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The artisanal and small-scale mining (ASM) sector and its importance for EU cooperation with resource-rich developing and emerging countries

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STRADE is an EU-funded research project focusing on the development of dialogue-based, innovative policy recommendations for a European strategy on future raw materials supplies. In a series of policy briefs and reports, the project will offer critical analysis and recommendations on EU raw materials policy.

This policy brief presents key facts about the ASM sector, its importance, opportunities and challenges, its relevance for the EU's cooperation with resource-rich developing and emerging countries and specific areas for potential support engagements.

1 Introduction

The topic of this policy brief – artisanal and small-scale mining (ASM) and its importance for EU cooperation – emerged out of STRADE's dialogue process with resource-rich developing and emerging countries and the project's Advisory Board. The relevance of the ASM sector for these countries and consequently, as a topic for EU cooperation, was deemed important enough to justify a separate policy brief addressing this issue. With the increasing recognition of the ASM sector's potential for local development, it is today also discussed in the framework of economic linkages in mining countries, an important topic for the EU and its member states and developing and emerging countries alike.

The policy brief will commence with a brief profile of the ASM sector, its importance, challenges and relevance for EU cooperation engagements (chapter 2). It will then present the international development debate on ASM and project trends and examples (chapter 3). Chapter 4 will explore specific areas in need of support to align ASM towards a more responsible activity, maximizing contributions to the host countries' sustainable development. Chapter 5 will present a short discussion and chapter 6 will draw conclusions.

2 Artisanal and small-scale mining at a glance

2.1 ASM facts and importance

Mining is often associated with large industrial operations run by international corporations. In many developing countries however, ASM is at least equally important in terms of employment, although generally not in terms of production volume. Although a universally accepted definition is lacking, with ASM used as an umbrella term for a range of very diverse mining activities, it is commonly understood as the labour-intensive, poorly mechanized and not centrally planned exploitation of mineral resources.[1] [2] Some experts argue for the importance of distinguishing between "artisanal" and "small-scale" mining in order to design effective policies and targeted interventions. While this is legitimate at the country level, it is difficult in the international context due to differing definitions. The box "What is ASM?" explains further details.

The OECD due diligence guidelines, on which the EU bases its Conflict Minerals Regulation, define ASM as: "formal or informal mining operations with predominantly simplified forms of exploration, extraction, processing, and transportation. ASM is normally low capital intensive and uses high labour intensive technology. ASM can include men and women working on an individual basis as well as those working in family groups, in partnership, or as members of cooperatives or other types of legal associations and enterprises involving hundreds or even thousands of miners."[3]

The ASM sector contributes considerably to the GDP as well as to economic development, diversification and technical innovation in rural areas of many resource-rich developing and emerging countries. Some recent studies even recognise a positive influence of the ASM sector on democratisation and political participation in remote areas.[4] Three main product groups mined by ASM can be distinguished: High-value minerals, such as gold, diamonds and gemstones, 3T (tantalum, tin, tungsten); coal; and low-value non-metallic raw materials, such as sand, gravel and clay. Some industrial metals, such as cobalt, are also mined by ASM in significant quantities. The ASM sector is responsible for approximately 15 – 20 %[i] of global minerals and metals production.[5] [6]

What is ASM?

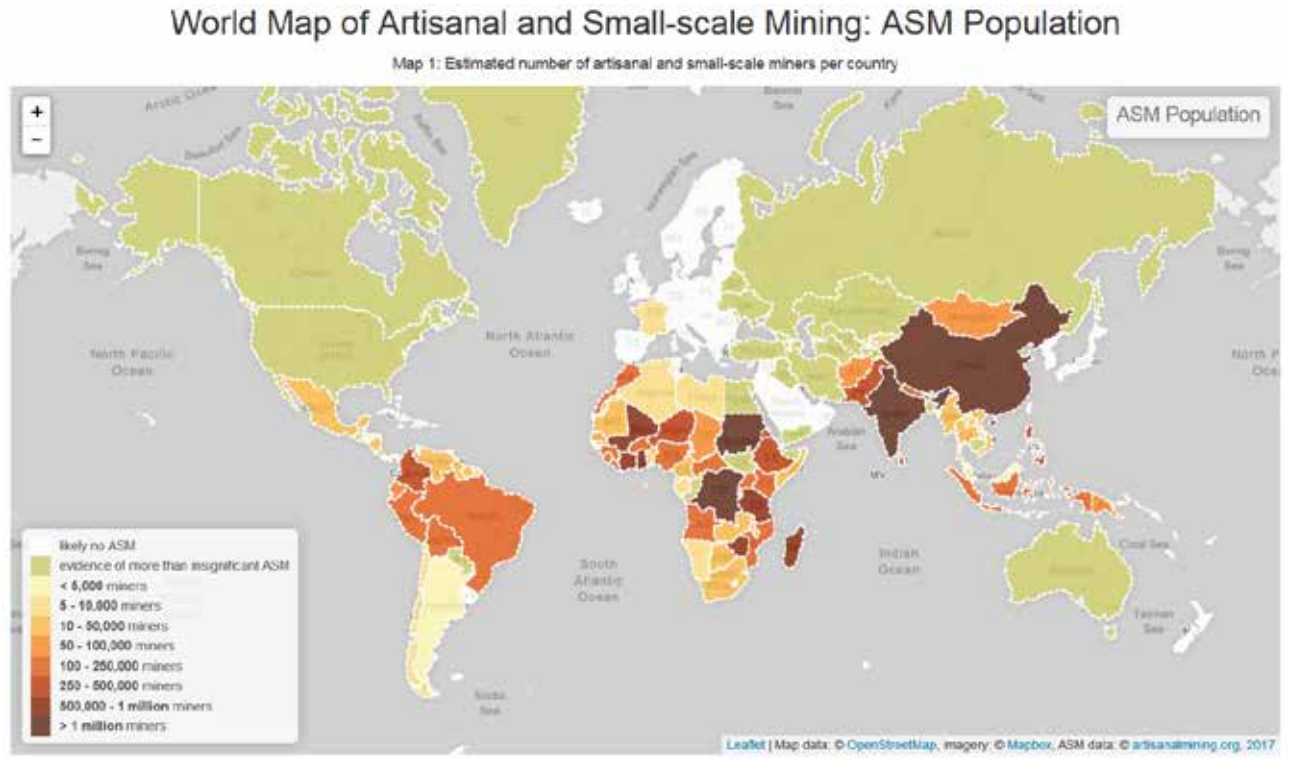
ASM refers to artisanal and small-scale mining. The precise definition of "artisanal" versus "small-scale" mining differs from one country to the other. Yet other countries do not differentiate between the two.

