

Paulina Schiappacasse 1,*, Bernhard Müller 1,2,* and Le Thuy Linh 3,4
Faculty of Environmental Sciences, Technische Universität Dresden, 01069 Dresden, Germany
2 Leibniz Institute of Ecological Urban and Regional Development, 01217 Dresden, Germany
3 Faculty of Environmental Sciences, Vietnam National University, Hanoi 10000, Vietnam
4 Dresden Leibniz Graduate School, Technische Universität Dresden, 01069 Dresden, Germany

Abstract

Responsible mining is a new catchword of our times. However, in practice, there seem to be many barriers that hinder the successful implementation of the concept. This is especially true for countries with high urbanization speed, and it is even true for one-party states where its implementation could, in general, be taken for granted as soon as the central government has taken respective decisions and put appropriate stipulations and mechanisms formally in place. On this background, the article deals with barriers and possible solutions regarding responsible mining taking the case of Vietnam, and more especially the Province of Hoa Binh, neighboring Hanoi. Based on a literature review on responsible mining, a set of principles promoting this approach is developed. This is taken as a criteria set for the assessment of respective policies and their implementation on the different levels of authority in Vietnam. Finally, proposals are developed how to advance responsible mining in this case and in other comparable countries.

Introduction

It is recognized in literature that during the economic transition from a resource-based to an industry- and services-oriented society, the consumption of aggregates, i.e., stone, sand, and gravel, in the building sector “increases in the same or even a higher degree than the economic performance” [1]. This is the case of Vietnam where an increased urbanization and industrialization process is rapidly creating expanding markets for the use of aggregates, particularly in megacities, such as Ho-Chi-Minh City and the Hanoi Metropolitan Region (HMR). Internationally, two main concerns have been raised regarding the extraction of aggregates. On the one hand, we have to be aware that aggregates are non-renewable resources. This implies that someday they may not be available for future generations anymore. For example, there is already an international debate about the aggravating shortage of certain types of sand [2,3]. On the other hand, it is obvious that the extraction of aggregates has negative environmental impacts, e.g., caused by inappropriate mining practices, inefficiencies in transportation, excessive energy usage, and extreme landscape alterations. In order to address these challenges it is important to acknowledge the economic and social relevance of aggregates. All countries in the world are highly dependent on them as they are the material used to construct and maintain buildings and infrastructure.

From Sustainable Development to Responsible Mining

The sustainable development goals (SDGs) of the United Nations (UN) do not make direct reference to mining or, even more specific, to the extraction and consumption of aggregates for construction. However, Goal No. 12 may be interpreted at least as an indirect reference to it by requesting “more sustainable patterns of consumption and production” [19]. The UN point out that achieving this goal requires strong national frameworks for sustainable consumption and production, supporting the decoupling of economic growth from natural resource use, especially in a situation in which global figures indicate the contrary, i.e., an increase of the material footprint. Therefore, the UN agreed to achieve the sustainable management and efficient use of natural resources by 2030, and to measure progress by two sets of indicators: (1) The material footprint per capita and per GDP, and (2) the domestic consumption, domestic material consumption per capita, and domestic material consumption per GDP. On this background, sustainability in mining cannot be understood in the same way like in the case of the extraction of other natural resources [20]. As minerals are not renewable, their extraction will lead to extinction, and cannot be sustainable from an environmental point of view. Therefore, there is a shift in the international discussion regarding mineral extraction from “sustainable mining” towards “responsible mining”.



