.4 Obtain free, prior and informed consent before acquiring land or property
	4.5 Understand the situation and perspectives of the women in the company's area of influence and design and implement company's operations in a gender-sensitive way
	4.6 Carry out an assessment on human migratory streams created by company operations and develop an influx migration action plan
5. The company seeks continual improvement of its environmental performance	5.1 Carry out an environment impact assessment as the basis for developing an environmental management and protection plan and strategy
	5.2 Properly treat or dispose of hazardous material and waste from its site(s)
	5.3 Make provisions for the full cost of rehabilitation upon closure

and sieving and may undergo limited additional processing steps (magnetic separation) before they are exported. The mines operate on eluvial and alluvial deposits associated with small lenses of pegmatite rocks. The host rocks of pegmatites in the area of interest are metasediments and metaigneous rocks of the Kibara Province.

Comprehensive investigations have been carried out by the BGR on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ) from 2006 to 2009. The goal was to develop analytical methods to verify the origin of coltan. Based on an evaluation of geological and mineralogical factors, the following measurable properties were identified as critical parameters (Fig. 5):

- Mineralogical composition and variability of ore concentrates
- Geochemical composition of tantalum minerals in the concentrates
- Radiometric age of tantalum minerals

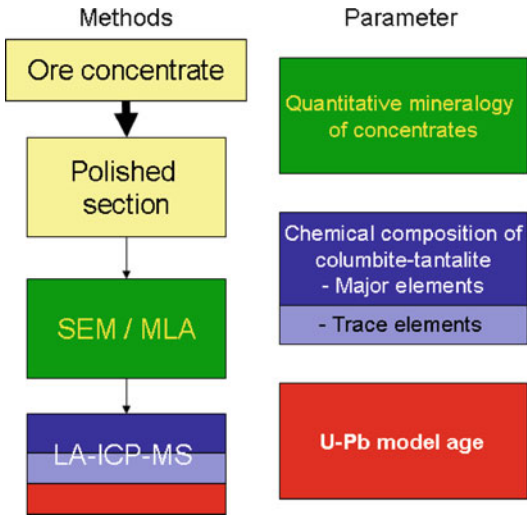

Fig. 5 Parameters and methods used to fingerprint the origin of coltan

Several methodological approaches were tested. A three-stage analytical protocol is proposed, taking into account the time available in routine work (Fig. 5):

- Preparation of polished sections
- Quantification of the mineralogy of ore concentrates using automated scanning electron microscope techniques (SEM/MLA)
- Determination of the chemical composition of about 50 single tantalum mineral grains, including their uranium and lead isotopic composition for radiometric dating, using laser ablation ICP-MS

Using these methods, a certification laboratory could analyse about 1,000 concentrate samples per year. The results are entered into a relational database, and the samples are classified using statistical methods, e.g. by machine learning techniques. At present, the reference database consists of more than 25,000 analytical data sets representing 343 samples from 33 countries.

The combined mineralogical and geochemical signatures allow for the definition of nine large tantalum provinces in Africa. These range in age from the Archean (>2,500 Ma) to the Mesozoic (younger than 225 Ma) (Melcher et al. 2008a, b). The accuracy of allocating a sample to a province or sub-province is calculated by applying error-validated classification methods. Blind experiments revealed excellent hit rates.

Within the Kibara province, the fingerprint of coltan concentrates relies on two parameters only because uranium-lead model ages are similar for most pegmatite-derived ores (between 930 and 980 Ma). However, distinct differences in the mineralogy of concentrates and in the geochemical composition of single tantalum mineral grains enable a discrimination down to the scale of an ore district such as Gatumba in Rwanda (Fig. 6) (Lehmann et al. 2008). Automated scanning electron microscope–based methods such as mineral liberation analysis (MLA) allow for a rapid quantitative measurement of a polished section prepared from an ore concentrate. Even rare phases are detected with a high probability. Once identified by MLA, the compositions of single tantalum mineral grains are then determined by laser ablation ICP-MS, resulting in a comprehensive data set for each concentrate. In columbite-tantalite minerals, the concentrations of the major elements (Fe, Mn, Nb, Ta) and of the minor to trace elements (Li, Sc, Ti, Zr, Y, Sn, Hf, W, U, rare earth elements) vary systematically within a given ore body (Melcher et al. 2008a, b). In combination with textural attributes such as intergrowths, inclusions and zoning, chemical data are used to identify the host pegmatite and to discriminate it from neighbouring occurrences.

Thus, for the first time, an analytical method is available to fingerprint the origin of tantalum ore concentrates. The method may be applied as a forensic instrument, or in conjunction with certified trading chains in mineral production. Extension of the analytical fingerprint to tin and tungsten ores is currently underway. If necessary, this would allow for the control of a significant portion of mineral exports from Central Africa's conflict region.

