



Short Commentary

Pivotal yet Hidden Role of Environmental Justice and Lead Pollution at Myanmar's Mining Sites

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Abstract

Although lead pollution in mining areas has increasingly concerned, the environmental injustice accompanied is still under negligence. This topic is directly concerned with the roles of the government and mining corporations responsible for taking accountability for the employees and indigenous people in the area affected by lead pollution as a consequence of mining. The aim of the present paper is to demonstrate the main points of the consequences of environmental lead pollution in the context of environmental justice. As mining scales become

enlarged, there needs to have more support for the disproportionate people and low-economic citizens suffering from potential lead pollution, and it is essential to give awareness to those people. This study also highlights environmental health injustice situations in Myanmar and the feasible solutions regarding mining and lead pollution.

Keywords: Environmental justice; Mining; Lead; Myanmar

1. Introduction

Environmental Injustice has been the cause of environmental pollution in previous years, and it poses a significant health threat to minority people. The concept of environmental justice is intended to be a fundamental human right, implying that everyone has the right to be protected from environmental hazards/pollution and to live in a clean and healthy environment [1]. A disproportionate impact of environmental pollution could be considerably observed in low-income and minority communities [2]. Some solid cases, such as lead poisoning at mining sites, demonstrate the evidence of environmental inequities [3, 4]. Although lead exposure has decreased in developed countries, it still remains as a significant environmental health problem in developing countries [5]. Lead pollution in mining areas has increasingly concerned, the environmental injustice accompanied is yet still under negligence. Therefore, it is essential for the governments and mining corporations to take accountability for the employees and indigenous people in mining-affected areas. The present paper will discuss the main issues involved in environmental lead pollution in the context of environmental justice. This paper will also argue the environmental health injustice situations in the mining areas of Myanmar and will propose the possible feasible solutions for lessening the exposure.

2. Environmental Injustice as a Cause of Lead Pollution in Mining Sites

Mining is the process of extraction of minerals and other geological materials of economic value from the earth's surface deposits. All the mining projects have environmental impacts depending on the mining

methods. Moreover, the mining process can destroy thousands of landscape acres through the activities of waste management or use of heavy machinery such as excavators and drills [6]. These impacts are disproportionately suffered by indigenous and local people [7]. In the context of the environmental injustice, the several issues are involved, such as (i) the corporations trying to deal with the authority without having the consent of the indigenous people in accordance with reaping the economic benefits; (ii) lack of political will and procedural injustice, i.e., illegally demanding the area with extracting the other materials than specified on contract in study design. Similar cases can also be found in Myanmar, where non-renewable resource-rich areas exist, including ethnic minorities' regions. As mining scales become enlarged, more support is needed for the disproportionate people and low-economic citizens suffering from potential lead pollution, and it is essential to give awareness to those people.

Mining sites are the obvious point sources of lead contamination with the various exposure pathways. Mining produces significant volumes of mineral waste in the form of waste rock and tailings, regardless of the minerals and elements mined for. When those mineral wastes are not stored or appropriately disposed of, leaching lead toxins into the soils or nearby water systems could happen. Lead is recognized as one of the most perilous heavy metals to humans and animals due to their elemental impurities, carcinogenicity, and likelihood of occurrence [8, 9]. Moreover, lead toxicity occurs with repeated exposure that builds up in the body for a certain period, and it is said there is no safe level of lead exposure [9].

In Myanmar, mining industries are blooming with the increasing trends of urbanization and industrialization. According to the high-resolution digitalized data of the Myanmar Information Management Unit, there were approximately 2,900 mining sites in Myanmar as of 2016 (Figure 1). Disproportionate mining sites can worsen lead exposure, whether they have existed historically or pollution-caused activities accumulate in poor neighborhoods or minor communities. In a previous study conducted in the gold mining areas in Myanmar, it was reported that lead concentration was higher than any other heavy metal concentrations [10]. Myanmar people settled in proximity to the lead mining sites could be exposed to lead from contaminated soil, lead dust, or ingesting contaminated drinking water or food items [10, 11]. Lack of adequate access to safe drinking water in those areas tends to increase lead consumption because of insecure water sources [10, 11]. However, there is a dearth of information on health risk assessments for specific exposure routes and environmental exposures in terms of occupational health risks for miners in Myanmar.

