



Building responsible construction material sectors

Insights from a global review

April 2022

Imprint

PUBLISHED BY

Bundesanstalt für Geowissenschaften und Rohstoffe (BGR)
Stilleweg 2
30655 Hannover (Germany)

Copyright © 2022 by the Federal Institute for Geosciences and Natural Resources (BGR)

All rights reserved under International Copyright Conventions. No part of this book may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopy, recording, or any information storage and retrieval system, without prior permission in writing from the publisher.

ABOUT THIS REPORT

This report presents the final version of “Building responsible construction material sectors: insights from a global review”. It is a product of BGR’s sector project “Extractives and Development”, which is implemented on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ).

For more information, please visit: www.bmz.de/rue/en

AUTHORS

This report was written by Leon Riedel, Nicolas Eslava and Angela Jorns, with contributions from Olivia Lyster.

ACKNOWLEDGEMENTS

The authors would like to thank everyone who provided information for this report and who agreed to speak to the authors, especially the interviewees who gave their time to provide more information on the case studies.

DISCLAIMER

This report was prepared from sources and data Levin Sources believes to be reliable at the time of writing, but Levin Sources makes no representation as to its accuracy or completeness. The report is provided for informational purposes and is not to be construed as providing endorsements, representations or warranties of any kind whatsoever. The authors accept no liability for any consequences whatsoever of pursuing any of the recommendations provided in this report, either singularly or altogether. Opinions and information provided are made as of the date of the report issue and as subject to change without notice.

For more information, please visit www.levinsources.com

DESIGN

deckermedia GbR

COVER PHOTO

Rosanna Tufo, Levin Sources

AS AT

April 2022

CONTACT

Bundesanstalt für Geowissenschaften und Rohstoffe (BGR)
Stilleweg 2
30655 Hannover (Germany)
E-Mail: rue@bgr.de

Table of contents

List of figures	4
List of abbreviations	4
1. Introduction	5
1.1. Background and objectives	5
1.2. Methodology	6
1.3. Structure and implementation of the recommendations	6
1.3.1. Sequencing	7
1.3.2. Implementation principles	8
2. Recommendations: insights from a global review	9
2.1. Strengthen the policy and regulatory environment	9
2.1.1. Gain in-depth understanding of the sector and its economic, ecological and social linkages	9
2.1.2. Develop a sector-wide and cross-ministerial strategy and long-term action plans	10
2.1.3. Continuously monitor and improve	12
2.1.4. Update and enhance laws and regulations	13
2.2. Enhance governance and institutional support	14
2.2.1. Invest in institutional infrastructure and capacities	14
2.2.2. Guide the formalisation process	14
2.2.3. Provide extension services and support infrastructure	15
2.2.4. Simplify the licensing procedure	15
2.2.5. Take a balanced approach to taxation	16
2.3. Create an enabling market environment	16
2.3.1. Promote and support small local businesses	16
2.3.2. Use public procurement to foster domestic producers	18
2.3.3. Foster access to finance and insurance	19
2.4. Foster value addition and economic development	19
2.4.1. Foster local content and linkages with other sectors	19
2.4.2. Promote recycling and secondary sources and industries	20
2.5. Ensure responsible business practices and the preservation of social and environment value	21
2.5.1. Consider a clustering approach	21
2.5.2. Enable continuous improvement through Environmental Social Impact Assessments (ESIA)s	23
2.5.3. Promote substitutes and alternative materials, processes and technologies	23
2.5.4. Reduce risks for workers and community	24
2.5.5. Manage environmental impacts and improved life cycle management	24
3. Annexes	27
3.1. Annex 1: Resources and further reading	27
3.2. Annex 2: List of interviews	30

List of figures

Figure 1	Human rights-based approach to formalization	5
Figure 2	A practical framework for understanding the objectives, attributes, and elements of environmental governance	6
Figure 3	Continuous cycle of responsive governance	7

List of abbreviations

ACP	African, Caribbean and Pacific
ASM	Artisanal and Small-scale Mining
C&D	Construction and Demolition
DRMI BMP	Regional District for Integrated Management of Forests, Marbles and Pantágoras
EIA	Environmental Impact Assessment
ESG	Environmental, Social, Governance
ESIA	Environmental and Social Impact Assessment
EU	European Union
GIS	Geographic Information System
GIZ	Gesellschaft für Internationale Zusammenarbeit
HRBA	Human Rights-based Approach
IGF	Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development
ILO	International Labour Organization
JAC	Juntas de Acción Comunal
MRC	Mekong River Commission
NGO	Non-Governmental Organization
OHS	Occupational Health and Safety
SME	Small and Medium Enterprises
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
VAT	Value Added Tax
WWF	World Wide Fund for Nature

1. Introduction

1.1 Background and objectives

This report aims to provide insights to governments who would like to foster a responsible domestic construction materials sector. Construction materials as understood by this report include primary resources such as sand, gravel, limestone, gypsum, crushed rock, marble, clay, granite, etc. These construction materials form part of the “development minerals” sector, which has been specifically named in the inter-governmental “Mosi-oa-Tunya Declaration on Artisanal and Small-Scale Mining (ASM), Quarrying and Development” (2018) as a sector requiring increased attention, support and sound governance.

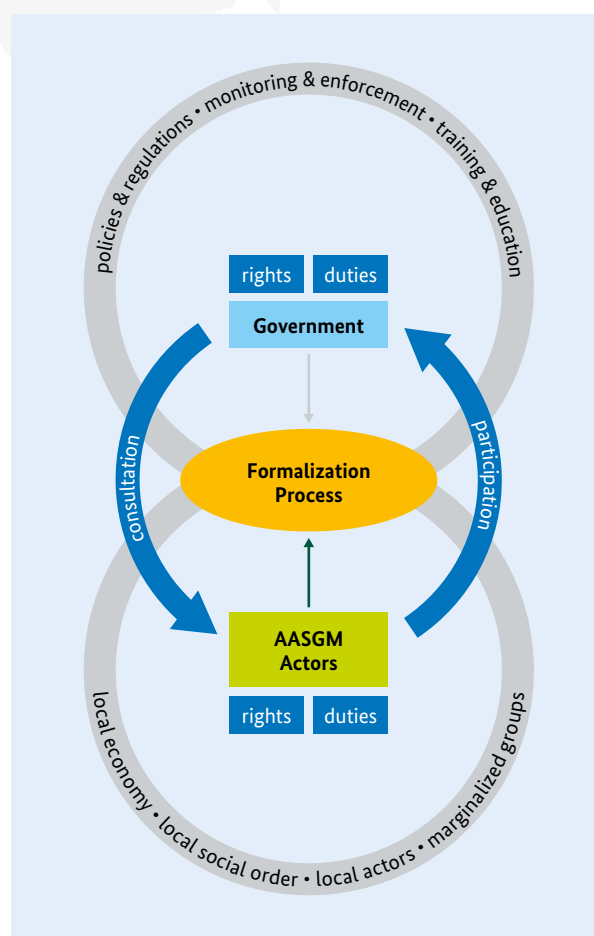
The purpose of this document is to provide guidance to governments of emerging economies on improving core elements of governance (institutions, structures and processes) in the sector in order to enhance positive economic, social and environmental opportunities while mitigating negative impacts caused by the extraction, processing and trade of these materials.

As a conceptual foundation, the report builds on the model of (environmental) governance developed by Bennett and Satterfield (2018). In line with this, improving governance should be achieved by taking into account the “attributes” of governance, and the application of a human rights-based approach (HRBA) (UNITAR & UN Environment, 2018; UNSDG, 2003).

The objective is to achieve increased formalisation of the sector with

- ▶ a level playing field for operators of all sizes,
- ▶ continuous participation and inclusion of all stakeholders,
- ▶ the internalisation of externalities at the operator level through a mitigation hierarchy approach,

Figure 1 – Human rights-based approach to formalization (Source: UNITAR & UN Environment, 2018)



- ▶ as well as increased value creation for the local and domestic economy, while conserving other types of value and capital (natural, social, governance), such as the provision of ecosystem services.

Figure 2 – A practical framework for understanding the objectives, attributes, and elements of environmental governance (Source: Bennett and Satterfield, 2018)

Objectives and attributes of governance	Elements of governance		
Effective <ul style="list-style-type: none"> • Direction • Coordination • Capacity • Informed • Accountable • Efficient 			
Equitable <ul style="list-style-type: none"> • Recognition • Participation • Fair • Just 	Institutions <ul style="list-style-type: none"> • Laws • Policies • Rules • Norms 	Structures <ul style="list-style-type: none"> • Decisionmaking bodies • Formal Organizations • Informal networks 	Processes <ul style="list-style-type: none"> • Decisionmaking • Policy creation • Negotiation of values • Conflict resolution
Responsive <ul style="list-style-type: none"> • Learning • Anticipatory • Adaptive • Innovative • Flexible 			
Robust <ul style="list-style-type: none"> • Legitimate • Connected • Nested • Polycentric 			

1.2 Methodology

The below recommendations draw primarily on research on the construction materials sectors in India and Indonesia (BGR, 2021). They are enhanced with further desk-based research into the sectors of six additional developing and emerging countries¹ as well as two industrialised countries.² The motivation of this selection was to include different geographical regions and governance contexts. The desk research primarily focussed on existing guidelines and reports regarding good practice. The analysis of certain countries also identified concrete examples of good governance practices that provide learnings for other countries. These countries and its practice (Vietnam, Uganda/Kenya, Mekong River region, Ethiopia, Colombia, Germany, and Netherlands) are presented in more depth in the form of case studies. In addition to the desk research, the recommendations and corre-

sponding case studies of good practice consider the insights of several experts and practitioners that were interviewed (see Annex II).

The recommendations aim to provide a, high-level framework that in general can be adapted to a large variety of governance contexts. Not all of them may be equally applicable in all contexts. The resources as well as suggestions for further reading can provide further guidance and inspiration, and are listed in Annex I.