Both, artisanal and small-scale mining operations, may be legal, illegal or "a-legal" (cf. 2.2), formal or informal, and feature various degrees of mechanisation. Motivations range from poverty (making a living) to entrepreneurial (making profit).

Countries that have specific legal provisions for artisanal and/or small-scale mining sometimes encounter problems with miners trying to define their operations as small-scale or even artisanal in order to avoid having to comply with stronger mining regulations.

Its particular importance lies in providing jobs for unskilled workers and a source of monetary income in rural areas.[7] As per conservative estimates, in 1999, approximately 13 million miners worldwide directly worked in the ASM sector and further 80-100 million people depended indirectly on ASM.[2] According to a 2011 estimate, these numbers have risen to at least 25 million miners and 150-170 million indirectly depending on ASM.[8] The map below shows the estimate numbers of ASM miners per country and demonstrates the importance of the sector for employment in Africa, Asia and Latin America. Employment in artisanal mining significantly outnumbers industrial mining employment, which reportedly provided 3.7 million jobs in 2010.[9] Specific estimates for the gold sector indicate that, as of 2011, over 16 million miners were involved in ASGM (Artisanal and Small-scale Gold Mining), producing between 380 and 450 tonnes of gold per year.[10]

[i] It should be noted that all figures related to the ASM sector, be it on production volume or on the workers involved, are always estimates and extrapolations due to 1) the high degree of informality of the sector and the consequent unavailability of reliable statistical data and 2) the differing definition of ASM in the national legislation of different countries.



Source: http://artisanalmining.org/Inventory/

2.2 ASM challenges

Although essential in terms of poverty alleviation and rural development,[11] [12] [13] ASM is rarely incorporated adequately in the legal and regulatory frameworks. The mining model which has been introduced over the last 30 years has systematically privileged mining in the industrial sector, contributing to the marginalisation and the disregard of ASM. The "prioritisation" of industrial mining introduced with the liberalisation of the sector goes a long way in explaining the persistence of the largely unregulated nature of ASM activities which may be seen as a central cause for the severe problems which have accompanied the sector. The lack of regulatory frameworks for ASM is in striking contrast to the call in the industrial sector for the introduction as of the early 1990s of clear rules and guarantees regarding exploration and mining rights, majority ownership for the private investor, taxation, foreign exchanges, escrow accounts, and profit and capital repatriation. In view of the fact that ASM mining activities have until recently continued to operate most often in the absence of an effective regulatory framework, this area of activity is summed up by the 'a-legal' neologism, a concept coined by Nicholas Garrett and Harrison Mitchell based on the Greek privative alpha prefix to describe a situation that is only illegal because the state does not create the necessary conditions for actors to comply with the law.[14]

In addition, policies targeted to the sector seldom take into account implementation challenges related to the remoteness of the operations. The mining activities often take place informally and clandestinely without valid licenses and beyond any institutional control. Due to very basic mining skills coupled with low or no mechanization, the extraction is commonly unsystematic and ineffective. Moreover, miners often cannot overcome simple geological constraints or take advantage of scale effects because of their limited financial means.[15] The improper use of chemical reagents, the irresponsible disposal of processing residues, and the lack of mine rehabilitation measures significantly impact the environment and the living conditions of miners and local communities.[16] [17] [18] [19] ASM miners frequently face dangerous working conditions, which are in conflict with human and labour rights, mining best-practices, and basic occupational health and safety (OHS) standards.[2] [7] [20]

2.3 Links to conflict and poverty

ASM often exploits minerals like gold, 3T, cobalt, or gemstones, which in many regions of the world have been linked with the financing of armed conflicts and criminal networks.[2] [21] [22] [23] In rural and remote areas

ASM is often the only employment alternative for poor, uneducated people besides traditional subsistence farming.[7 24 25 26] Economic shocks, such as loss of crops or arable land due to natural disasters or land grabbing, the closure of large-scale mining companies or civil wars drive additional people into ASM. Migrant ASM miners at times may not respect private, indigenous or corporate property or protected areas which can lead to severe conflicts among the different stakeholders.[27 28 29 30 31] Moreover, ASM communities may suffer from social disruptions that accompany migration, corrupt local authorities, armed groups, and hostile mining companies. Irrespective of applicable law, children are often involved in the mining activities[20] and women suffer multiple discriminations[32 33]. Failures and inefficiencies in fighting poverty have contributed to the increase in ASM activities as evidence suggests that these are, by and large, poverty-driven.[26 34] Therefore, in countries rich in mineral resources, ASM is a highly relevant topic for development cooperation in terms of poverty alleviation, rural development, and environmental protection.

2.4 Relevance of ASM for resource-rich developing and emerging countries and the EU

Previous STRADE research found that ASM is an important topic in many developing and emerging countries' mining and mineral strategies[ii] [35] and for African and Latin American stakeholders when discussing necessary support for their mining sectors.[36] The 2017 Annual General Meeting of the Intergovernmental Forum (IGF) on Mining, Minerals, Metals and Sustainable Development had ASM as its main topic.[37] Given that the member countries choose the topics for the Annual Meeting, this underlines the priority for ASM on the international agenda.

The EU mentions the ASM sector in the RMI as a potential field for resource-related cooperation with developing countries. Specific references are made to improving environmental, social and human rights conditions, and combatting child labour.[38] The EIP Strategic Implementation Plan mentions the development of technology and innovative metallurgical techniques, especially suitable to ASM, as one of its priority action areas for the cooperation with Latin America.[39] EU and member states' international development engagements in this field, previous and current, also suggest the sector's relevance and need for support has been noticed (cf. 3.4).