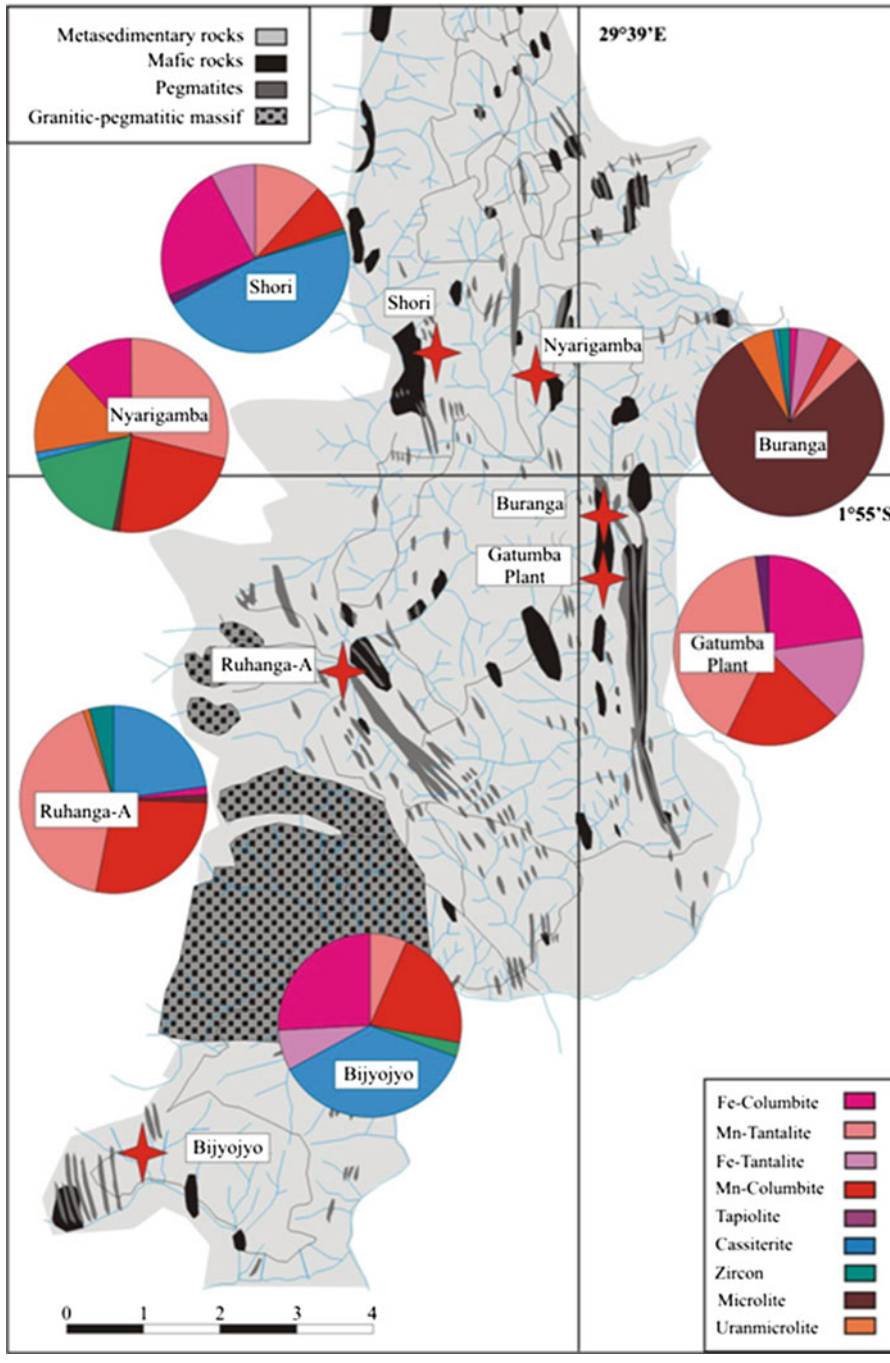

Fig. 6 Location of samples of mineral concentrates from the larger Gatumba district. The geological map is redrawn from Dewaele et al. (2008). Modal mineralogy from mineral liberation analysis (*MLA*). Note that the Gatumba sample is from the Gatumba treatment plant and represents a mixed concentrate

CTC in Practice

The pilot project on CTC in Rwanda was started within the framework of a technical cooperation programme to strengthen the competitiveness of the Rwandan mineral sector by developing best practice and enhancing transparency. The pilot project was implemented in cooperation with the Office de la Géologie et des Mines du Rwanda (OGMR) and private mining and processing companies.

Rwanda supports the desire to establish Certified Trading Chains (CTC) through the strengthening and supervising of the mining sector in the country. In order to implement socio-economic and environmental best practice in its mining industry, Rwanda is setting and will later enforce good standards in its mining sector to guarantee a sustainable market for its minerals. Preliminary findings suggest that high-value metals produced in and exported from Rwanda including tantalum (coltan), tin and tungsten offer a leverage to handle poverty alleviation, prevent conflict as well as supply security.