1.3 Structure and implementation of the recommendations

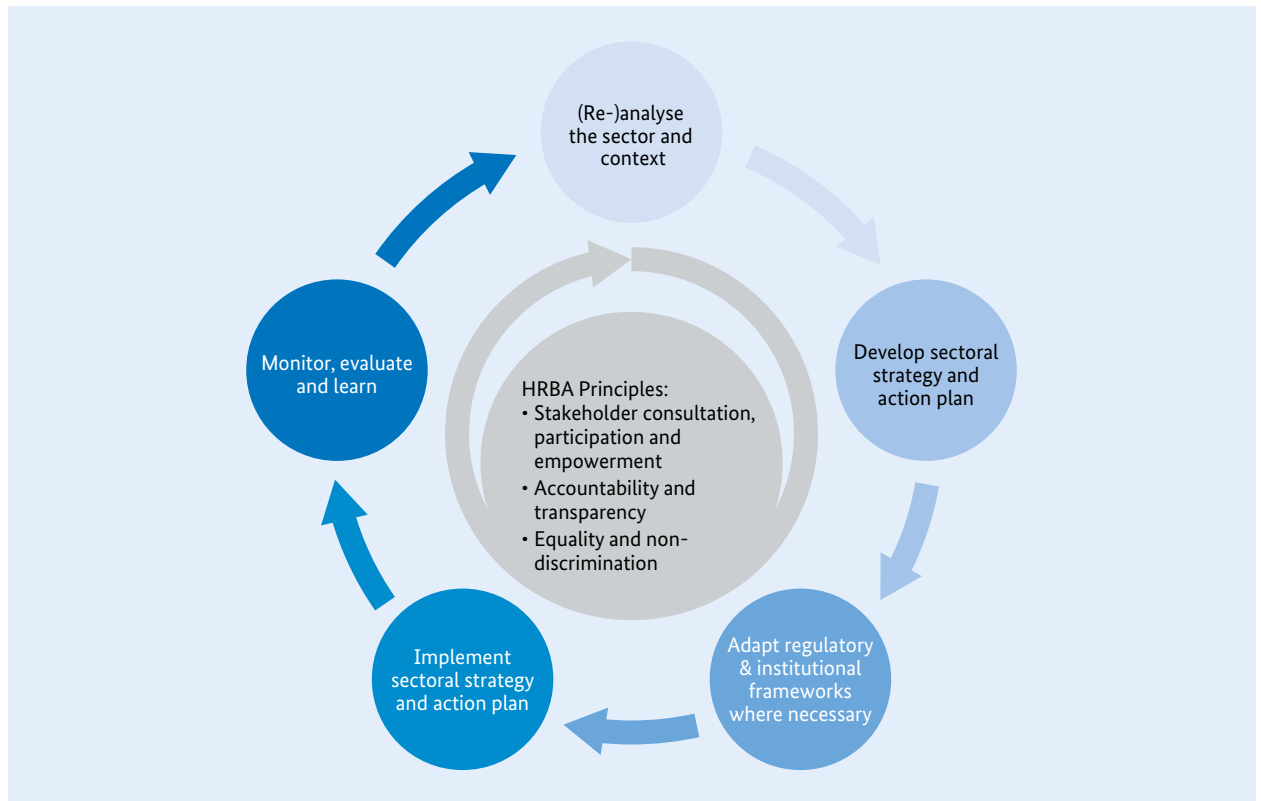
The recommendations organise into the following five main pillars:

1. Strengthening the policy and regulatory environment
2. Enhancing governance and institutional support
3. Creating an enabling market environment

¹ Beyond India and Indonesia, this included desk-based research on Colombia, Ethiopia, Fiji, Jamaica, Uganda (and to a smaller degree Kenya), Vietnam and the Mekong region.

² Germany and the Netherlands, as well as to a smaller degree EU-wide initiatives and standards.

Figure 3 – Continuous cycle of responsive governance (Source: Levin Sources)



4. Foster value addition and economic development
5. Ensure responsible business practices and the conservation of other types of capital (natural, social), including safe and fair working conditions, safeguarding ecosystem services and minimised environmental impacts, managing social and community impacts

Additional case studies provide more detailed information on good practice examples as a source of inspiration and further reading.

It should be noted that the recommendations and case studies should not be taken as a one-size-fits all blueprint, and due consideration needs to be given to the individual context and country governance structure as every context requires specific approaches. We therefore put much emphasis on first conducting an evaluation and assessment of the construction materials sector at the outset, and then provides high-level guidance on the issues that need to be tackled.

1.3.1 Sequencing

These recommendations are structured under thematic pillars, to ensure all governance aspects of the construction materials sector are covered. However, in most cases, the recommended actions require a thoughtful sequencing in a continuous cycle of responsive governance. Where relevant and possible, it is indicated how recommended actions should be sequenced. In any case, the guidelines are not designed to be prescriptive and are meant to be adapted to different types of governance environments and processes.

A continuous cycle of responsive governance is particularly important in cases where parts of the sector remain in the informal economy and significant formalisation efforts need to be made in the process. Stakeholder engagement and participation is essential at each step in this cycle.

1.3.2 Implementation principles

The implementation of these recommendations should be guided by a human rights-based approach. In addition, the following principles are key, especially when dealing with informality in the sector:

1. **Be informed:** The report primarily addresses government institutions in emerging countries or those that work with them. Due to their general character, users should consider a context analysis as starting point. With an assessment of local current practices, an informed decision of which aspects to consider for implementation can be taken.
2. **Be realistic:** As important as defining the starting point is the definition of (realistic) goals when working with the report. This also needs to be considered in the context of political dynamics, as election cycles might strongly influence what is possible within a given time frame. The insights follow five thematic pillars, which need to be embedded in a realistic sequence, especially where a broader process of formalisation is required. Formalisation itself is a lengthy process (c.f. specific guidance such as the Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development (IGF) ASM Guidance (IGF, 2017)) but also facilitates reaching policy objectives through enabling better institutional support and monitoring of the sector.
3. **Be pragmatic:** An informal sector is a reality in many regions this report was developed for, especially where small- and medium-sized operations produce construction materials. As described above, formalisation is an essential part to address negative impacts and foster positive outcomes in the sector. Through this, improvements towards a more responsible construction material sector can be achieved in an informal sector as well. Especially environmental and health and safety aspects can be improved, helping to respect basic human rights. The report therefore suggests recommendations that are applicable for both formal and informal sectors.

2. Recommendations: insights from a global review

2.1 Strengthen the policy and regulatory environment

2.1.1 Gain in-depth understanding of the sector and its economic, ecological and social linkages

Knowledge of the sector and its economic, ecological and social linkages enables evidence-based policy-making. It is therefore important to get a solid understanding of the sector, context and actors. This should include the following actions:

- ▶ Conduct comprehensive studies to enhance knowledge about supply chains, including for example: A full assessment of value chains, the legal and policy framework, the institutional framework and operating context, an impact analysis of health and safety, environmental, community and social aspects, and an assessment of markets and value addition. Due consideration should be given to collecting quantitative and qualitative data, as well as ensuring gender-disaggregated data.
- ▶ Conduct ecosystem- and region-wide studies and impact assessments (Environmental Impact Assessment (EIA) - see further below) especially on construction materials extraction situated for example in river basins and coastal areas to determine quotas for production/extraction based on sediment inflows.
- ▶ Conduct strategic assessments of the domestic market environment, especially under the wider urban planning and infrastructure planning processes: Study how much resources will be needed

of what material and ensure material/resource optimization already in the planning phase.

- ▶ Conduct a stakeholder mapping and ensure the strategy is developed in consultation with stakeholders by establishing formal and regular consultation and feedback opportunities (see dialogue forums below).
- ▶ Map all laws, regulations and policies touching the sector, as well as all relevant government agencies involved in it.
- ▶ Conduct institutional capacity assessments of the government agencies involved in governing and regulating the sector.

CASE STUDY: THE MEKONG RIVER COMMISSION

MEKONG RIVER: REGIONAL AND ECOSYSTEM-WIDE APPROACH TO RESOURCE MONITORING PLANNING – THE MEKONG RIVER COMMISSION’S MONITORING OF SEDIMENT FLOWS

Studies to understand the construction materials sector and subsequent sectoral strategies should aim to take into account a regional and ecosystem-wide perspective. In the Mekong River basin, such a transboundary approach is implemented by the Mekong River Commission (MRC), which has developed a regional system to monitor water and sediment flows along the river. This is particularly crucial in a region where several countries are dependent on the Mekong River for a variety of uses, such as hydropower dams, fishing, transport, irrigation and extraction of sand and aggregates, each in turn affecting other countries and other users along the waterway.

The MRC’s sediment and water flow data is captured through monitoring stations along the river, and publicly accessible online. The MRC also provides a toolbox where sediment flows and sand extraction rates can be modelled to understand the economic and ecological impact of extraction rates at different stages of the river. This toolbox comprises of data management and analysis tools as well as modelling software. It also provides a Decision Support framework that forms the basis for data-driven policy and decision-making, and is intended to be used by policy mak-

ers to understand and balance different economic uses and their impacts with longer term ecosystem services. Sediment-flow monitoring is discussed at MRC’s ministerial level-meetings and a sediment management plan has been established on this level as well. While initial assessments were focused on the impacts of changing sediment movement, advocacy by conservation organizations such as WWF have ensured that the MRC now also has the mandate to monitor sediment mining. Through this, the MRC has been successful in monitoring and raising awareness on the sediment flow “crisis in the making”.

However, there are challenges in implementation. Consensus finding and joint decision making within MRC has proven difficult. MRC’s decisions are not binding, and often, national policy decisions still take precedent. While the national Mekong River committees are mandated to bring information and data to the relevant national Ministries, in practice they are often not well connected to these ministries. Furthermore, mining ministries are often not structured to deal with sand extraction from rivers, and there are capacity gaps in overseeing extraction concessions in particular at the provincial levels.



Sources and further reading:

- Marc Goichot, World Wide Fund for Nature (WWF) Lead on Freshwater Asia Pacific,
- Anh Ha Huy, National Project manager, “Mitigating the impacts of climate change in the Mekong Delta through public and private sector engagement in the sand industry” (IKI SMP), WWF-Viet Nam,
- Hang Doan, Technical officer, IKI SMP, WWF-Viet Nam,
- Rechar Lee, Freshwater Communications Manager, WWF
- [WWF. \(2018\)](#). The sands are running out. How WWF sought to better understand the impact of dam construction and sand mining on sediment flows in the Mekong river basin. Fresh water case study.
- [Mekong Legal Network and Baird M. \(2016\)](#). Manual of Environmental Impact Assessment in the Mekong region: Commentary & materials (first edition).
- [Mekong River Commission for Sustainable Development. \(2018\)](#). Guidelines for transboundary Environmental Impact Assessment in the lower Mekong basin. Working document.
- [Mekong River Commission. \(no date\)](#). Modelling toolbox.
- [Best, J. et al. \(2019\)](#). Understanding sediment flux in the Mekong river: geomorphology, tropical cyclones, sediment mining and implications for delta stability. Presentation at the 22nd International River Symposium.