3 ASM in the international development debate

3.1 A brief history of ASM in the international debate and projects trends

ASM has been overlooked or marginalized in the international development debate for a long time due to various reasons.[iii] In the 1970's, the development community first started to engage with the topic, but was preoccupied with defining what ASM actually was. In the 1980's, in line with the general donor thinking at the time, technical issues were high on the agenda and in the early 1990's became integrated with environmental (especially mercury emissions from artisanal gold mining), legal, social and economic issues. Later in the 1990's the issue of legalization and formalization of the ASM sector gained attention[iv], followed by the relation between industrial mining companies and ASM, gender and child labour issues. In the 2000's, community related issues and sustainable livelihoods were the latest trend and ASM's contribution to poverty reduc-

[ii] Developing and emerging countries' mining policy documents mentioning the importance of ASM for their mining sectors include the African Mining Vision and national strategies of Ghana, Liberia, South Africa, Mongolia, Colombia, Mexico, Argentina and Peru.

[iii] Among these, besides a general dislike to engage in the mining sector and the focus on industrial mining, the perception that ASM does not need assistance as its actors have already escaped extreme poverty. Where this is true, it comes at the cost of high vulnerability, still justifying assistance. But, as one publication ([40] p. 30f.) states: "Unfortunately, more development programmes focus on poverty-doomed (and -perpetuating) sectors than on opportunities to escape poverty. While "high mobility and flexibility in the job market" is praised as a "virtue" in economically developed countries, migration of the urban and rural poor into ASGM areas is almost everywhere condemned as a "problem".

[iv] This was a reaction to a growing informal ASM sector, in large part a consequence of the structural adjustment programmes (SAP) and mining sector reforms initiated by the World Bank. These aimed at attracting foreign investors and were thus tailored to the needs of the large-scale mining sector, overlooking the creation of adequate legislation for the ASM sector. At the same time, many people turned to (informal) ASM due to growing unemployment as a consequence of SAPs.

tion started being discussed in the framework of the UN MDGs.[7 15 40] In the wake of the public debate on "conflict" or "blood" minerals, supply chain due diligence and environmental and social certification initiatives entered the scene from the mid-2000's onward[40]. The Communities and Small-Scale Mining (CASM) platform was established in 2001 as a solution to coordinate donor activities in the ASM sector. This brought more attention to ASM in the international development debate as well as providing integrated multi-disciplinary support to artisanal miners around the world.[15 41] Its ultimate aim was "to transform [ASM] from a source of conflict and poverty into a catalyst for economic growth and sustainable development".[41] However, its success in delivering on its aim was limited, particularly because of insufficient donor support,[15] and the initiative eventually ended in 2012[42].[v]

3.2 Current themes

Recently, the issue of formalization has gained attention again – sometimes as part of certification efforts – suggesting it is by no means resolved and its importance for any other successful support measures has been recognized. Other topics, such as (legal) market access for ASM products, human rights, environmental, social and governance issues, are now often discussed in the framework of formalization or due diligence and certification.[40 43] The implementation of the UN Minamata Convention on Mercury[44], which came into force in August 2017, entails a growing number of projects on the reduction of mercury emissions in ASM. Due to the latest shift of development agendas towards the achievement of the sustainable development Goals (SDG), ASM is now also discussed in this context. Efficiency is a new entrant in the list of topics discussed internationally in connection to ASM. Reference is made to deposit, water and energy efficiency. Moreover, miners in parts of Latin America tend to use the low production efficiency (ASM often has a recovery rate of only 50%) and consequent considerations of reprocessing the tailings as an argument for lacking re-cultivation.[vi] Last but not least, strong backward linkages from ASM activities to other sectors, particularly at the local level, have attracted attention and have changed the assessment of ASM's contribution to development. Although the importance of the sector has been increasingly recognized by host governments and international donors alike, anecdotal evidence from various countries suggests that this is by no means always the case. Governments as well as donors may change their attitude towards ASM at any time. The sector's marginalization continues, at least to a certain extent, and its mainstreaming into holistic and integrated rural development programmes is still uncommon.

3.3 Improved sector knowledge base

Today, several important facts about the sector are known and can help to design targeted projects. Firstly, there are different types of ASM: It may be carried out permanently and full-time or seasonally/ part-time (mostly in combination with agriculture). It can be a traditional livelihood activity carried out in the vicinity of the community or it may be carried out by migrant workers who move on to the next site when the current one has been mined out[vii]. The latter is often associated with a rush situation, in which hundreds or thousands of miners flock to a promising mine site in a very short period of time, thus causing considerable stress on the environment and possible communities living in the area. Secondly, there are different motivations for miners to engage in ASM: So-called pull factors refer to the attraction of the possibility of quick wealth, or at least a higher income than in any other available job. Push factors, on the other hand, refer to poverty or economic shocks driving people into the sector, i.e. the absence of other opportunities to make a living.[40 45] The latter may even be caused by mining, including ASM, and the resulting environmental degradation. Progress has been made in the knowledge about such diverse topics as the involvement of women and gender specific roles in ASM[46], production[5] and employment figures[8], and environmental aspects[47] to name a few.

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[v] See [15] for a comprehensive analysis of CASM and reasons for its end.

[vi] In some cases they have actually reprocessed tailings, for instance while looking for a new deposit or when prices have risen. Oftentimes however, it is only an argument in disputes over re-cultivation with the government without any concrete reprocessing plans.

[vii] Meaning that no more high-grade material is accessible with the employed simple tools.

Although the general knowledge base about the ASM sector has improved considerably, it is important to note that especially due to the diversity of the sector, its actors and the environment in which they work, there is no "one-size-fits-all" solution to the sector's challenges.