First steps were bilateral consultations with the Rwandan government and other national stakeholders, especially from the industry. A workshop with stakeholders from government institutions and the mining industry started implementation in March 2009. After a period for expression of interest, three mining companies, local producers of cassiterite, wolframite and tantalite concentrates who cooperate with or engage ASM, volunteered to join the initiative: Natural Resource Development (NRD), Gatumba Mining Corporation (GMC) and Eurotrade Ltd. In a later stage, another two companies also expressed their interest to participate. An independent auditor conducted a baseline assessment of the companies, their concessions and trading chains to develop indicators for the certification scheme, to assess the actual status and to give recommendations for improvement. For each standard, a set of indicators for verification adopted to the situation of mining in Rwanda has been developed. An official audit of the participating companies was conducted in 2010. Two out of four companies received CTC certificates of compliance.

As a further step, technical cooperation between BGR and the Congolese Ministry of Mines with the aim of introducing a certification system for coltan, cassiterite, wolframite and gold has started in October 2009. The cooperation combines the pilot implementation of certification (with a focus on transparency of origin) at selected mining sites in South Kivu and neighbouring provinces with the capacity building of sector institutions so that they can fulfil their mining oversight function (Fig. 7).

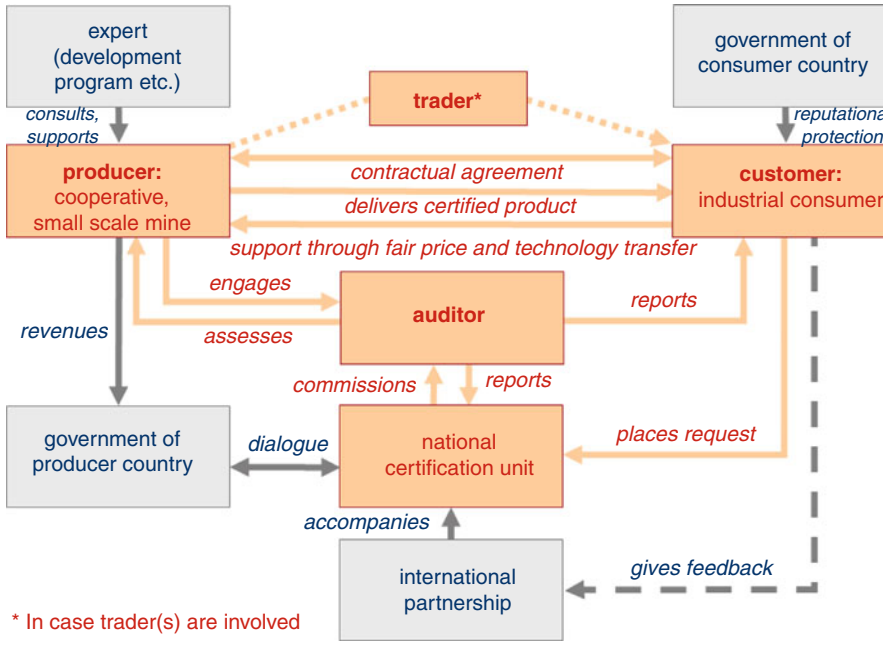

Fig. 7 Conceptual flowchart of a CTC

Outlook: Regional and International Integration

In November 2006, the 11 member states[1] of the International Conference on the Great Lakes Region (ICGLR) signed the Protocol against the Illegal Exploitation of Natural Resources, which includes the aim of implementing a mechanism for the certification of natural resources in its Article 11. By implementing the exemplary pilot project in Rwanda and supporting launching the certification in DRC, CTC aims for regional stability and peace building, as designed by the ICGLR, and for the support of the intergovernmental body in implementing certification. The results of the workshop and of the first steps of implementation were brought to the ICGLR meetings in April and in September 2009 as a Rwandan contribution to the development of a regional certification mechanism. ICGLR is currently developing a scheme for a regional certification mechanism.

The issue of certification of mineral production and trade not only is a national or regional effort. Support is also coming from the EU Special Representative for the Great Lakes who initiated a Joint Action Plan to curb illegal exploitation of and trade in natural resources in Eastern DRC. As part of this initiative, the OECD has initiated a working group to promote responsible investment through enhanced due diligence in the mining sector on the basis of the OECD Risk Awareness Tool for Multinational Enterprises in Weak Governance Zones and the OECD Guidelines for Multinational Enterprises. A consultation and implementation process with the private sector has been started, also including companies that participate in the CTC pilot project.

Certification as a tool for development can be relevant especially in artisanal and small-scale mining communities. Therefore, the CTC initiative is in close dialogue with the CASM network (Communities and Small-Scale Mining). Relevant other initiatives in the sector provide exchange and lessons learned such as the Kimberley

[1] Member states: Angola, Burundi, Central Africa Republic, Republic of Congo, Democratic Republic of Congo, Kenya, Uganda, Rwanda, Sudan, Tanzania, Zambia.

Process for diamonds, the Alliance for Responsible Mining (ARM) for the development of a fair trade gold standard or the diamond development initiative. Ongoing other emerging initiatives in this sector show that the issue of responsible mining and certification might develop beyond the current relevance for limited commodities (diamond, jewellery, gold) as well as beyond the large-scale mining sector and increase its relevance along the trading chain.

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