2.1.2 Develop a sector-wide and cross-ministerial strategy and long-term action plans

A sector wide strategy can foster a common vision and objective, “buy in” and acceptance of affected parties, and thereby creates a greater chance for success. When

planning long-term strategies, a phased approach that has clear milestones achievable in reasonable time is important for progress in the long term. The development of a sector-wide and cross-ministerial strategy and action plans should involve the following steps:

- ▶ Establish inter-ministerial committee to oversee and monitor the development of the strategy and the implementation of the subsequent action plans.
- ▶ Integrate the results of the studies (above), into policies and strategies that go beyond the mineral sector and line Ministry in charge of mining, e.g. land use planning, poverty reduction strategies, infrastructure investment plans, industrialisation policies.
- ▶ Integrate geological knowledge about the resources into overall land use planning
- ▶ Consider a regional policy perspective, in terms of ecosystem services and management, but also in terms of economics and trade flows, i.e. markets of construction materials (transport corridors, urban developments).
- ▶ Develop the strategy and action plans and ensure they include clear objectives, action points, responsibilities and communication lines, key performance indicators, and timeframes.

CASE STUDY: VIETNAM



VIETNAM: INTEGRATION OF SAND MINING AND CONSTRUCTION SECTOR IN POLICIES TO ADDRESS IMPACTS OF CLIMATE CHANGE

The 13 provinces situated in Vietnam's Mekong delta have developed an integrated and cross-sectoral plan for 2030 with a further vision up to 2050, which includes sand mining and the construction materials sector. The plan is accompanied by a policy that coordinates the action of all relevant Ministries. The aim is to address impacts of climate change on the country, taking into account the shrinking Mekong River delta, the erosion of river beds and banks, which again changes the coastal line and leads to salination, a change of tidal dynamics, reduced fresh water supply, more pressure on ground water, and impacts on agriculture and food security.

The awareness of impacts on the climate and the changes in the Mekong River – and their subsequent environmental, economic and social consequences for the Vietnamese population – have led the government of Vietnam to develop a coordinated policy response. This is coordinated across Ministries and involves development partners and donors under the “Mekong Delta Working Group”, to ensure actions are aligned with the overarching plan.

This is relevant for sand mining, as it affects many different government agencies and ministries, such as construction, natural resources (including minerals and water), industry, transport, planning, agriculture, public security etc. There are also efforts to integrate the provinces through a centralized committee.

In the Mekong delta, before 2020, provinces have established plans for the extraction of sand and construction materials, which are foreseen to be extended to other provinces in the future. In addition, a reform of the Mining and Mineral law is planned in the next years, which will incorporate this sector further.

WWF Vietnam, with funding from the International Climate Initiative, is currently implementing a project to make sand mining in the lower Mekong Delta more sustainable. While it is in early stages, the project includes several studies that aim at providing an evidence base for policy makers to create plans for extraction while preserving the river ecology. In addition, the project also includes analyses of the current sand value chain, and an evaluation of potential alternatives to river sand as a material for the construction industry.

Despite the favorable policy environment, challenges in implementation remain. Demand for river sand is increasing its price, while alternative materials are not yet in commercially viable use. There are still regulatory loopholes and the market is not well regulated. Engagement with the private sector remains difficult and at a probing stage, as the construction sector seems not very well organized. In addition, few civil society organizations are currently focusing on the issues of sand mining, though this seems to be changing with increased awareness of the issues.



Sources and further reading:

- Marc Goichot, WWF Lead on Freshwater Asia Pacific,
- Anh Ha Huy, National Project manager, “Mitigating the impacts of climate change in the Mekong Delta through public and private sector engagement in the sand industry” (IKI SMP), WWF-Viet Nam,
- Recharad Lee, Freshwater Communications Manager, WWF

2.1.3 Continuously monitor and improve

Monitoring should go hand in hand with the cross-ministerial strategy as described above. The dynamic of political landscape as well as fluctuation of material demand and a change of impacts might require reviewing strategies, action plans and its implementation on a regular basis. Monitoring of milestones or key indicators informs corrective actions.

- ▶ Establish continuous monitoring and supervision of the sector, using the baseline as a starting point and conducting regular inspections that feed into a database/registry.
- ▶ Establish an integrated GIS database and or cadastre and registry of operators (see also below under licensing).
- ▶ Establish continuous and meaningful dialogue with operators and affected communities by investing in community-based monitoring and quality control through community mobilization and ownership where possible. This could take the form of collaborative forums or committees with the producers and communities to jointly define quality criteria and jointly monitor these. However, this may require significant support and building of capacities of these actors at the local level.

CASE STUDY: INDIA



INDIA: MONITOR EFFECTS OF SMALL SCALE INTERVENTIONS TO ENSURE POSITIVE INCREMENTAL CHANGE IN LINE WITH THE LONGER-TERM STRATEGY

While smaller, incremental change in the policy and regulatory framework is often a good option as it requires less capital (either financial or political), such changes should preferably not be implemented on an ad-hoc and disjointed basis, but instead form part of a coherent longer-term sectoral strategy, whose achievement is continuously monitored. Enacting legislative changes that are limited in scope and serve to respond to emergencies rather than forming part of long-term strategic steering, can have unwarranted consequences, as it may cause confusion, legal backlogs and loopholes, and could become difficult to reverse.

In Uttar Pradesh, an Indian State that has been suffering from industrial scale illegal sand mining the development of regulations and laws took the form of piecemeal legislation: Authorities sought to address the urgent situation by enacting regulations that were limited in scope but that could allow both “to deal with immediate issues at hand”. Further reaching interventions would have delayed any response and would not have allowed “to keep mining going on”. This lack of materials would have significantly slowed down the development of neighbouring cities, including Delhi, to a halt. However, as these regulations were enacted to respond to the “need of the moment”, little consideration was given

to monitoring and ensuring that these regulations were coherent with the existing supporting legislation and with the capacities of agencies to implement said regulations. (At the time, Uttar Pradesh had an estimated 30 mines inspector for a population of more than 200 million and a nationally important sand mining industry.)

This has made both implementation by civil servants and compliance from operators both extremely complex and nigh impossible. This also provided many opportunities for established operators benefitting from the status quo to bring litigation against specific articles, due to the existing inconsistencies with supporting laws and regulations. Thus, stalling their implementation and creating a judiciary backlog that further hinders their implementation. These litigations and the regulatory quagmire they produce also impacted legal operators as the delivery of certain services, such the granting of riverbed sand mining leases that was frozen for years at a time. Meanwhile illegal mining continued, which would have served to further enshrine illegal actors. Correcting said issues require widespread legal reform, including of supporting legislation, which is cognisant not only of the implementing agencies but also of the courts’ capacities.



Sources and further reading:

- [Banerjee, S. \(2016\)](#). Regulating small-scale mining of minor minerals - A comprehensive framework beyond environmental clearances. Centre for Science and Environment. p17-21.
- [Building Materials & Technology Promotion Council \(BMTPC\). \(2018\)](#). Utilisation of recycled produce of construction & demolition waste – a ready reckoner. Ministry of Housing & Urban Affairs, Government of India.

2.1.4 Update and enhance laws and regulations

Laws and regulations governing the construction materials sector might be outdated, include gaps or loopholes, or counterproductive in as much as they can create a barrier to formalisation. Based on the outcome of the other recommendations of this section, the regulatory framework should be sharpened and brought in line with the sector strategy. An enhanced regulatory framework will build the basis for enhanced governance and institutional support can be provided in order to strengthen compliance.

- ▶ Recognise construction materials as minerals/resource (including sand) and ensure that there is a regulatory framework in place that covers them as such.
- ▶ Simplify laws and regulations and ensure that a holistic approach is taken to reform, rather than a patchwork approach, which could lead to an in-

consistent and contradictory regulatory framework that is ripe for abuse.

- ▶ Ensure that a “continuous improvement” approach is built into compliance (e.g. differentiated requirements for smaller producers that increase over time or with increased mechanisation). In cost-sensitive contexts, the costs associated with compliance could otherwise render formal operations practically commercially in-viable and thus provide an incentive for continued informality.
- ▶ Establish requirements along the value chain (not just at extraction level), especially for responsible sourcing, due diligence and chain of custody for construction companies to understand their supply chain and prevent, mitigate and remediate negative impacts in collaboration with their suppliers. This could be fostered through public procurement policies (see below).

CASE STUDY: UGANDA AND KENYA



UGANDA AND KENYA: AN ADAPTED REGULATORY FRAMEWORK FOR CONSTRUCTION MATERIALS

Uganda’s Mining Act of 2003 did not have any separate provisions for ‘building minerals’ (even though the term appears in the definitions at the beginning) or licensing processes for such materials. Neither did the Mining Act differentiate between artisanal and small-scale mining. However, an in-depth baseline study of the construction and industrial minerals sector in 2018 found that it was highly artisanal and informal, but at the same time provided employment and significant economic value locally and for the country overall. Based on this, the government proposed regulatory and policy changes to help foster and formalise the sector. The draft of the new Mining bill (version of October 2021), which is still under consideration in parliament, now incorporates construction materials more explicitly and includes specific licensing procedures in this sector. The new draft bill now also differentiates between artisanal and small-scale mining licenses. This new policy framework provides a low barrier for entry for artisanal producers into the formal sector that does not involve complying with onerous requirements. It also recognizes the diversity of work and organizational ar-

rangements that exist in the mining sector and in particular in the construction materials sector (e.g. small enterprises, community-based organizations, and small companies). In addition, it provides an opportunity for operators to progressively grow and “step up” from artisanal to small-scale as their operations improve, at the same time building their financial and technical capacity while also increasing the regulatory requirements (including environmental and social responsibilities).

In a similar way, Kenya had updated its mining law in 2016, which now regulates rights and obligations for all kinds of minerals, including construction and industrial minerals. It also differentiated between artisanal mining licenses and small-scale mining licenses, each with differing rights and obligations adapted to their scale and capacity. This standardisation of legislation also meant that the management of the construction and industrial materials sectors was unified under one Ministry, but also devolved to the local level with representatives of the Ministry at county level.