3.4 Examples of EU funded ASM assistance projects

At the end of the **SYSMIN**[viii] era, the EU used these funds for general **mining sector support programmes** in several countries. Almost all of these included components specifically addressing the ASM sector. In **Papua New Guinea** (PNG), for example, the EU funded the construction and establishment of the Small-Scale Mining Training Centre (SSMTC). The project involved the development of curricula and didactic materials, training of trainers and support of the early stages of training course delivery. After the end of the SYSMIN funding in 2010, the SSMTC was taken over by the National Mineral Resources Authority (MRA). Today, 8 qualified trainers with different backgrounds and qualifications conduct trainings for 11 modules in 4 levels of training, covering a wide range of issues important to ASGM in PNG. Besides the training courses, the trainers also conduct outreach activities all over the country. SSMTC's activities are now funded by the MRA, other government institutions as well as mining companies. The EU funded project contributed to creating the basis for sustainable small-scale mining, i.e. improved utilisation of natural resources while minimising the environmental degradation for the benefit of small-scale miners, their extended families and the local economy.[48]

In **Senegal**, EU SYSMIN funds from the Mining Sector Support Project were also used to support the ASM sector. In particular, the project (2007-2010) supported the government authorities and implementation of practical support measures in the fields of geology, environment, mining exploitation, mineral concentration, occupational safety & health and social issues in the artisanal and small scale gold mining communities of eastern Senegal. The project also worked towards the formalisation of gold mining communities. It resulted, besides the direct support of ASGM miners, in the creation of a considerable database on the ASGM sector in Senegal and a collection of maps.[49]

In the **Dominican Republic**, the EU, through its SYSMIN funds, supported artisanal larimar mining cooperatives. It assisted them in the planning of small-scale mining operations and through collaboration with processing and prospecting companies. It also provided training on security, environment and socio-economic assessments and assisted the cooperatives in the legal recognition by the State, of their mining areas. The project resulted in improved incomes and living conditions of the miners through an increase in production.[50] [51]

Currently, the EU, together with the United Nations Development Programme (UNDP), is financing the **ACP-EU Development Minerals Programme**. The three-year capacity building programme aims to build the profile and improve the management of the so-called "development minerals" (low-value minerals and materials, such as industrial minerals, construction materials, dimension stones and semi-precious stones). These are often produced by artisanal, small- or medium-scale mining operations and consumed near the place of extraction. The project, implemented by UNDP, conducts regional capacity building activities for representatives of 40 ACP countries and in-depth training and further support activities in six focus countries.[52] [53]

Several EU member states are also active in the ASM sector with their national development cooperation engagements. The **German GIZ**, for instance, includes the sector in several of its mining sector governance programmes in various African countries.[54] The **German Geological Survey BGR** also implements technical cooperation projects aiming at improved and sustainable management of mineral resources or resource certification that involve the ASM sector in Africa, Asia and Latin America.[55] The **UK Department for International Development (DfID)** funded a project on good natural resource management, including the ASM sector, in DRC.[56] The **European Partnership for Responsible Minerals (EPRM)**, an initiative of the Dutch and UK governments together with several private sector and civil society stakeholders, aims "to create better social and economic conditions for mine workers and local mining communities, by increasing the number of mines that adopt responsible mining practices in Conflict and High Risk Areas"[57] and also addresses the ASM sector.

[viii] See [70] for details on the SYSMIN facility.

4 Important areas for ASM support

The topics described below are all areas in which the ASM sector would need further support and thus potential fields for EU cooperation engagements. ASM formalization is addressed first, in general terms. The topics that follow are all parts of an integrated and holistic formalization process and are today often addressed within the framework of ASM formalization projects. The first three – an appropriate policy, legal and regulatory framework, a minimum level of organization of the miners, and adequate local governance capacities – can be considered prerequisites for successful formalization. Most importantly, the transformation of the ASM sector towards greater contribution to sustainable development requires recognition of its importance and political will. It should be noted that formalization might not always be possible, for instance due to a lack of government capacity or political will to formalize the sector. In this case, focusing on mitigating the impacts of ASM might be a plausible approach. In other cases, formalization – in the sense of upscaling to more mechanized small-scale mining – might not even be desirable. Here, support for organizational, management aspects and improved manual mining methods, while keeping the activity micro-scale, could be considered.

4.1 ASM Formalisation

"Formalization is a process that seeks to integrate ASGM into the formal economy. […] Formalization can only be successfully achieved if programmes and public policy deal with the different dimensions of ASGM activities simultaneously and in an integrated way. Legalization is just one dimension of the process of formalization." [58]

A holistic approach, tackling the different dimensions involved in parallel and lowering the barriers for formalization, is paramount. At the same time, formalization is commonly regarded as essential for any other successful ASM support measures. This is due to several reasons, including: 1) Only formal and legal operations have access to government support services and/or international development cooperation support projects (and thus the chance to realise development opportunities); 2) Supply chain due diligence and certification initiatives require mining operations to be legal (and thus formalized); 3) Informal miners are in most cases excluded from the formal trade chain, which may result in lower prices paid to the miners and means the production will enter the illicit trade chain of minerals (with all consequences this entails); 4) Access to finance for informal miners is limited to informal financiers, which usually equates to high interest rates; 5) Long-term planning (including investment into technological upgrading and environmental measures) is only feasible with security of tenure, for which operations need to be formal. [59] [60]

Any successful formalisation efforts require detailed knowledge about the type of ASM present. Four types are commonly distinguished: ASM as a traditional permanent or seasonal activity, shock-push and rush-type ASM (cf. 3.3). Permanent and seasonal ASM usually mines primary deposits, is stationary, and carried out with a long-term perspective and by people who have some mining skills. Shock-push ASM is usually poverty-/ economic shock-driven, carried out as an interim activity and its actors are commonly unskilled, unless in the case of laid-off employees of industrial mines. It is also more often associated with migratory miners working alluvial deposits[ix]. This has consequences for the readiness of miners to invest in their activities as well as for the possibility of formalisation. Rush-type activities involve both types of miners as well as the 'adventurer' type. Community mining is a term that came up recently and refers to the first two types of mining. The last two types may convert into community mining after the initial phase. Community mining is usually associated with positive impacts on rural economic development and increased resilience of households and incurs limited social and environmental damage. In contrast, rush-type ASM causes significant social and environmental damage and is hard, if not impossible, to formalize.[x] [8] [40] [61]

[ix] Experiences, e.g. from Peru, have shown that formalizing ASM working alluvial deposits is generally difficult due to its migratory nature and a lack of options for corresponding licenses in the mining codes.

[x] Although anecdotal evidence of initially rush-type ASM sites, eventually becoming formal community mining sites exists.

