# Environmental Management of Ex-Tin Mining in Bangka Island

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## 1. Introduction

The surface of Bangka Island is fulfilled by holes and ruined lands, so the view is very uncomfortable from remote upside. The lands are spread on almost whole of Bangka Island area. The illegal mining is the main cause of destroying the land. Nevertheless, there is another cause of the incorrectly arranged environment of ex tin mining lands. It is the ineffective managements of handling the area which is still a responsibility of respective mining company. To solve such the problem, the environment of lands must be managed and planned for sustainment. Effective reclamations should be chosen as methods to recover and develop the ruined lands changing to useful lands. Reclamation activities may change the destructive lands to areas of plantations/cultivations, fisheries, settlements, or tourism/resorts. The purpose of this study is to evaluate the environmental management of tin mining companies, especially



Figure 1. Location of the study

their reclamation activities, and to find what factors affect the effectiveness of the activities.

## 2. The Preview of Bangka Island Condition

Bangka Island is located in the area of Province of Bangka Belitung Islands, eastern of South Sumatra Province, Indonesia (figure 1). The island has 1,169,354 ha of total land area. There are two main companies which have mined and produced tin in Bangka-Belitung Islands since years ago, PT. TIMAH, Tbk. and PT. KOBA TIN. In 2009, most of areas were allowed as a concession of PT. TIMAH, Tbk. to mine, as 273,124 Ha wide (23.36% of total area of the island)<sup>[1]</sup>. Meanwhile, PT. KOBA TIN had 41,680.30 Ha of the land area of mining (3.56% of total land area of the island)<sup>[2]</sup>.

Companies which involve in mining businesses have some responsibilities to their mining environment, and one of them is to provide reclamation programs of lands. It mentioned in the Laws and several government regulations, such as Laws/UU No. 11/1967, Government Regulation/PP No. 32/1969, PP No. 75/2001, Minister Decision of Mining and Energy/Kepmen PE No. 1211.K/1995 and Minister Regulation of Energy and Mineral Resources/Permen ESDM No. 18/2008 (Reclamation and Mine Closure). The government (center and local) acted as board of supervising to make sure reclamation programs done by companies. Otherwise, in practice, there were always factors causing disruptions of the programs.

# 3. Environmental Management System (EMS)

There are many approaches that have been formulated for managing the environment both in the company level and government level; one of them is Environmental Management System (EMS). An EMS is a formal set of procedures and policies that defines how an organization will manage its potential impact on the natural environment and on the health and welfare of the people who depend on it. It creates a system to assess, catalogue, and quantify facility environmental impacts - not simply activity by activity, but throughout the entire company <sup>[3]</sup>. The international standard for EMSs was first published by the International Organization for Standardization (ISO) in 1996 and was last revised in 2004. Its official catalogue title was *ISO 14001: 2004, Environmental Management Systems – Requirements with guidance for use* <sup>[4]</sup>.

The impact of environmental activities on corporate performance is strongly affected by the presence of a formal EMS, based on Deming's Plan-Do-Check-Act (PDCA) management cycle <sup>[5]</sup>. The ultimate aim of an EMS is to produce a corporate environmental plan, which will lead the company to improved environmental performance. However, monitoring and measuring the effectiveness of the EMS and therefore updating the corporate environmental plan regularly are keys to a successful environmental improvement. Continual improvement is required because continual improvement is a process of enhancing the environmental to achieve improvements in overall environmental performance in line with the organization's environmental policy.

This figure 2 represents the basic steps of EMS<sup>[6]</sup>:



Figure 2. Basic steps of EMS

## 4. Discussion

In this research, focused steps are Aspects and Impacts, EMP (Environmental Management Programs), Communication, and Operational Control.

#### 4.1. Aspects and Impacts

Aspects mean the causes, elements of an organization's activities that can interact with the environment. Meanwhile impacts mean the effects, any changes to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's activities. 'Cause and Effect' provides a useful overview of issues which embraces environmental management standards.

From data of surveys, interviews and reports <sup>[7][8]</sup>, there were some physical aspects which had to be concerned by companies, such as the major plant selection, the quite high mortality rate of some plants, the disordered layout of lands, and the bad water drainage of lands. Those physical aspects affected to the life expectancy of vegetations, so that it decreased the quality and quantity of reclamation activities. From table 1, the success rate of reclamation program of the mining companies in 2009 was in range 45-70%.

	Estimated Aspects of	Mining Companies (%)	
No.	Reclamation	PT. Timah,	PT. Koba
	Activities	Tbk.	Tin
1	Land Arrangement	50	87.5
2	Erosion Control and	20	50
	Sedimentation Trap		
3	Cover Crops	50	50
4	Fast Growing Plants	67.5	53.3
5	Local Plants	10	60
6	Plant Sewing	10	50
7	Plant Treatments	10	40
	On Target Area	60-70	100
	Success Rate	45	70

### 4.2. EMP

It is the vital link between thought and action. It is the blueprint that brings to life what the plan to do as set out in the environmental policy statement and flows from detailed objectives and targets. It achieves this by establishing a systematic implementation program or series of interlinked programs and prioritizes roles, responsibilities, processes, resources, timetables and is designed to provide a dynamic plan of campaign. A well-designed program helps to foster commitment through the organization as it begins the implementation and ongoing management of an EMS in a logical and pragmatic way.

The reclamation programs which should be fixed in the future are land arrangement/leveling, integrated with water drainage and sedimentation, and correctly doing vegetation stages (include planting cover crops as a land stabilizer, restoring micro agro climate, and soil fertility).

#### 4.3. Communication

Communication is the glue that holds the EMS together and is the process the organization uses to provide and obtain information. A key role for the environmental manager is deciding who – both internally and externally – needs to know what and when they need to know it and what they need to do as a result of this new knowledge and understanding. As ever, a systematic approach will deliver the best results and help focus on maintaining environmental performance.

#### 4.4. Operational Control

The more detailed the analysis of the operations, the easier it is to make changes to achieve improvement not only in reclamation performance, but perhaps in other areas as well. The analysis should consider how controls affect the identified significant impacts, and how they are used during emergencies, unusual operating criteria, and especially when suppliers and contractors are involved.

The less monitoring and control of reclamation activities could be shown by lack of nutrients in plants especially nitrogen as a result of soil leaching by rain water (run off). Other indications were disease attacks, significant varieties of the plant height, lacked of sewing plants, the competition between the main crop with weeds, and many plants attacked by pest organisms.

#### 5. Conclusion

The ineffective management of reclamation activities is another factor of unarranged environment of ex-tin mining area in Bangka Island. To fix problems, in the future mining companies should concern about their environmental management systems (EMS), especially related with reclamation activities. They have to redesign and fix the planning and doing of EMS, including generating aspects/impacts, programs, communications and operational controls.

## Reference

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