Sources and further reading:

- [ACP-EU Development Minerals Programme. Implemented in partnership with UNDP. \(2018\)](#). Baseline assessment of development minerals in Uganda. Summary Report, Volume 1&2.
- Ugandan Government. (2021). The mining and minerals bill. Bill No. 30, 2021. The Uganda Gazette No. 72. Volume CXIV. 1 October 2021. Bills supplement No 12.

2.2 Enhance governance and institutional support

2.2.1 Invest in institutional infrastructure and capacities

Institutional capacity in terms of quality and quantity are a foundation for mineral sector governance improvements. Especially recommendations around taxation, formalisation and licensing will benefit from capable institutions that support the sector beyond enforcing compliance.

- ▶ Decentralise and strengthen the institutional capacity, including at the local level. This can a decentralised approach to licensing and compliance, but a centralised level of oversight needs to be retained to ensure that potential issues of (mis)alignment between decentralisation levels are managed.
- ▶ Strengthen monitoring and enforcement capacities at the local level, alongside extension services (below).
- ▶ Build capacity for technical staff at the relevant Ministries and agencies, including GIS capacity, geology, laboratory and chemical analysis, etc. Create good practice guides for authorities and share them with other local authorities where relevant.
- ▶ Conduct GIS mapping and geological assessments to collect resource/reserve data on key construction minerals, as well as assessments of chemical-physical quality of materials in these deposits. Make the results of these assessments publicly available, including to civil society, who could play a role in monitoring and oversight.
- ▶ Foster the establishment of and collaborate with accredited laboratories for quality assurance of construction materials. Ideally, materials are checked before being used. Builders could also be required to do quality control on a regular basis.
- ▶ Establish e-governance solutions in the construction materials value chain where feasible and useful, in order to streamline procedures and make them easily accessible. This may be particularly helpful in conjunction with establishing one-stop-shops for licensing and tax payments, for example (see below). Be aware that an e-governance system needs to be properly implemented and main-

tained to be useful. Accessibility to and capacity building for users are also key aspects to consider.

2.2.2 Guide the formalisation process

Acknowledging the extent of informality and ensuring an inclusive and constructive engagement of the informal sector is crucial to achieve positive impact for the whole sector. Along with the lack of opportunities for value addition, informality represents an important barrier to the potential ‘upgrading’ of smaller operators in construction supply chains towards better business practices, more efficient production, or access to higher-value markets. The informal construction materials sector tends to be characterised by large numbers of smaller operators, who are more difficult to monitor than the (more) formal sector.

- ▶ Formalisation of the operators should be seen as a long-term process that consists of several steps. This should be guided by further resources, such as the IGF Guidance on ASM formalisation (IGF, 2017) or the Handbook for developing national ASGM formalization strategies (UNITAR & UN Environment, 2018).
- ▶ The formalisation should be a supported step-by-step process focused on progressive improvement. It is important to make the process inclusive, as loading more requirements onto the existing (small) operators without fundamentally changing the constraints within which they operate is unlikely to push operators towards more sustainable practices and is instead likely to move them further towards informality.
- ▶ Establish stakeholder dialogue: Engage and consult, and ensure that formalisation is a participatory process.
- ▶ Support cluster and administrative grouping of operators, in particular for ASM operators, e.g. in the form of small businesses. The most suitable form of small business collectives may vary based on the legal framework and is best determined in participation with the operators to avoid top-down imposition that facilitates elite capture of such organisations. Promoting the formation of small business entities would allow the operators to access formalisation, financing, technical support, and capacity building more easily.

- ▶ Businesses also need incentives to formalise and the process needs to be accompanied with benefits (IGF, 2017) to balance out costs such as taxation and increased regulatory requirements. One of those incentives could be providing businesses that commit to formalise access to finance, more specifically low-interest loans. Another incentive could be offering participation of small businesses in public tender processes for construction projects. As the government controls those tenders, they could offer integration of small businesses as material or service suppliers under the condition they formalised (see below).

2.2.3 Provide extension services and support infrastructure

Extension services and support infrastructure can provide an essential incentive for formalization and help ensure that business practices improve over time. Governments may provide such services themselves or incentives other actors (including private sector actors or civil society) to provide them.

- ▶ Improve coordination between up- and downstream actors in the value chain and provide market information as a service. Operators that are well informed about the market demand of materials, with details on quantity, quality, location, and time can manage their production more efficiently.
- ▶ Develop and distribute – to all supply chain actors – a handbook (vade mecum) containing consolidated information on all the applicable legal requirements and payable taxes, making it the sole document operators need to consult. As regulations will continue to evolve it would be pertinent to ensure that such practical information is updated as soon as necessary and that it is easily accessible to anyone at no cost. If the local context allows, this presupposes a web-based distribution of soft copies.
- ▶ Provide awareness campaigns and trainings around the information provided in the vade mecum or good practice guidance. Support business literacy and business planning skills (that also help operators get access to credit, see below). Non-governmental organisations and development agencies can play an important role in the distribution of the vade mecum and the provision of training to operators on the rules and their implementa-

tion. Training and capacity building programmes could consider the following:

- Supplement classroom-based training with practical, hands-on training at site level;
- Pilot the provision of scholarships in key topics for short-term practical training
- Tailor training curricula and materials to mineral-specific needs

- ▶ Consider supporting or fostering the provision of critical inputs and infrastructure to (small) operators who are willing to formalise and improve their practices, for example equipment rental schemes, facilitated access to (clean) energy, access to water for dust management and mining camps (combined with responsible water management), transport and road infrastructure to facilitate access to markets (see also recommendations under creating an enabling market environment).

2.2.4 Simplify the licensing procedure

Licensing procedures are a fundamental part of governing the construction materials sector, enabling long-term land (and water) use management and ensuring compliance with social and environmental regulations. However, licensing procedures can also create a barrier to formalisation of the sector, as they may not be in line with operators' financial and practical capabilities. As a first step, improving this would involve making licensing across the supply chain more accessible, less complex, and cheaper.

- ▶ Create a streamlined, simple licensing process with a "one-stop-shop" for applicants, ideally through the local or decentralised authorities (closer to the operators).
- ▶ Establish a decentralised licensing structure and increase responsibility for local governments to receive applications, issue licenses and monitor compliance. This will facilitate the process for smaller and especially informal operators to access licenses. However, this requires resources, support as well as guidance and coordination from the central Ministry as well as capacity building for local authorities.

- ▶ Ensure an integrated approach to land and water management in the licensing procedure and combine the minerals cadastre with inter-ministerial strategies and maps of other land and water uses. Ensure effective land-use and water-use planning across ministries, and manage conflicts with other land or water users.
- ▶ Make licensing for operators affordable: a great barrier for licensing can be the fees connected to a license. It is therefore recommended to introduce fees that are realistic (regarding earnings and materials value). A fee based on operation size can make sense as well.
- ▶ Build incentives such as access to finance and public tenders into the licensing regime. Benefits for licensed operations need to be known and therefore clearly communicated among stakeholders.
- ▶ Consider using parts of the revenue from taxation to develop understanding and improve practices in extraction.
- ▶ Adjust taxes to encourage increased recycling of construction materials and promote the uptake of alternative materials (see further below).

2.2.5 Take a balanced approach to taxation

Taxation on operators extracting, processing and trading construction materials can be a tool to steer the sector towards improved practices, but may also create a barrier to formalisation. Taxation needs to reflect government capabilities as well as capabilities of producers.

- ▶ Consider creating a one stop shop for tax payments, ideally locally, and enable the use of electronic or mobile phone-based payment systems. The construction material value chains offer multiple opportunities for taxation, depending on government capacity to administer the taxation system (at a mine site production related, licensing, processing, Value Added Tax (VAT) etc.). While collecting taxes close to the mine site requires greater state capacities, it can be considered the most straight forward and comprehensible system from an operator perspective.
- ▶ Use taxation as a governance tool to steer the sector. Taxation levels need to set the right incentives to encourage or discourage certain types of operations (e.g. operations with high environmental impacts such as river dredging could have higher tax rates or required to pay into rehabilitation funds) or certain types of materials (e.g. tax incentives to encourage circularity, recycling and re-use, as well as the use of secondary or alternative sources).
- ▶ Establish SME development programmes to promote small businesses along the value chain. Such programmes could be focussed on priority value chains, such as high-value materials (e.g. granite, marble, kaolin) where the increased participation of smaller domestic players is desired. Such programmes could provide an incentive and support for formalisation, support the diversification of the sector and value chain and support more value flowing into smaller businesses.
- ▶ This also requires technical and vocational education and training. For this, cooperation with existing technical schools and universities could be envisaged, to establish training of trainers programmes, but also to develop corresponding occupational standards and model curricula (including technical understanding, but also health and safety aspects, environmental aspects, etc.) (c.f. Hofmann, K. et al., 2012).
- ▶ Consider establishing requirements for large-size (and often international) companies to partner

2.3 Create an enabling market environment

2.3.1 Promote and support small local businesses

In many emerging economies, construction materials are frequently extracted, processed and traded by smaller, local enterprises, who often operate in the informal sphere. While they create employment income and livelihoods, they often struggle to become formal and thus may not fulfil their economic potential while also creating negative social and environmental impacts. Fostering small local business enterprises in the construction materials sector can therefore be a strategy that can be integrated into poverty reduction strategies.

CASE STUDY: INDONESIA

INDONESIA: PROMOTING SMALL BUSINESS AND LOCAL PROCUREMENT

In cases where there are challenges caused by a dominance of large companies in the construction sector, an opportunity lies in promoting smaller businesses, subcontracting and local procurement. The government of Indonesia for example is undertaking efforts in this direction, by promoting local content rules and providing incentives for large construction companies to work with local and small businesses. The Ministry of Public Works has made efforts to improve construction supply chains in Indonesia, including requiring large-size companies to collaborate with local companies, promoting specialisation of small- and medium-sized contractors, and promoting an environment conducive to subcontracting.

The government of Indonesia also provides financial incentives for companies to favour local content and local value

addition and beneficiation. Under the Investment Law, for example, companies can receive fiscal incentives if they employ a large number of workers, invest in a remote or deprived area, cooperate with micro, small or medium-sized enterprises or cooperatives, use locally produced goods or equipment, or work on a project related to environmental sustainability. These are positive approaches from a local value addition perspective, but they must go along with formalisation and capacity-building efforts to ensure that marginalised operators and workers have fair access to these opportunities and to ensure these requirements can be met by large contractors. More research is needed to assess the impact and challenges of these measures to date.