Meanwhile, it has been acknowledged that for a successful formalization of the sector, the cooperation of multiple stakeholders, such as governments, ASM actors, industry, civil society, academia, development agencies, and possibly even consumers, is essential. Lessons learned from formalisation efforts also point to the importance of involving the main stakeholders of ASM formalization, i.e. the artisanal miners, from the outset in any planning and reforms to successfully achieve desired outcomes.[40 59 62]

It should be noted that ASM formalization is a costly undertaking and, at least during the initial stages, will have to be financed mainly by the national public budget. Allocations for the implementation of ASM formalization activities will therefore have to be made in the national budget. A portion of the revenues generated from the formal mining sector could be diverted to financing formalization efforts. LSM-ASM partnerships could also help to lower the financial burden of formalization.[59] Finally, donor engagements could contribute to the initial financing of formalization efforts, however, they usually have a pilot character for implemented measures and would not finance the formalization of an entire country's informal artisanal mining sector.

4.2 Policy, legal and regulatory framework

The persistence to the present of the absence of effective regulatory frameworks in this sector is a key element which must be addressed. Mining policies must recognize ASM and its contribution to the economy and rural development. The legal and regulatory framework must make provisions for specific licenses for small-scale and artisanal mining (two different categories). Some legal frameworks even define specific subcategories within these two classifications. Important elements are simplified, affordable and accessible procedures for licensing, environmental requirements etc.[59 63] Tanzania, for instance, has introduced an online/ mobile application system for artisanal mining licenses.[64]

While the legislation, to be effective, must be designed in a way that artisanal miners have a chance to comply with it, it should nevertheless aim to improve the situation in terms of conflict, social and environmental management and not 'legalise the status quo', however damaging it is. This implies of course that the sector be given time to comply and in the meantime receive capacity development and technical support.[40]

An important element of good legislation and regulation is to give miners rights, but also responsibilities. This means, for instance, to make provisions for longer mining license validity periods so the miners have security of tenure, and can thus safely invest in their operations. At the same time, they can be required to develop, with technical assistance and capacity building measures, alternatives to damaging practices, such as mercury amalgamation in gold processing.[40 59] Mining titles should preferably have a long duration, be easily renewable, transferrable and upgradeable. The definition of artisanal versus small-scale (and by extension, medium or large-scale) mining for the license should depend on the maximum area to be covered and the maximum extraction capacity. Including criteria, such as the technology applied or maximum investment may restrict ASM activities unnecessarily and should thus be avoided.[59]

A related topic that is of concern, especially in sub-Saharan Africa, are competing land (and mining) rights systems and, in some cases, local government officials taking advantage of this situation. Often, modern statutory land and mining rights systems exist in parallel to customary ones, which are more community based.[65 66] Availability of land for ASM is essential, especially where there is high competition from industrial mining or exploration companies. Many countries have lately introduced designated zones for ASM. While this is, in principal, a good move, problems have occurred around the lack of mineralization of these areas or knowledge thereof, suggesting it is crucial to survey these areas and prove to the artisanal miners that they actually contain minerals that are economically exploitable with existing, and permissible, ASM methods.

4.3 Organisation

Formalisation at the level of the individual miner is not feasible, hence the artisanal miners first need to organize in larger groups. These could, for instance, have the legal form of cooperatives, associations or small enterprises. The larger, better organized, and more entrepreneurial these groups, the greater the chances to develop beyond the subsistence sphere of ASM and make use of economies of scale.[40 59] "While 'economy of scale' is achieved in the industrial mining sector through mechanization, it is achieved in the ASM sector through organization."[67] It is thus "not in contradiction to the employment generating characteristics"[67] of the sector.[40]

Several governments of countries with a vibrant ASM sector have tried to organise ASM miners into cooperatives (some even require this by law[xi]) to facilitate formalisation. This may prove feasible in some cases and where the organizational form of a cooperative fits into the cultural environment. However, international experience suggests that the unilateral commitment to cooperatives as an organisational vehicle for the formalisation and structuring of the ASM sector can only be recommended to a limited extent. Cooperatives have been supported and promoted in many cases worldwide, but they have rarely contributed to empowering the miners and their families.[xii]

In view of this problem, it was decided in the ASM legislation in Peru (2000) to allow formalisation of three different forms of organisations: cooperatives, associations and companies (sociedades). The latter were designed as employee-owned companies in which the ASM miners are involved as partners, but with an independent management. The experience of 15 years of formalization in Peru has shown that the model of mining companies was by far the most successful of the three options and that more than 80% of the successful formalization processes came from such structures. Some of these formalized small mining companies are now even certified through international certification initiatives such as ARM, FairTrade and the Responsible Jewelry Council, and considered to be model operations in Peruvian small-scale mining.[68]

4.4 Local governance capacities

Successful ASM formalisation needs strong government institutions, especially at the local level. As formalization is a multi-stakeholder process, roles and mandates need to be clearly assigned and a designated government institution needs to coordinate activities. Especially for the compliance monitoring and on-the-ground ASM support services local governance capacities are essential and likely need to be enhanced (cf.[35]). An important aspect is also to keep the legislation enforcement process simple. The parliament may play an important role in the definition of a common vision and approach to ASM formalization when different government institutions have fragmented views on the issue[59] and later, parliamentary oversight might be used as a control mechanism, provided the MPs are sufficiently trained.[35] Generally, the importance of local governance capacities cannot be overemphasized.[62] And although the relevance of good governance has been recognized by the international donor community, support usually focuses on the national level and overlooks the strengthening of local government institutions as well as the alignment of the agenda at different government levels (cf.[35]).