Figure 1. Showing the study area

Framework for Addressing the Governance of Extraction of Aggregates

Evidently, governments follow different approaches to ensure a sustained supply of aggregates, influencing the way mining activities are conducted. They reach from a market-driven approach, where governments, mainly in less economically developed countries, only have a passive influence on the market, e.g., regarding access, to a strong government-driven approach where authorities pursue an active policy guiding the strategic development [1]. In economically less developed countries, companies can be granted mineral rights in different ways. On the one hand, countries with a well-developed legal system, such as Vietnam, Chile, and Zambia, grant mining licenses through frameworks that regulate the rights and obligations of the state and the respective companies. However, in Vietnam, despite this legal backup, progress in achieving good mining practices has been slow due to insufficient and inconsistent local implementation of the legal framework. On the other hand, in countries with weak legal frameworks, such as The Philippines, Burkina Faso, and Mongolia among others, governments usually grant mineral rights to private companies through individual negotiations. Although there are wide variations regarding types of contracts, governments usually end up with poorly negotiated deals containing limited benefits to local communities. Based on the literature review presented in Section 2 of this article, the roles and tasks of governments to safeguard a responsible management of aggregates can be summarized in eight principles. In short, they are: (1) Define policy statements (objectives and standards) that act as guidance for industry development; (2) promote land use planning to identify and establish deposits, reserve areas, and buffer zones to prevent land use conflicts with other sectors; (3) establish a regulatory process for granting licenses, controlling, and monitoring environmental impacts; (4) promote transparency in taxation, fee calculation, and revenue allocation; (5) acknowledge, regulate, and assess environmental and socio-economic impacts, defining clear compensation methods; (6) establish the obligation to present, finance, and implement a post-mining activity plan; (7) promote the use of clean technologies and recycled aggregates; and (8) stakeholder involvement (as a transversal principle).

Extraction of Aggregates in Vietnam—Steps Towards Responsible Mining

Promoting industrialization and modernization are among the major goals of the Vietnamese Central Government. This is accompanied by fast urban growth. According to the Vietnam Urban Development Vision 2025–2050, the proportion of urban population is expected to grow from 38% in 2015 to 45% by 2020 and 50% by 2025. The main driving forces behind fast urbanization are public investment in infrastructure and the opening up of land to leaseholds entitlement. These driving forces put housing and infrastructure development in all urban areas under enormous pressure, causing an unprecedented demand for aggregates in the construction sector. On this background, it becomes vital for the urban sustainability discussion and the issue of responsible mining in Vietnam to have a closer look at how aggregates are managed in the country, and what barriers for achieving responsible mining exist. The eight principles described in this poster provide the main framework for the analysis. The efforts of the Vietnamese government for institutionalizing responsible mining during the last decade are evident. However, important gaps still remain between the national expectations, which are, for example, materialized in concrete laws, regulations, and guidelines, and the real implementation at the district and communal level.

Conclusions

Although mining, and especially mining of aggregates for construction, is not explicitly mentioned in the SDGs of the United Nations, reference can be made to Goal 12. Nevertheless, and in order to avoid misunderstanding, the discussion about sustainable development has shifted in the case of mining towards responsible mining. We have defined eight features to characterize what responsible mining means in the concrete context of construction aggregates. They are related to policy guidance, land use and construction planning, the process of granting licenses, taxation and revenue collection, environmental and socio-economic impacts, the facilitation of post-mining activities, clean technologies and recycling, and stakeholder involvement.

Contact

Agbaje Adeyeye
Ocean College of Zhejiang University
Email: oladipoadeyeye@yahoo.com
Phone: 13093736173

References

1. Tiess, G.; Kriz, A. Aggregate Resources Policies in Europe. *Int. J. Environ. Prot.* **2011**, *1*, 54–61. [CrossRef]
2. Torres, A.; Brandt, J.; Lear, K.; Liu, J. A looming tragedy of the sand commons. *Science* **2017**, *357*, 970–971. [CrossRef] [PubMed]
3. Brown, G. A Global Sand Shortage could Cause Damaging Effects to our Rapidly Urbanizing World; Business Insider: Berlin, Germany, 2019.
4. European Commission. Promoting Sustainable Development in the EU non Energy Extractive Industry; Commission of the European Communities: Brussels, Belgium, 2000; p. 20.
5. Drew, L.; Langer, W.; Sachs, J. Environmentalism and Natural Aggregate Mining. *Nat. Resour. Res.* **2002**, *11*, 19–28. [CrossRef]
6. Blodgett, S. *Environmental Impacts of Aggregate and Stone Mining*; Chambers, D., Ed.; Center for Science in Public Participation: Cerrillos, NM, USA, 2004; p. 7.
7. Langer, W.; Drew, L.; Sachs, J. Aggregate and the Environment. In *Environmental Awareness*; American Geological Institute: Alexandria, VA, USA, 2004; p. 68.
8. Poulin, R.; Pakalnis, R.; Sinding, K. Aggregate Resources: Production and Environmental Constraints. *Environ. Geol.* **1994**, *23*, 221–227. [CrossRef]
9. World Commission on Environment and Development. *Our Common Future*; United Nations: New York, NY, USA, 1987; p. 247.
10. Goodland, R. Responsible Mining: The Key to Profitable Resource Development. *Sustainability* **2012**, *4*, 2099–2126. [CrossRef]