**Sources and further reading:**

- [BGR. \(2021\)](#). Construction raw materials in India and Indonesia - Market study and potential analysis – final report.
- [Rahmansyah, D. and Widuro, B. \(2020\)](#). Construction and projects in Indonesia: Overview.

with or source from local companies, promoting specialisation of small- and medium-sized contractors, and promoting an environment conducive to subcontracting. This can also include requirements for due diligence on such suppliers and for addressing and mitigating risks and impacts jointly with these suppliers.

- ▶ Foster access to inputs and markets: Mine sites are often located in remote areas, and the lack of infrastructure makes it difficult to get raw materials to and out of remote areas. At a mine site, the supply of electricity can be irregular and thus requiring generators to fill these gaps. The location of most mines away from towns also complicates the availability of spare parts and the maintenance of machinery. Fostering the access to such inputs and markets can act as an incentive for small businesses to formalise and conduct their business responsibly.

2.3.2 Use public procurement to foster domestic producers

Establishing public procurement requirements and processes to foster domestic producers, value addition and responsible sourcing can be a key governance tool and market incentive for formalization, progressive improvement, and SME development. Smaller, informal operators are often prevented, because of their informal status, from accessing credit, government support programmes, and higher-quality, higher-value markets such as public tenders and large infrastructure projects. Public procurement, in conjunction with support measures to lower-capacity operators, can provide an opportunity for the inclusive engagement of and support to small- and medium-sized enterprises (SMEs) and informal operators. Such approaches can be a starting point for progressive formalisation and improvement of business practices. Consideration should be given to the following:

- ▶ Establish standardised tender processes also for smaller contracts to give a chance to smaller operators to apply.

- ▶ Establish cyclic application of such tender procedures and recurring contract management, which enables continuous learning and increase of capacities of government agencies managing these processes.
- ▶ Ensure a comprehensive evaluation framework is in place that includes criteria beyond the commercial offering (e.g. also environmental and social aspects), but that allows for stepwise improvement. This could also include requirements for responsible sourcing and due diligence for providers who are further downstream.
- ▶ Consider implementing a step-by-step increase of requirements in the public procurement process in order to foster continuous improvement without excluding operators from the start. This could mean keeping the requirements in the first round low, and then over time introduce more competitive processes, adding increasing requirements to the tender over several years. Such an approach supports stepwise formalisation by requiring actors in the supply chain to (increasingly) abide by regulations and providing formal actors with access to preferable prices to cover the costs of this compliance.
- ▶ The operators should be provided with financial support and capacity building during this process, and this could be combined with SME development programmes (see above). This is particularly important where large segments of the sector are informal, as putting additional regulatory demands on operators will not solve the issue and instead would only further entrench the problem and push smaller operators towards greater informality, while at the same time further disenfranchising the already vulnerable labour force that depends on this sector and its economic linkages.

CASE STUDY: ETHIOPIA



PURPOSEFUL PUBLIC PROCUREMENT OF CONSTRUCTION MATERIALS: ETHIOPIA'S COBBLESTONE ROADS PROJECT

The example of Ethiopia's cobblestone roads rehabilitation project, financed by GIZ (2007–2012), provides a good example of how purposeful public procurement of construction materials can lead to increased responsibility of businesses, as well as improved governance outcomes at the level of authorities.

In this case, the municipality level was responsible for public procurement of construction materials for the rehabilitation or building of local roads. The introduction of public tendering processes at this localized level for cobblestones ensured that tenders were small enough for local SMEs (i.e. local quarries, stone chiseling and paving operators) to participate in, and thus enhanced competition and diversification in the sector. The tendering processes were adapted over the course of several years to become more competitive, introducing additional requirements for the operators over time. This provided an initially low barrier for small or informally organized operators at first, but then ensured that they had an incentive to improve their practices over time with the market access they gained.

This was combined with technical training and capacity building of operators, to support them to become formalized contractors. In addition, the small and cyclically recurring tendering processes allowed for learning and capacity building of the authorities as well. This ensured that municipalities became more experienced in managing such processes and were increasingly able to take on their wider role in urban planning and infrastructure provision at large. From a few pilot projects, step-by-step manuals were developed, which were then disseminated in other municipalities by the line Ministry and became countrywide policies and standards. In this sense, the purposeful public procurement and spending enabled the inclusion of local SMEs in the construction sector and thus fostered local employment creation (including for marginalized groups such as women and the urban poor and unskilled), better business practices, empowered local administrations and improved urban services.



Sources and further reading:

- Hofmann, K. et al. (2012). Making good governance tangible. The cobblestone sector of Ethiopia. Gesellschaft für Internationale Zusammenarbeit (GIZ).
- Oirere, S. (2013). Cobblestones offer alternative road construction in Ethiopia. *Aggregates Business*. 1 October 2013.
- *Cities Alliance News*. (2014). Cobblestones are creating jobs and empowering Ethiopia's urban poor.

- ▶ Include incentives for operators who continue to improve their practices, e.g. longer-term contracts, additional criteria or evaluation points during the tendering process, etc.
- ▶ Link quality control with payments, e.g. by considering the establishment of a multi-party committee that checks the quality of the delivered product or work based on the evaluation criteria and approves the product or work before the payments are released
- ▶ Consider establishing strategic evaluation criteria to steer the sector, for example through the inclusion of requirements for the % content of recycled materials or alternative materials in the procured construction materials.

2.3.3 Foster access to finance and insurance

Banking (access to bank accounts), loans and credit is an important tool for the formalisation and monitoring of the sector but many banks eschew the ASM sector due to its (perceived) risks, which are often linked to informality. Low-interest loans are often one of the most cited needs for support services in the sector, and thus can be an important way of supporting the sector while gradually formalising or imposing Environmental, Social, Governance (ESG) requirements.

- ▶ Consider enhancing access to finance as a tool to steer the sector towards more formalisation and responsible practices. Access to finance could be facilitated for operators willing to formalise and improve over time.
- ▶ In addition, the more “desired” types of operations could be made to benefit from access to finance – for example, finance is especially needed for hard rock extraction, as this requires more upfront investment as well as machinery and technology, but might be deemed a more environmentally preferable extraction type than river dredging.
- ▶ Consider facilitating the coverage of gaps in cash flow for smaller operators, especially where customers (including the state through public procurement) do not pay immediately for services. This can be a significant barrier for smaller operators.

- ▶ Consider developing insurance or financial products that support the smoothing of or hedging against raw materials price fluctuations. SMEs in particular are often not resilient against financial shocks, such as an increase in input prices (e.g. fuel or energy), and require economic stability and predictability.
- ▶ Ensure that support in access to finance is implemented in parallel with the support in formalisation and the simplification of the licensing process. Often operators are not able to access finance due to their informal status, i.e. by not having a license, they lack documentation and a collateral.

2.4 Foster value addition and economic development

2.4.1 Foster local content and linkages with other sectors

Governments can support employment creation and value addition in the construction raw material value chains by enacting policies that foster local content, i.e. the hiring of local workers and subcontracting of local and small businesses and local procurement.

- ▶ Consider providing financial incentives (through investment or taxation policy) for companies who favour local content and local value addition and beneficiation. Such approaches must go along with formalisation and capacity-building efforts to ensure the most vulnerable operators and workers have fair access to these opportunities, and to ensure large contractors can actually meet these requirements.
- ▶ Consider establishing flexible requirements for local content and localisation of value addition, potentially also in conjunction with public procurement requirements (see above). This can help foster local SMEs and support the diversification of the sector by counterbalancing the dominance of larger or vertically integrated companies. However, unintended consequences of such policies need to be carefully considered, as such rules may also cripple the market or economies of scale, and potentially open doors for abuse. Regulation needs to be accompanied by monitoring and enforcement efforts.

- ▶ Consider establishing incentives or requirements also for investments into economic linkages of the construction sector, such as production of or access to (clean) energy, or road and transport networks. Some operators may already be involved in this (especially in cement value chains), and purposeful steering of such efforts in line with broader infrastructure and development plans may be beneficial.
 - ▶ Any measure looking to localise value addition – particularly through the formalisation and/or improvement of smaller local operators – will require more local capacity than an approach focusing on a few nationally operating big players who will require less monitoring and enforcement capacity. Whereas the latter will likely have less redistributive effects and promote less local reinvestment, the first will likely have more redistributive effects. This means such measures need to be implemented in parallel with formalisation efforts and capacity building/SME development for smaller operators. These are trade-offs that must be taken into account when considering the greatest potential for the development of construction raw materials value chains. Non-governmental organisations, private sector entities such as consultancies and development agencies can provide services such as research, capacity-building, awareness-raising, advocacy and community support for these implementation efforts.
 - ▶ Consider establishing minimum requirements for processing and value addition before export (and/or ban certain exports of raw, unprocessed materials). This can support value addition in country and allows exporters to sell products of higher economic value. However, such policies need to be carefully assessed in advance, and require additional support for capacity building and investment, and support to formalisation in order to ensure that smaller informal operators are not side-lined.
- non-negligible part of certain material needs of the construction sector (such as aggregates, manufactured sand, concrete blocks, paver blocks, tiles, etc ...).
- ▶ Such a strategy should take into account the inclusion of the (often already existing) informal recycling sector and build on the existing recycling centres for the production of lower value-added goods and goods that face a national shortage. This may need to be linked with formalising the existing waste collection and recycling sector, as much of this sector may also happen in the informal economy. This can help to keep the pricing competitive and promotes uptake among consumers.
 - ▶ Consider implementing campaigning and capacity building measures in order to promote recycled products, and raise awareness amongst construction companies about the opportunities and advantages of such new products.
 - ▶ Consider fostering the use of secondary materials through requirements and incentives; e.g. require a percentage of recycled material in in public procurement tenders, support investment and capacity building especially for SMEs, adapt taxation rates to make such materials competitive.