4.5 Environmental aspects of ASM

Most important on the international agenda and especially in the framework of the Minamata Convention and respective national laws banning the use of mercury is the topic of mercury abatement and substitution in artisanal gold mining. Several techniques and technologies exist to significantly reduce the use of mercury and its emissions or even replace it completely. Some of these technologies have proven effective and cost-efficient, however, the best solution depends on the individual geological conditions. Moreover, the miners – who are often not aware of the dangers of mercury to the environment and their own health – must be convinced of its usefulness.[40] Simply banning mercury by law is not an enforceable solution. It drives even formalized mining communities back into informality processing the gold clandestinely and worsening the general situation considerably.[40] [59] Formalisation and organization into groups are important requirements for successful mercury substitution and even for some methods reducing mercury use and emissions.[40] Any ban or restriction of mercury or other processes, methods and technologies, in order to be effective, must be

[xi] E.g. the DRC

[xii] Reasons for this are: 1) internal, related to the fact that the principles of cooperative action, namely solidarity, risk sharing, equality of rights and obligations and democratic constitution are hard to transfer to ASM, in which, especially when looking at acquisition and marketing, individualistic structures (or family structures etc.) prevail. 2) cooperative members usually expect the cooperative's income to be distributed immediately, leaving the organisation as such without working capital. Moreover, the cooperative sector is often regulated by the state (e. g. open access for new members, etc.) in such a way that capitalisation and investment activities, which are essential for modern mining, are practically prohibited. Almost all ASM cooperatives worldwide are empty shells that fulfil a legal-administrative purpose, but do not lead to the development and maintenance of an economically viable, partially mechanized and formalized mining activity. 3) The cooperative itself is often politically burdened and the sector and its representatives are extremely politicised. Both impede the necessary dialogue with government bodies.[68]

accompanied by accessible alternatives. The uptake of the alternative should be facilitated by subsidies or other incentives and training must be provided.[59]

Other important environmental concerns associated with the ASM sector include land degradation, pollution of soil and water bodies, deforestation, loss of biodiversity, damage to riverbeds and siltation (especially in connection with alluvial mining). It should be noted that ASM does not necessarily have lower environmental impacts than LSM. On the contrary, the impacts may be worse due to the lack of environmental management.

General considerations for environmental licenses include the challenge to simplify requirements sufficiently so that ASM operations have a chance to comply while, at the same time, still achieving high quality environmental management.[59 63] One idea that has proven successful is the implementation of collective Environmental Impact Assessments for ASM operations with similar technical characteristics in regions with similar environmental conditions and subsequent development of Environmental Management Plans that are based on common considerations and individualized for each operation.[47]

The topic of mine legacies has recently gained importance and this is also true for ASM mines. Today, obligations pertaining to the rehabilitation of mining areas after closure of operations are generally not well implemented, not adapted to the specific nature of ASM or nonexistent. Examples of different well-adapted approaches to rehabilitation of ASM sites and related regulatory guidelines exist from around the world.[59]

4.6 Capacity building and technical support

Capacity building measures need to accompany any efforts to formalize ASM as well as reducing its environmental footprint. Trainings should address the miners themselves, surrounding support services and local government institutions.

One idea from the 1980's that has recently re-gained attention in ASM support projects, were the "ASM centres", essentially "one-stop-shops" providing administrative, processing and assaying services as well as technical advice and technological demonstration in countries such as Ghana and Zimbabwe[15 69]. In Ghana, the project also included equipment leasing services. Both projects were in principle promising, as they addressed real needs of the ASM sector. They both failed to deliver long-term assistance, mainly due to flaws in important details of technology design, such as miscalculating the demand for the services or installing inadequate equipment for the type of mining practiced.[xiii]

One best practice example of a training project is the SSMTC in Papua New Guinea that succeeded in the continuous provision of training courses to artisanal and small-scale miners throughout the country, first in the framework of the EU SYSMIN funded Mining Sector Support Programme and since the end of that funding in 2010, up until today, under management of the PNG MRA. Another example is the current EU-ACP Development Minerals Programme (cf. 3.4). Generally, it can be stated that capacity development is considered important by the EU and several member states in their cooperation with resource-rich developing and emerging countries as can be seen in their resource policies (cf.[35]) as well as their funding for development cooperation engagements (cf.[70]).

4.7 Access to finance

In general, better access to finance should be one important outcome of, and incentive for, formalization. A mining title can be used to obtain credit. The longer the duration, and easier the renewal, transferability and upgradeability, the better it can be used as a tool to promote access to loans. These aspects also allow the miners to plan for a longer-term perspective, an important precondition for investing in the operation (and, by extension, making it safer, more productive and environmentally sound).[59]

Experiences from the last 20-30 years have shown that financing options in the ASM sector are scarce and successful financing is very difficult. Some positive examples exist nevertheless, for instance from Mongo-

[xiii] An additional factor was that many artisanal miners addressed by the projects worked informally (unregistered and without mining licenses) and thus avoided any contact with official institutions. This points again to the importance of formalization for the success of any other support measures. In the case of Zimbabwe, some bad business decisions made after the handover to a national miners association also contributed to its termination.

lia[71] or Tanzania, where a government revolving fund provided small loans for specific targets at low interest rates to ASM miners.[xiv] [60]

Sources of finance that have proven successful in other economic sectors and could be adapted for the ASM sector include private investment, local credit mechanisms (e.g. microfinance schemes), and soft-loans for small- to medium-scale miners. They could be provided by NGOs, governments or financial institutions. International and national development banks should be involved in finance options for the ASM sector to give a positive signal to the private finance sector. Attention should be paid to not favouring particular groups or operations over others or to give grants that do not need to be repaid as both would cause distortions in the market that may have long-lasting negative effects. Interest rates and payback periods have to be adapted to the economic capacity of the sector.[59]

Another interesting and theoretically promising idea are hire-purchase schemes for equipment. Unfortunately, most examples of such schemes have eventually failed and stopped activities, but research suggests this was rather due to poor management, inappropriate equipment offered or poor quality of the overall service offered.[15] [59]

The difficulties of providing adequate financing options for the ASM sector are aggravated by the complicated and exploitative pre-financing models that currently exist. These models often tie the miners to their financiers for a long time and may be paired with the purchase of the production thus making it difficult for miners to leave this system. This is especially true when financiers and miners belong to the same community and there is thus strong social pressure or where there is a criminal element linked to the finance. On the other hand, village level informal financial markets have been observed in several communities, e.g. in the DRC. These might involve typical pre-financing models, but also associations of several households to pre-finance mining operations together and later split the profits.

The area of ASM finance schemes is one that is in particular need of further research and pilot testing before larger programmes can be implemented.