3. Neglected Environmental Justice Issues in Myanmar Mining Industry

In Myanmar, the mining areas lack transparency and are limited for accessibility of quantitative and/or

qualitative data, reflecting the country's status of environmental injustice [12]. The currently practicing procedures of open-pit mining, underground mining, strip mining, and drilling could lead to the loss of biodiversity especially habitat area, deforestation, floods, high water consumption, soil erosion, and contamination of surface water & groundwater, and population migration, with the formation of sinkholes [11]. Moreover, several issues have arisen as a result of human rights violations and environmental injustice, including land displacement, land compensation, safety issues for mineworkers, the resultant damage to health and remedial health care cost, unfair-paid, operating unqualified equipment, inadequate proper personal protective equipment (PPE), poor awareness of lead exposure knowledge, obstacles for public-requested health study along with lack of proper healthcare [11, 13]. Diverse rural, ethnic, and indigenous custodianship of nature, involvement in political processes, and distributive equity of environmental risk are all but ignored in Myanmar's mainstream climate and environmental politics [15]. Therefore, not only weakness and problems in environmental governance but also human rights violations are the underlying roots of environmental injustice in the Myanmar mining industry [12].

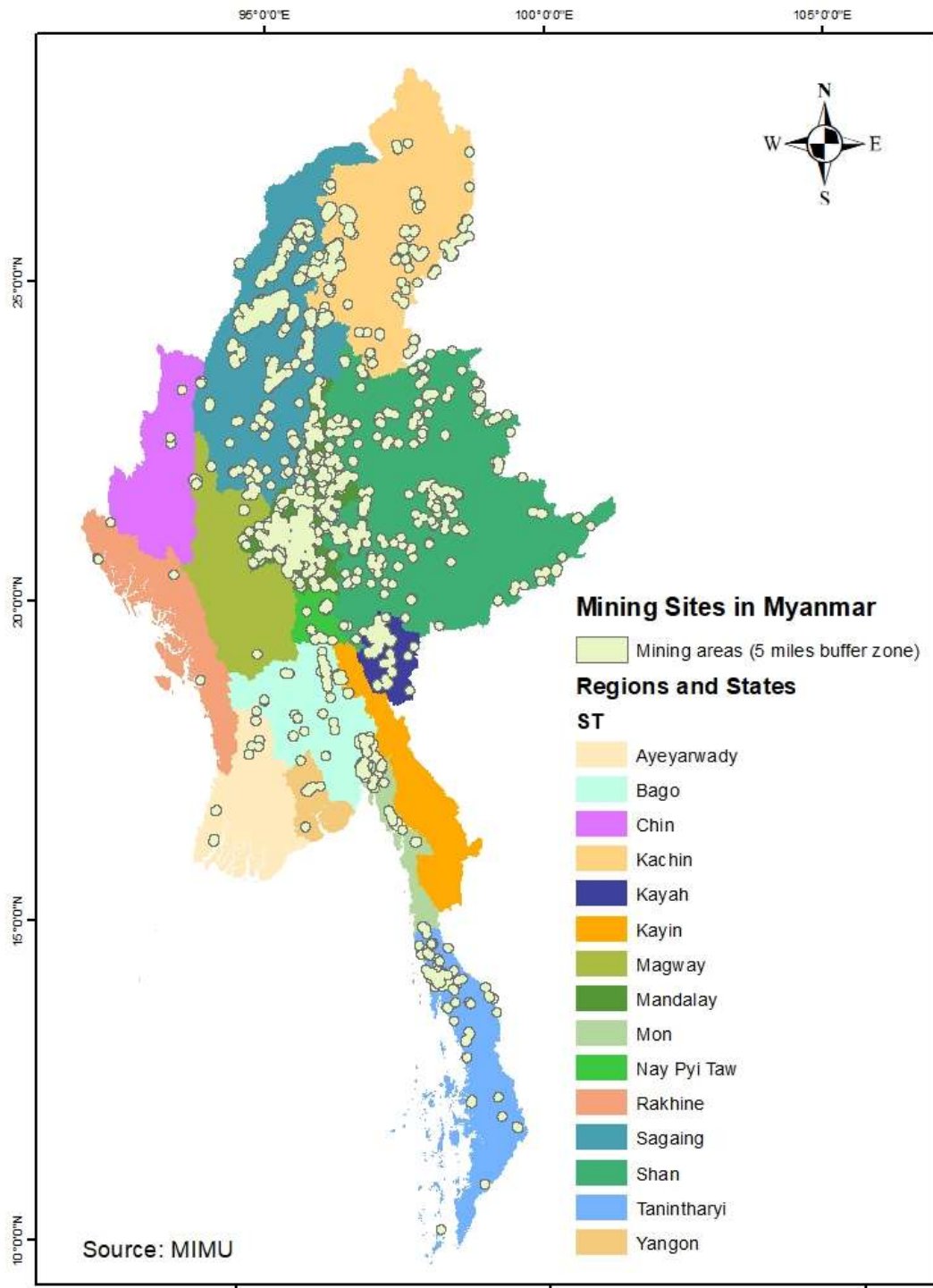


Figure 1: Possible Mining Areas in Myanmar (n=2947 sites) created by the first author using ArcGIS Pro (Version 10.8), 5-mile buffer zones using open accessed data from Myanmar Information Management Unit (MIMU).

4. Mitigated Ways for Lead Pollution and Environmental Injustice in Public Health Perspective

It is undeniable that the environmental benefits and harms are not distributed equally across society. In terms of legal perspective, negotiation and decolonization should have between the environmental governance system of local indigenous people in the mining operating regions and the government policies, considering the affected society as a priority in decision-making [12]. Environmental justice-driven communities should be encouraged by establishing Tax Increment Funds (TIF) [9]. That could lead the communities and stakeholders to observe and realize the unfavorable effects of mining on health, quality of life, ecology, agriculture, and more. From an operation perspective, mining workers and residents near those operation regions should be aware of