2.4.2 Promote recycling and secondary sources and industries

Promoting recycling and secondary sources can be done by strengthening construction and demolition (C&D) waste recycling in the sector. This offers a potential complement to primary production (extraction), reduces dependence on imports, and builds up secondary industries, which could make-up a

CASE STUDY: INDIA

INDIA: BUILD ON, RATHER THAN REPLACE, EXISTING INFORMAL SECTORS AT THE DISPOSAL AND RECYCLING STAGE OF THE CONSTRUCTION MATERIALS VALUE CHAIN

Delhi's implementation of a citywide construction and demolition (C&D) waste recycling program was characterised by a top-down design that did not include the existing informal C&D waste recycling sector, chiefly among them transporters. This led to issues of material acceptance among users, as the materials generated were not those associated with C&D recycling, and limited the interest of waste generators in using the formal system. Under this formal system, most operators have to deliver, at their cost, their C&D waste to a network of more than 240 designated disposal areas managed by the municipality who will then dispatch this material to official recycling centres, with the exception of big waste generators who ought to deliver their C&D waste to the recycling centres directly. On paper, the established network of C&D waste collection points is a good solution. In practice, however, this ignores the existing, informal economic model of C&D waste disposal, where such material is treated as a saleable commodity and not waste.

The traditional model of waste disposal depends on transporters, who are independent from the C&D waste generators. These transporters make their income through both the transport fee they charge the demolition operator and the sale of the debris produced by the demolition process, as all higher value materials will have been collected by the demolition operator. If the debris can be re-processed into aggregates, transporters can even pick them free of charge. At the same time, there is also substantial demand for low

quality debris that can be used in backfilling, elevation improvement or road construction. Operators will thus often prefer to send their waste outside of the official recycling network as transport would be more expensive, or could also delegate debris management to the transporters who prefer selling this material rather than handing it over to the municipality. This is compounded by the fact that some disposal areas managers have been noted to request payments, or that transporters can be turned away if the site is overburdened, which creates additional costs, thus eating further into their already slimmed-down margins. At the same time, official recycling centres are competing for the supply of higher quality C&D waste that can be re-processed, and a lack of material segregation at the collection points is creating issues of space.

While informal sectors might be politically unpalatable to decision makers, these have often been able to establish themselves, and in the case of C&D waste recycling, provide important services to the wider community despite their informality. The soft infrastructure they have established thus offers a well-developed starting point for formalisation and upgrade through hard infrastructure, with the added advantage that this would preserve and upgrade a substantial number of jobs for some of the most vulnerable parts of the community. However, to do so consultation has to take place early, transparently, and be inclusive.

**Sources and further reading:**

– [Somvanshi, A. and Verma, A. \(2020\)](#). Another brick off the wall: Improving construction and demolition waste management in Indian cities. Centre for Science and Environment, New Delhi.

2.5 Ensure responsible business practices and the preservation of social and environmental value

2.5.1 Consider a clustering approach

The definition of geographical “clusters” reserved for the extraction of particular construction materials, in line with geological assessments and other land use and water use planning, can help facilitate and simplify the licensing process, enable region-wide and ecosystem-wide environmental and social impact assessments (ESIAs) as well as foster access to

shared inputs and infrastructure, market access and support.

- ▶ Such clusters should be defined based on geological assessments, but also on broader land and water use plans.
- ▶ The clustering should also integrate an ESIA of the entire area (see below), resulting in an environmental and social management plan for each parcel in the cluster, before such a “cluster” is designated and opened to applications for extraction/beneficiation licenses.
- ▶ Such clusters can have several advantages:

CASE STUDY: COLOMBIA


COLOMBIA: CONSULTATIVE AND PARTICIPATORY PROCESSES SUPPORT CO-EXISTENCE WITH OTHER ECONOMIC SECTORS AND THE PLANNING FOR MULTIPLE AND COMPLEMENTARY LAND-USES

The Regional District for Integrated Management of Forests, Marbles and Pantágoras (DRMI BMP) is a protected area established in 2019 in the Colombian department of Antioquia, where 13 construction minerals extraction and processing companies operate alongside other economic activities, tourism most visibly. The process of planning and implementing a variety of land uses in this area is a good example of how construction materials extraction can exist alongside other sectors, including those who depend on a well-preserved environment, such as tourism, and in areas of high conservation interest.

In 2015 CORNARE, the competent authority for environmental management in the region identified the area as an area of high interest due to its high conservation potential, unique geological landscape, and the presence of local efforts to manage resources collaboratively. Given the complexity of a full environmental and social mapping of the area, a partnership was developed with Fundación Natura a Non-Governmental Organization (NGO) who had experience in using the required methodology in similar mappings conducted in the Magdalena River watershed, where DRMI BMEP is located. The methodology deployed identified not only the known vocal and/or visible stakeholders but also the key community level actors that are the Community Action Boards (Juntas de Acción Comunal, JAC), independent community-level elected groups that represent their community. Engagement with JACs has often been eschewed as working with them is not necessarily straightforward: they are often located in remote areas where cell phone coverage might not exist, their capacity to participate in complex discussions may not be sufficient and they tend to be dependent on the intermediation of other actors instead of having their own representation.

To overcome this issue JACs representatives were given initial training to ensure they could participate as equals in the discussions taking place in the purposed formed consultative group. Based on the stakeholder mapping, said group was constituted in 2018 by representatives of the JACs, of

each key economic sector, administrative authorities and CORNARE, as well as civil society and allows these difference segments of the local society to work collaboratively, using known and accepted rules. In 2020, this resulted in the development and acceptance of the DRMI BMP's 2021-2026 management plan, which specifies the category of uses that can be given to the various sub-divisions of the area (preservation, restoration, sustainable use, public use) as well as the mechanisms that will be used to develop different projects towards said objectives in said zones.

Mineral extraction and transformation operators in the area are now updating their EIAs with the results of the management plan and mine closure plans, the later will be shared for discussion in early 2022, the first-time mining closure plans are shared with the community. Three other such workshops will take place in 2022 in order for all stakeholders to present their projects and set objectives on how to manage the areas under their influence. Encouragingly, the harshest critics of the process have been transformed into key supporters thanks to the ongoing, predictable, and transparent consultation approach from Fundación Natura. This highlights the role of transparent stakeholder consultations in transforming ad-hoc efforts into ongoing governance processes.

With the implementation of the plan about to start, the DRMI BMP will now have to ensure that all relevant stakeholders present appropriate projects. The role of the JACs is critical in both processes and requires their ongoing training, a component integrated into the DRMI BMP management plan. It will also be important for the DRMI BMP to be able to finance itself after this initial implementation period. This shows how stakeholder consultation and participation is essential especially in areas where construction materials extraction needs to co-exist with other land uses and economic sectors. Collaborative planning and implementation can foster the finding of common ground and leads to local ownership for implementation.


Sources and further reading:

- David Echeverri, Project Director at CORNARE (Colombia)
- Jorge Cortissoz, Representative of the tourism sector in the consultative group (Colombia)
- [CORNARE. \(2020\). Plan de manejo Distrito Regional de Manejo Integrado Bosques, Mármoles y Pantágoras: Convenio de Colaboración Fundación Natura.](#)

- It saves the costs and complications of undertaking EIAs for operators, while it is ensured that ESIA's are done even before a particular area is designated “open” for licenses and thus can consider ecosystem-wide or regional impacts and be aligned with higher-level land-use and water-use planning.
- It would facilitate and simplify inspection and monitoring (in particular of many smaller operators), ensuring that extraction takes place formally and contributes to the treasury.
- It would facilitate the provision of key inputs and infrastructure, such as electricity, water, access roads, etc., while monitoring responsible business practices.

2.5.2 Enable continuous improvement through Environmental Social Impact Assessments (ESIA)s

Environmental and Social Impact Assessments are a crucial part of ensuring the prevention and mitigation of environmental and social impacts caused by the extraction and processing of construction materials. Ideally, ESIA's should be conducted not only on the level of an individual operation, but also as part of a higher-level land and water use planning on a regional or ecosystem level.

- ▶ Consider conducting the ESIA's with public financing and support for entire clusters or areas (see above), in particular where small and informal producers are dominant. This can also be part of the higher-level and longer term land- and water-use planning conducted by the government.
- ▶ Consider establishing differentiated ESIA requirements with minimum benchmarks and simplified processes for small, non-mechanised operations and stricter requirements for larger, mechanized operations
- ▶ Ensure regular monitoring of the implementation of mitigation plans, and establish corrective action plans with clear timelines and responsibilities after non-compliances are found.
- ▶ Promote the use of a mitigation hierarchy approach in order of priority: favour a design that

minimises negative impacts, promote the avoidance of negative impacts first, if needed minimise and mitigate impacts and finally compensate over and beyond the remaining impacts (which at this point should be unavoidable) created.

2.5.3 Promote substitutes and alternative materials, processes and technologies

The promotion of alternative materials, processes and technologies for the construction sector can help reduce social and environmental impacts caused by the primary extraction of minerals. Fostering these should be considered especially where social and environmental impacts of extraction are deemed too high and unsustainable over the long term, especially when considering ecosystem services for society and economy at large.

- ▶ Invest in research and development to promote the use of alternative or substitute materials. This could involve working with construction companies, real estate owners (end users) and universities to develop quality measurements and standards, as well as potential alternatives for construction materials (that can be extracted/produced locally, but with less environmental impacts for example).
- ▶ In depth assessments of the market potential of such materials and processes, as well as cost-benefit analysis and assessment of social, environmental impact need to be made before alternative materials are encouraged. This needs to include assessments that evaluate direct and indirect impacts and opportunities and support policy makers in balanced decision-making.
- ▶ Support the uptake of alternative working processes and technological upgrading for value chains that come from primary extraction, but also for value chains that feed alternative materials or recycled materials. This should include awareness raising and education on alternative materials with the end users in the construction sector.
- ▶ Support and invest in circularity (see also promotion of secondary materials), re- and upcycling in the construction sector to reduce the dependence on primary (mined) sources.

2.5.4 Reduce risks for workers and community

The construction materials sectors' impacts on workers, communities and society should be prevented, mitigated and remediated and their rights upheld and fulfilled. Governments should incentivise such business practices, but also control compliance with these requirements through an effective monitoring and inspection framework, including through audits and certifications. This is particularly challenging in informal parts of the sector and thus requires an adapted formalisation process.

- ▶ Integrate a particular focus on the most vulnerable actors in all policy decision, strategies and processes, and ensure that consultation and participation by rights holders and affected stakeholders is guaranteed throughout.
- ▶ In the construction sector, this means a particular focus on the labour force, which is often composed of migrant workers (including with informal status). Poor labour conditions often accompany informality in the construction raw materials sector, and these can only be addressed if the actors are included rather than pushed further into informality.

This also means particular focus on gender aspects and women's roles. In many countries, women play a key role in the workforce extracting and processing construction materials, in particular in sub-Saharan Africa, but are often faced with lower income levels.