4.8 Revenue Generation from ASM/ taxation

Many developing countries with vibrant ASM attempt to generate taxes from the sector. This is now often one underlying driver for formalization efforts.[59] While this seems logical at first sight, it may be problematic where ASM is merely a subsistence activity and marginally profitable and it might be a deterrent for ASM miners to become formalized. Any successful taxation regime must be adapted to the reality of the sector and take into account its actual economic capacity to pay all taxes and fees applied. This includes the coordination of different government institutions levying taxes and fees in order to take into account the cumulative amounts to be paid by ASM miners.[59] [63]

For high value minerals such as gold or precious stones, transport costs are low which makes smuggling easy. In such cases, attempts to tax miners usually fail and result in miners being driven to the informal sector. An important aspect is the regional harmonisation of fiscal regimes to avoid smuggling into neighbouring provinces or countries.[59] [63]

In general, taxation will only work well where governance is good and the sector has no choice but to comply with legislation. Even so, the revenue from taxing small scale miners is likely to be very modest and often lower than the cost of collecting the tax. Moreover, where governance is weak, miners' costs for informality are often lower than for formality. This problem has also been encountered by organisations working towards a Fairtrade or Fairmined certification of artisanal mines: In some cases, certified operations have turned back to selling their production on the informal market as the premium paid for the Fairtrade/ Fairmined certification did not sufficiently offset the additional costs for taxes.[72]

It should be noted that, regardless of the direct revenues created from the sector, ASM formalization may lead to a reduction in associated costs for the state, e.g. by lowering environmental impacts or criminal activity surrounding informal ASM activities.

[xiv] Bigger loans have been avoided here as they have been proven to be more difficult to repay.

4.9 Market access

Direct access to the legal market is considered one of the main advantages of formalization, for miners and host governments alike. Some countries have established so-called State Gold Buying Programmes (SGBP), to ensure the gold extracted by ASM operations is traded through legal channels.[69] [73] While there are currently no known examples of it outside of the precious metal and stones sectors, such programmes could possibly be extended to include other minerals.[74] Access to the legal market, be it through state buying programmes or refiners exporting the minerals directly, usually means cutting out some intermediaries and thus access to near world market prices for the miners.

Formalisation and the subsequent access to the legal market may also result in access to premium certification initiatives, such as Fairtrade and Fairmined and to closed pipe responsible supply chain systems, such as the Swiss Better Gold Initiative for ASM or Solutions for Hope. A forthcoming STRADE report[74] discusses the implementation of certification and due diligence schemes and the EU's role in detail.

4.10 Gender equality

Women are commonly engaged in ASM activities around the world. They typically play a much larger role in the ASM sector than in industrial mining.[46] The degree of their involvement varies between and even within countries and so do the tasks performed and the amount of time spent in ASM work. In Latin American countries, women account for approximately 10-35 % of ASM miners, in Asia, their proportion varies between 10 and 50 % in some countries and in Africa, women may make up 20-100 % of the ASM work force, depending on the country.[7] [33] [75] [76] [77] [78] [79] [80] Women in the artisanal mining sector are involved in tasks directly associated with mining (e. g., digging and crushing of stones, washing and sorting of materials) as well as processing (e. g., amalgamation), transportation of materials, trade in minerals or other goods and services around the mines (e. g., food and other merchandise sales and prostitution).[32] As women are more frequently found performing processing, transportation or other ancillary tasks, they are not always identified as miners.[81] Often, they are invisible as they carry out some of the mining-related tasks in the domestic sphere.[46]

Studies on this topic generally suggest that women are often marginalized and more frequently found in informal, scarcely mechanized operations with poorly paid jobs.[81] [82] [83] [84] Research further found that negative impacts of ASM activities are often greater for women and that there is a connection between gender roles, inequalities and child labour in ASM.[46] Considering that research suggests that equitable access of women to the productive sphere, and thus investment in women, is beneficial for the entire community[85], the current inequalities are especially alarming.

It is important to keep the topic in mind when designing ASM support programmes or projects. If gender roles are not sufficiently studied and taken into account, support measures may exacerbate gender inequalities and thereby impede the sector's potential contribution to sustainable development.[46]

4.11 ASM-LSM relations

Relations between large-scale industrial mining (LSM) and the ASM sector have traditionally been prone to conflict.[67] Reasons are, amongst others, historical reasons related to strategies aiming at the industrial sector developing not only as distinct from ASM but in fact in opposition to it. The constellation of structural relations of power has kept in place the particular hierarchy of norms (cf. 2.2). Poor communication between ASM and LSM as well as poor performance of companies in the area of Social License to Operate and a consequent lack of trust add to the problems.[86] In many cases there are disputes related to mining activities in a specific area, which is under the license of an industrial mining company. The company claims the artisanal miners are encroaching on its land,[87] while the artisanal miners claim they have discovered the deposit and the company has taken it from them.[67] Both statements are legitimate from the respective point of view and often, it is impossible to find out who really had been there first (cf. 4.2). Further, the situation is exacerbated by (perceived or real) unfair allocation of mineral resources, especially considering the vast areas of

land licensed to companies during the exploration phase.[67 86] Taking into account that ASM and LSM do not mine the same type of deposits[xv], the "simple" solution often lies in co-habitation agreements.

These agreements, however, are unfortunately not always straightforward. One issue that has hindered the conclusion of such agreements in many cases, is the question of who is responsible for damage to the environment and rehabilitation as well as the fulfilment of minimum standards regarding occupational health and safety, human rights etc. Legally, the mining or exploration title holder is responsible for all these issues. Most of the time, however, companies do not want to assume this responsibility on top of the compromise to give artisanal miners access to mineral deposits in their license area.[71] The result may be that companies and miners resort to tacit agreements, where the company accepts that miners illegally mine on company land and the miners lack any legal status. Since under such agreements miners have no interest or possibility to enter the formal sector, all the negative effects of informal mining tend to thrive.

Despite these generally unsolved problems, some best practice examples of co-habitation exist.[74 88 89 90 91] In these, companies have even agreed to support the artisanal miners, for instance by providing production and safety equipment, access to health services etc. By purchasing the artisanal production, the companies ensure access to the legal market.[xvi] At the same time, this may be a viable path towards formalization.