the health impact of lead exposure and proper handling of PPE and operating steps in order to reduce occupational lead exposure. Some general factors need to be considered in policy making and decision-making processes to abate environmental inequalities. Local mining regions should introduce public policy in balance with nature, including urban and rural ecological policies based on mutual respect, justice, and environmental health impact conditions for the residents. The responsible business persons and stakeholders should consider utilizing the geosphere-extracted commodities to apply for fair and ethical purposes with sustainable use of land and other natural resources. Quality health care, full compensation, worth payment, and repairing of damages are of equal importance in creating a safe and healthy environment for all employees at mining

sites. In particular, the corresponding minorities, ethnic people, should have the right to participate in decision-making processes such as needs assessment, planning, implementation, and evaluation.

In Myanmar, there are no mining-specific criteria, although justice and equity have manifested as remarkable disputes in environmental health policy in the mining industry. From the standpoint of public health, there should be an implementation of advocacy for human rights and the awareness of lead poisoning impacts on the environment and public health. In addition, the government's health and safety standards monitoring policy and training in the mining industry, should also be improved. Moreover, the weak legal framework of occupational safety and health and the government capacity to analyze the various impacts of lead pollution in the mining industry should be strengthened [14]. In order to empower and redress the local actors, culturally relevant strategies for environmental disputes and community-based environmental education initiatives, should be introduced with corporate accountability [12]. The foregoing implications should aim not only at mining areas but also at natural resources exploitation areas. Furthermore, there should be a priority on the implementation regarding environmental and public health conditions of residents living around mining areas.

Authors Contribution

T.S.S.H., Y.W., and K.M.W. conceived the idea. T.S.S.H., Y.W., O.S extracted data and drafted the manuscript. All authors contributed to editing, and approved the final version.

Disclosure Statement

The authors declare there is no conflicts of interest.

Data Availability Statement

Not applicable.

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