Vulnerable groups and gender aspects also need to be taken into account in formalisation processes themselves. Governments should make sure that increased professionalization, formalization, technological advancement, and mechanization in the sector is conducted in an inclusive manner, making sure that vulnerable and marginalized groups (who are often involved in the construction material value chain in high numbers) are not pushed out of their livelihoods inadvertently.

Mining is one of the most dangerous occupations, heavy machinery and equipment, manual physical work and a hazardous working environment bear risks for workers health and safety. The same can be said about work in the construction and demolition sectors, especially where they remain in the informal economy. Against this background, occupational health and safety (OHS) measures should be regulated

and supervised by competent authorities. The international labour organization provides standards on which national regulation should be based (c.f. International Labour Organization (ILO), 1995).

- ▶ Governments need to establish competent authorities for supervision, inspection, and awareness raising and introduce incentives based on key occupational health and safety metrics.

2.5.5 Manage environmental impacts and improved life cycle management

Environmental impacts are inevitable during mining operations, especially open pit mines and dredging in rivers and coastal areas can have a large environmental footprint. However, this impact can be mitigated and remediated when planned properly at an early stage. Mine rehabilitation should therefore be required by law and plans for it should be part of the licensing process. Rehabilitation plans could include progressive rehabilitation over the course of the operational phase, in addition to the final rehabilitation at the end of the extraction phase. Rehabilitation plans should also include a financial or budgeting component.

- ▶ Establish requirements for mine-closure and post-mine plans, including for rehabilitation and biodiversity management throughout the mine life cycle. These plans may be a pre-requirement for obtaining an extraction license.
- ▶ Consider the mandating or creation of rehabilitation funds into which operators need to pay. However, ensure that operators have access to the necessary infrastructure such as formal banking, which needs to be considered especially for the informal sector.
- ▶ Ensure that operators and government agencies facilitate stakeholder engagement in developing and implementing environmental impact management plans, rehabilitation plans and biodiversity management plans.
- ▶ Consider establishing requirements for progressive restoration (in addition to mitigation) already in the operational phase, facilitating the final restoration after extraction ends.
- ▶ Monitor and inspect the implementation of mitigation and restoration measures recommended

or required by the ESIA along a mitigation hierarchy and key performance indicators, and foster establishment of monitoring and reporting system by operators. Ensure that this also includes (indirect) impacts on climate, e.g. type of energy use, CO₂ emissions, etc. – in particular in the cement industry.

- ▶ Support the integration of dynamic biodiversity management into operations throughout the life cycle, to reap the potential for positive biodiversity impacts particularly in quarries. This could involve:
 - Require (and support the development of) biodiversity management plans throughout the life cycle, including the operational phase
- Staff training on biodiversity in order to foster natural biodiversity havens in pits and quarries and attract pioneer species for later rehabilitation.
- ▶ Foster the large potential of the quarry sector in particular for effective and net positive rehabilitation measures; in particular the opportunities for transformation into wetlands and habitat for amphibians and nesting sites for birds that require cliff habitats.

CASE STUDY: GERMANY



GERMANY: MINE CLOSURE, REHABILITATION AND COMPENSATION FOR ENVIRONMENTAL IMPACT

Ensuring responsible mine closure and rehabilitation, including compensation for environmental impacts, has been a key focus of industrialized countries in the past years. In Germany, mining operators are required to compensate for environmental impacts caused by during operations, so that after the mine closure no negative impacts remain in sum overall. While compensation can happen outside the concession area, continuous rehabilitation during and after operations is the most common way to compensate for environmental impacts. During this rehabilitation, either used land is transferred back to its original state (at times with improved biodiversity) or the mining area is prepared for new economic uses such as agriculture, recreational, industrial or residential zones.

In addition, the planning of mine closure and environmental compensation and rehabilitation is a key element already at the licensing stage. With their application for a license, operators must conduct an assessment of environmental aspects which must be compensated for by the end of the mining operations, and provide plans for how they intend to

do this. These plans have to include financial planning for mine closure and rehabilitation. An operator is also required to obtain a bank guarantee, which can cover the costs for mine closure and rehabilitation should a company not do their duty or go bankrupt. In such a case, the bank guarantee would be accessible to the authorities to cover for mine closure and rehabilitation.

While required legally, operators in Germany now also regard responsible mine closure and rehabilitation as a way of supporting the social license to operate. Negative environmental impacts in the past hampered the acceptance of mining in the society in general. Therefore, the industry now considers its potential for rehabilitation and renaturation one of the best arguments to convince civil society and other stakeholders of their value and responsibility, including already during the land use planning processes. This shows that pressure and monitoring from civil society and affected stakeholders and their formal inclusion and influence in planning/zoning processes encourages good practice by operators.



Sources and further reading:

- Anonymous, German quarry operating company
- [Bezirksregierung Arnsberg](#). (no date). Stilllegung und Wiedernutzbarmachung von Bergwerksbetrieben.

CASE STUDY: NETHERLANDS

 **NETHERLANDS: FLOODING ZONES, RESTORATION OF WETLANDS, AND RESPONSIBLE EXTRACTION OF CLAY AND SAND**


Near Nijmegen, in the Netherlands, clay mining and sand mining supports the restoration of an entire riverscape. Well-planned extraction of fluvial sand and alluvial clay deposits was combined with contemporary rewilding. This “Gelderse Poort” project saved jobs in the local mining industry while having positive environmental and social impacts such as creation of more space for the river which led to its ecological recovery, reduced the damage caused by flooding, and enhanced the quality of living, working and recreational space. As such, the project is now a role model for the restoration of other rivers in Europe, with both people and nature benefitting from smart design and management.

Along many rivers, problems exist regarding changing land-use and river management – problems similar to those found in the Gelderse Poort area. A lesson learned in the Gelderse Poort is that one economic driver or one pilot resulted in a chain reaction that saw more economic partners joining in. An important take away for policy makers and organizations is to consider environmental conservation alongside economic opportunities at a level playing field and to identify where the interests of these two spheres overlap. Strict environmental conservation on one hand, and subsidies for inefficient economic sectors on the other, may seem attractive from a political point of view, but might hamper progression in both fields.

Clay mining

The clay mining industry depends heavily on river forelands, as this is where the clay is deposited by rivers. The future

of the industry in the Netherlands came under threat when around 1980 conservationists opposed new mining activities in the Gelderse Poort area to protect nature. Soon after that, due to the regular flooding of river forelands as part of wider river management, the area became inappropriate for industrial farming. Aiming at the creation of extra water flood capacity, the WWF One Europe, More Nature project advocated in the early 1990s for a water retention strategy for the area that included clay mining as an economic driver. This instrument was successfully implemented and helped restoring historical river courses, improved biodiversity and water retention.

Sand mining

While rivers are a geologically a suitable area for extraction of sands for construction, the Dutch authorities have placed heavy restrictions for sand extraction in rivers in recent decades, due to its environmental impacts. This also created a threat on the sand mining industry based in the Gelderse Poort area and meant that a growing volume of sand had to be imported from abroad to supply the demand in the construction sector in the Netherlands. In 2003, the Dutch sand and gravel industry introduced a new vision for mining, which was supported by environmental organizations. Like the clay mining example, this vision saw mining as a way to create new landscapes in which ecological processes are restored and social needs met (for example water retention, recreation areas). Pilot projects in the Gelderse Poort area have been implemented to that effect and show great success in the recent years.



Sources and further reading:

- [Van Poppel, J. \(2020\)](#). Zand is het fundament van onze steden, maar de winning ervan verwoest de natuur. Dit project laat zien hoe het anders kan. De Correspondent. Amsterdam, 23 September 2020.
- [Bekhuis J. et al. \(2005\)](#). A policy field guide to the Gelderse Poort. A new, sustainable economy under construction. Stichting Ark and Stroming commissioned by WWF.

3. Annexes

3.1 Annex I: Resources and further reading

ACP-EU Development Minerals Programme. Implemented in partnership with UNDP. (2018). Baseline assessment of development minerals in Fiji. <http://developmentminerals.org/index.php/en/resource/studies-handbooks?view=download&id=41> [accessed 15 March 2022].

ACP-EU Development Minerals Programme. Implemented in partnership with UNDP. (2017). Baseline assessment of development minerals in Jamaica. <http://www.developmentminerals.org/index.php/en/resource/studies-handbooks?view=download&id=21> [accessed 15 March 2022].

ACP-EU Development Minerals Programme. Implemented in partnership with UNDP. (2018). Baseline assessment of development minerals in Uganda – Vol 1. <http://developmentminerals.org/index.php/en/resource/studies-handbooks?view=download&id=30> [accessed 15 March 2022].

ACP-EU Development Minerals Programme. Implemented in partnership with UNDP. (2018). Baseline assessment of development minerals in Uganda – Vol 2. <http://developmentminerals.org/index.php/en/resource/studies-handbooks?view=download&id=31> [accessed 15 March 2022].

ACP-EU Development Minerals Programme. Implemented in partnership with UNDP. (2018). Baseline assessment of development minerals in Uganda – Summary report. <http://developmentminerals.org/index.php/en/resource/studies-handbooks?view=download&id=29> [accessed 15 March 2022].

ACP-EU Development Minerals Programme. Implemented in partnership with UNDP. (2016). Development minerals in Africa, the Caribbean and the Pacific. <http://developmentminerals.org/index.php/en/resource/studies-handbooks?view=download&id=16> [accessed 15 March 2022].

ACP-EU Development Minerals Programme. Implemented in partnership with UNDP. (2016). From limestone into toothpaste: the legacy of capacity building with Jamaica's Mining and Geology Division. Blog. At: <http://developmentminerals.org/index.php/en/resource/blog/96-from-limestone-into-toothpaste-the-legacy-of-capacity-building-with-jamaica-mining-and-geology-division> [accessed 15 March 2022].

Banerjee, S. (2016). Regulating small-scale mining of minor minerals - A comprehensive framework beyond environmental clearances. Centre for Science and Environment. <https://www.cseindia.org/regulating-small-scale-mining-of-minor-minerals-8531> [accessed 15 March 2022].

Bekhuis J. et al. (2005). A policy field guide to the Gelderse Poort. A new, sustainable economy under construction. Stichting Ark and Strooming commissioned by WWF. <https://www.ark.eu/sites/default/files/media/Gelderse%20Poort/Policy%20Guide%20Gelderse%20Poort.pdf> [accessed 15 March 2022].