5 Discussion

The policy brief has highlighted a number of issues in the ASM sector, for which support projects are needed and could be provided by the EU or its member states. The most important finding of research conducted on ASM over the past decades is that the sector is, in the vast majority of cases, poverty-driven. This fact has to be kept in mind when trying to regulate the sector as it means that bans – of the activity itself as much as specific methods, practices etc. – will not be effective unless a viable alternative is provided. While the ASM sector is poverty-driven, it is, at the same time, essential for poverty alleviation. Most artisanal miners state that through carrying out this activity, they earn more than they would doing any other job accessible to them.

Even though ASM has been marginalised in the international development debate compared to other topics over the past decades, a considerable number of academic studies and donor projects have been implemented. The lack of resounding success in finding solutions to the challenges associated with the sector and transferring ASM to a more profitable and responsible activity with maximised contribution to sustainable development and minimised negative impacts, points to the following reality: When individual ASM mines or organisations succeed in advancing their operations towards more mechanised formal small- or medium-scale businesses, there are always other miners replacing them at the lower end of the scale.

Once, the general governance, quality of life, availability of secure and well-paid jobs and income levels in a country are high enough for ASM not to be worthwhile any longer, the sector will disappear. An individual project, however, cannot achieve this. The rationale of ASM assistance projects must therefore be a humanitarian-social, and not a purely economic one. Additionally, the importance of the sector for rural development must be recognised, as well as its interconnectedness with other rural livelihood activities, such as agri- or horticulture. Instead of piecemeal project approaches, the sector should be supported in the framework of long-term integrative rural development programmes.

6 Conclusion

This policy brief has presented the ASM sector's relevance in terms of production as well as employment. It has attempted to draw attention to the diversity of the sector, basic facts, its positive impacts – mainly the

[xv] ASM typically works small, high-grade surface deposits that cannot be economically mined by industrial methods; LSM typically works large, low-grade deposits that may reach several kilometers underground and are inaccessible and not interesting for ASM.

[xvi] Although the advantages and disadvantages of a stipulation on the sale/ purchase of the production need to be carefully balanced. There have also been reports of companies abusing this and paying the artisanal miners lower prices than independent buyers.

contribution to rural development and poverty alleviation –, and its challenges – mostly its widespread informality, the lack of productivity, poor environmental performance, dangerous working conditions and links to conflict and human rights abuses. It also highlighted that, although different motivations exist for people to become artisanal miners, the activity is, by and large, poverty-driven.

As can be deduced from the mineral policies of several resource-rich developing and emerging countries, as well as the agendas of international mining conferences with said countries' involvement, ASM is an important topic in many parts of the world. The EU and several member states have acknowledged this and included the ASM sector in their resources policies as a topic for cooperation with such countries as well as in mining and resource governance related support programmes.

Despite its relevance, an improved knowledge base and the attention increasingly given to the sector, the policy brief also shows how ASM has been marginalised in the international development debate and the development of developing countries' mining sectors over many decades and project successes have been limited due to a piecemeal approach and the lack of continuous long-term and holistic support programmes.

The integration of ASM support into long-term holistic rural development programmes is paramount and should therefore be considered by the EU and its member states in the design of development engagements addressing the sector. In this framework, ASM formalisation has been identified as most important and promising for potential EU and member states' engagements. The topic includes several prerequisites in need of support: An appropriate legal and regulatory framework, a minimum level of organization of the miners, and adequate local governance capacities. Further topics that require support and are, ideally, addressed within the framework of holistic ASM formalization projects, but could be addressed independently if formalization is already advanced or impossible at this stage, include: Environmental management, capacity building and technical support, access to finance, government revenue generation from ASM, market access, gender equality and ASM-LSM relations.

The discussion highlighted that due to the sector being largely poverty-driven, any regulation must include the provision of viable alternatives to methods or practices it seeks to prohibit. It also stressed that individual support projects will not succeed in eliminating ASM. This will only happen, once the host country has reached a certain level of general economic development. Supporting the ASM sector and its actors is nevertheless crucial due to 1) its importance for the production of metals imported by the EU (e.g. up to 25% of gold, tantalum and tin)[92], and 2) its connection to poverty and importance for poverty alleviation. It should therefore be justified from a humanitarian-social perspective instead of a purely economic one.

The EU and its member states, through well-designed integrated programmes, can effectively improve mining practices and the living conditions of artisanal and small-scale mining communities. There is more leverage for the EU in the ASM than in the industrial mining sector as it calls for direct support engagements instead of secondary support to EU mining companies active in developing and emerging countries. It is, however, important to note the need for solutions to be designed, put forward and monitored by those who work in the sector.

Recommendations to the EU and its member states therefore include to continue and intensify their efforts to support the ASM sector in resource-rich developing and emerging countries, to work towards a better integration of ASM support into holistic long-term rural development programmes and to improve donor coordination in this field.

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7 Project Background

The Strategic Dialogue on Sustainable Raw Materials for Europe (STRADE) addresses the long-term security and sustainability of the European raw material supply from European and non-European countries.

Using a dialogue-based approach in a seven-member consortium, the project brings together governments, industry and civil society to deliver policy recommendations for an innovative European strategy on future EU mineral raw-material supplies.

The project holds environmental and social sustainability as its foundation in its approach to augmenting the security of the European Union mineral raw-material supply and enhancing competitiveness of the EU mining industry.

Over a three year period (2016-2018), STRADE shall bring together research, practical experience, legislation, best practice technologies and know-how in the following areas:

1. A European cooperation strategy with resource-rich countries
2. Internationally sustainable raw-material production & supply
3. Strengthening the European raw-materials sector

8 Project Identity

Project Name	Strategic Dialogue on Sustainable Raw Materials for Europe (STRADE)
Coordinator	Oeko-Institut; Doris Schueler, Project Coordinator, d.schueler@oeko.de
Consortium	OEKO-INSTITUT E.V. – INSTITUT FUER ANGEWANDTE OEKOLOGIE (Oeko-Institut) Merzhauser Strasse 173, Freiburg 79100, Germany
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	UNIVERSITY OF WITWATERSRAND JOHANNESBURG (WITS) Jan Smuts Avenue 1, Johannesburg 2001, South Africa
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Funding Scheme	Horizon 2020 Programme, Grant Agreement number 689364
Duration	1.12.2015 – 30.11.2018
Budget	EU funding: €1 977 508.75
Website	www.STRADEproject.eu

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