Bennett, N.J. and Satterfield, T. (2018). Environmental governance: A practical framework to guide design, evaluation and analysis. Conservation Letters. <https://doi.org/10.1111/conl.12600>

Best, J. et al. (2019). Understanding sediment flux in the Mekong river: geomorphology, tropical cyclones, sediment mining and implications for delta stability. Presentation at the 22nd International River Symposium. <https://riversymposium.com/wp-content/uploads/2019/11/144.pdf> [accessed 15 March 2022].

Bezirksregierung Arnsberg. (no date). Stilllegung und Wiedernutzbarmachung von Bergwerksbetrieben. <https://www.bra.nrw.de/energie-bergbau/bergbaufolgen/stilllegung-und-wiedernutzbarmachung-von-bergwerksbetrieben> [accessed 15 March 2022].

Bezirksregierung Arnsberg. (no date). Arbeits- und Gesundheitsschutz im Bergbau. <https://www.bra.nrw.de/umwelt-gesundheit-arbeitsschutz/arbeitsschutz/arbeitschutz-und-betriebssicherheit/arbeits-und-gesundheitsschutz-im-bergbau> [accessed 15 March 2022].

BGR. (2021). Construction Raw Materials in India and Indonesia - Market Study and Potential Analysis. Final Report. <https://rue.bmz.de/resource/blob/93010/9e87b9cef9b7489d2fae3358b97081db/construction-raw-materials-in-india-and-indonesia-market-study-and-potential-analysis-final-report-data.pdf> [accessed 15 March 2022].

Building Materials & Technology Promotion Council (BMTPC). (2018). Utilisation of recycled produce of construction & demolition waste – a ready reckoner. Ministry of Housing & Urban Affairs, Government of India. [https://www.bmtpc.org/DataFiles/CMS/file/PDF Files/C&D Ready Reckoner BMTPC web.pdf](https://www.bmtpc.org/DataFiles/CMS/file/PDF%20Files/C&D%20Ready%20Reckoner%20BMTPC%20web.pdf) [accessed 15 March 2022].

Byiers, B. et al. (2017). Regional markets, politics and value chains. The case of West African cement. ECDPM, Discussion paper no. 216. <https://ecdpm.org/publications/regional-markets-politics-value-chains-case-west-african-cement/> [accessed 15 March 2022].

Cities Alliance News. (2014). Cobblestones are creating jobs and empowering Ethiopia's urban poor. 26 March 2014. <https://www.citiesalliance.org/newsroom/news/cities-alliance-news/cobblestones-are-creating-jobs-and-empowering-ethiopia%E2%80%99s-urban> [accessed 15 March 2022].

CORNARE. (2020). Plan de manejo Distrito Regional de Manejo Integrado Bosques, Mármoles y Pantágoras: Convenio de Colaboración Fundación Natura. <https://www.cornare.gov.co/SIAR/Plan-de-manejo/DRMI-Bosques-Marmoles-y-Pantagoras/Plan-de-Manejo-Ambiental-DRMI-Bosques Marmoles Pantagoras Vigencia 2021-2026.pdf> [accessed 15 March 2022].

Franks, D. (2016). Fiji, built on sand. Blog, ACP-EU Development Minerals Programme. <http://developmentminerals.org/index.php/en/resource/blog/97-fiji-built-on-sand> [accessed 15 March 2022].

Franks, D. (2019). Sand governance: include artisanal miners' voices. *Nature*. Volume 573, issue 34. <https://doi.org/10.1038/d41586-019-02625-1>

Franks, D. (2020). Reclaiming the neglected minerals of development. *The Extractive Industries and Society*. Volume 7, issue 2. P453-460. <https://doi.org/10.1016/j.exis.2020.02.002>

Global Cement and Concrete Association. (2018). GCCA sustainability framework guidelines. https://gccassociation.org/wp-content/uploads/2019/03/GCCA_Guidelines_SustainabilityFramework-v0.pdf#:~:text=This%20%E2%80%98GCCA%20Sustainability%20Framework%20Guidelines%E2%80%99%20is%20the%20overarching,requirements%20for%20full%20members%20against%20each%20of%20these [accessed 15 March 2022].

Global Cement and Concrete Association. (2020). GCCA sustainability guidelines for quarry rehabilitation and biodiversity management. https://gccassociation.org/wp-content/uploads/2020/05/GCCA_Guidelines_Sustainability_Biodiversity_Quarry_Rehabilitation_May_2020-1.pdf [accessed 15 March 2022].

Hofmann, K. et al. (2012). Making good governance tangible. The cobblestone sector of Ethiopia. GIZ. <https://www.giz.de/de/downloads/giz2012-making-good-governance-tangible-en.pdf> [accessed 15 March 2022].

ILO. (1995). C176 – Safety and Health in Mines Convention. 1995, (No. 176). https://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12100:0::NO::P12100_INSTRUMENT_ID:312321 [accessed 15 March 2022].

Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development (IGF). (2017). IGF guidance for governments: Managing artisanal and small-scale mining. Winnipeg: IISD. https://www.iisd.org/system/files/publications/igf-guidance-for-governments-asm_0.pdf [accessed 15 March 2022].

Life in quarries programme. (no date). Actions. <http://www.lifeinquarries.eu/en/actions/> [accessed 15 March 2022].

Mekong Legal Network and Baird M. (2016). Manual of Environmental Impact Assessment in the Mekong region: Commentary & materials (first edition). Earth-Rights International. https://earthrights.org/wp-content/uploads/eia_manual_final_0.pdf [accessed 15 March 2022].

- Mekong River Commission for Sustainable Development. (2018). Guidelines for transboundary Environmental Impact Assessment in the lower Mekong basin. Working document. <https://www.mrcmekong.org/assets/Publications/TbEIA-Guidelines-Final-version-25-9-2018.pdf> [accessed 15 March 2022].
- Mekong River Commission. (no date). Modelling toolbox. <https://portal.mrcmekong.org/toolbox/mrctoolbox> [accessed 15 March 2022].
- Mosi-oa-Tunya Declaration. (2018). International Conference on Artisanal and Small-scale Mining & Quarrying. ASM18. Annex I, September 2018. <https://www.greengrowthknowledge.org/research/mosi-oa-tunya-declaration-artisanal-and-small-scale-mining-quarrying-and-development> [accessed 15 March 2022].
- Oirere, S. (2013). Cobblestones offer alternative road construction in Ethiopia. *Aggregates Business*. 1 October 2013. <https://www.aggbusiness.com/feature/cobblestones-offer-alternative-road-construction-ethiopia> [accessed 15 March 2022].
- Rahmansyah, D. and Widuro, B. (2020). Construction and projects in Indonesia: Overview. [https://uk.practicallaw.thomsonreuters.com/w-015-4459?transition-Type=Default&contextData=\(sc.Default\)](https://uk.practicallaw.thomsonreuters.com/w-015-4459?transition-Type=Default&contextData=(sc.Default)) [accessed 15 March 2022].
- Somvanshi, A. and Verma, A. (2020). Another brick off the wall: Improving construction and demolition waste management in Indian cities. Centre for Science and Environment, New Delhi. <https://www.cseindia.org/another-brick-off-the-wall-10325> [accessed 15 March 2022].
- The Natural Stone Council. (2009). Best practices of the natural stone industry quarry site maintenance and closure. <https://naturalstonecouncil.org/wp-content/uploads/2018/10/Quarry-Site-Best-Practices-NSC.pdf> [accessed 15 March 2022].
- Ugandan Government. (2021). The mining and minerals bill. Bill no. 30, 2021. The Uganda Gazette no. 72. Volume CXIV. 1 October 2021. Bills supplement no. 12.
- Union Européenne des Producteurs de Granulats UEPG. (no date). Quarries, pits and biodiversity. <https://www.cemex-policy.eu/wp-content/uploads/2020/12/uepg-biodiversity-brochure.pdf> [accessed 15 March 2022].
- UNEP. (2019). Sand and sustainability: Finding new solutions for environmental governance of global sand resources. https://unepgrid.ch/storage/app/media/documents/Sand_and_sustainability_UNEP_2019.pdf [accessed 15 March 2022].
- UNITAR and UN Environment. (2018). Handbook for developing national ASGM formalization strategies within National Action Plans. <https://mercury.unitar.org/site/document/1438> [accessed 15 March 2022].
- UNSDG. (2003). The human rights based approach to development cooperation: Towards a common understanding among UN agencies. <https://unsdg.un.org/resources/human-rights-based-approach-development-cooperation-towards-common-understanding-among-un> [accessed 15 March 2022].
- Van Poppel, J. (2020). Zand is het fundament van onze steden, maar de winning ervan verwoest de natuur. Dit project laat zien hoe het anders kan. *De Correspondent*. Amsterdam, 23 September 2020. <https://decorrespondent.nl/11586/zand-is-het-fundament-van-onze-steden-maar-de-winning-ervan-verwoest-de-natuur-dit-project-laat-zien-hoe-het-anders-kan/5852096269932-024b4119> [accessed 15 March 2022].
- World Business Council for Sustainable Development. (2011). Guidelines on quarry rehabilitation. <http://docs.wbcsd.org/2011/12/GuidelinesOnQuarryRehabilitation.pdf> [accessed 15 March 2022].
- WWF. (2018). The sands are running out. How WWF sought to better understand the impact of dam construction and sand mining on sediment flows in the Mekong river basin. Fresh water case study. https://www.wwf.org.uk/sites/default/files/2018-04/180419_Mekong_sediment_CS-external.pdf [accessed 15 March 2022].

3.2 Annex II: List of interviews

- ▶ **Dr Louise Gallagher**, Honorary Fellow. Development Minerals, Sustainable Minerals Institute.
- ▶ **Anonymous**, German quarry operating company
- ▶ **David Echeverri**, Project Director at CORNARE (Colombia)
- ▶ **Jorge Cortissoz**, Representative of the tourism sector in the consultative group (Colombia)
- ▶ Group interview (Vietnam and Mekong region):
 - **Marc Goichot**, WWF Lead on Freshwater Asia Pacific,
 - **Anh Ha Huy**, National Project manager, Mitigating the impacts of climate change in the Mekong Delta through public and private sector engagement in the sand industry (IKI SMP), WWF-Viet Nam,
 - **Hang Doan**, Technical officer, IKI SMP, WWF-Viet Nam,
 - **Recharad Lee**, Freshwater Communications Manager, WWF

