Development Strategy of Post-Coal Mine Area in Kutai Kartanegara Regency, East Kalimantan Province, Indonesia

Nasruddin[1], Luthfi Muta'ali[2], Su Ritohardoyo[2] and Suharyadi[2]

1. Department of Geography Education, Lambung Mangkurat University, Banjarmasin 70123, Indonesia

2. Department of Geography Information Science and Regional Development, Geography Faculty, Gadjah Mada University, Yogyakarta 55281, Indonesia

Abstract: East Kalimantan province is one of the largest coal deposit reserve source, especially in the mining and quarrying sector. Mining sector is a strategic sector in East Kalimantan but post coal mining land has the problem for land using. The research method used survey method and laboratory test on 21 entities/companies with the status of cooperative and non-cooperative approach and land resource evaluation on 30 respondent keys (key informant). Analysis of data is using the evaluation of land potential: Analytical Hierarchy Process (AHP), IRR, NPV and BCR. The results showed that there are 2 scenarios decisions in the development of coal mining region that is the optimistic scenario on 2 aspects namely: (1) tourism (recreational parks and historical tours) and (2) aspects of the fishery (tilapia, goldfish, catfish). Then, in the moderate scenario, there are 3 aspects of development: (1) services (administration and housing); (2) fisheries (cork fish and damselfish) and (3) agriculture (guava, melinjo and dragon fruit). Optimizing the utilization of post-coal mining land in the regency of Kutai Kartanegara can be carried out with reference to these two types of scenarios as a manifestation of an engine of regional development.

Key words: Development strategy, post coal mine area, scenario decision.

1. Introduction

East Kalimantan province is one of the largest coal deposit reserve source of the 37.5 billion tons, or 35.7% of the total coal reserves in Indonesia [1]. Kutai Kartanegara is one of the districts with the largest number of mining and licensing in Indonesia, with economic growth areas of data measured GRDP. Mining and quarrying sector is a strategic sector or including the second contributor after the oil and gas sector, which in the period of 2000-2010 and 2010-2012, from the aspect of growth is steadily declining (Table 1).

Contribution of mining and quarrying sector from GRDP (Gross Regional Domestic Product) by industrial origin in years 2008-2012 showed average value of 65.54%, which suggests that this sector is the largest contributor to GRDP Kutai Kartanegara Regency, as presented in Table 2.

However, from the amount of points for results and acceptance of the budget contributed by the coal mining sector to local income was not directly proportional to the aspect of welfare. Kutai Kartanegara regency is a region with the number of poor people in east Kalimantan province of 112,560 in 2006 [2]. In addition to the year 2010, 40 villages in Kutai Kertanegara did not receive electricity. In year 2012, as a recipient of rice for the poor in the province of east Kalimantan which is about 2.200 tones for 30.095 household or 19% of the total 159,757 household [3], empirical issues above has been a gap in the aspect of economic growth at the macro level [4]. Strategy economic growth through industrialization is to create centers of economic growth in the region, but the micro aspects of

---

community level has not been reached [5]. Kutai Kartanegara regency is presented in Fig 1.

Until the year 2011, Kutai Kartanegara regency has been issued a mining production operations license (IUP), the highest in Indonesia is at 627 IUP or 61% of the 1.304 mining licenses in the east Kalimantan province [6, 7]. Coal mining data in Kutai Kartanegara regency has been collected from various sources. During the year 1996 and 2014, it has a trend of increasing activity of mining area (ha), especially on the type of exploitation. The exploitation area is reached about 642,068.05 ha or percentage ratio is about 23.55% of the total area regions of 2,726,310 million ha, as presented in Table 3 [6-10].

2. Methods

The research used survey method and laboratory test on 21 entities/companies with the status of cooperative and non-cooperative approach and land capability evaluation from FAO in 1976 [11] and 30 respondents key (key informant). Analysis of data using the evaluation of land capability, Analytical Hierarchy Process (AHP) and investment feasibility analysis (Internal rate of return, net present value and

benefit cost ratio). Scenario decision formation development post-coal mine area include optimistic, moderate and pessimist. This scenario uses scoring technique analysis.

3. Results and Discussion

Results of the research study showed that a class of land capability using software Land Cover and Land Use Planning (LCLP) is gained 2 classes of land capability—class V and VI. Classes V and class VI has the status of reclamation land and non-reclamation land. Generally, there are no class distinctions among them. The distribution that the acquisition is not reclaimed shows that land capability class V and VI is higher (Table 4).

Furthermore, according to age of the post-coal mine, it also describes that there is no significant differences in the acquisition value of the land capability class. In the age distribution, it shows that the lower ages have the higher capability (Table 5).

Land capability class directives and other land potential parameters obtained land suitable classes on aspects of the fishery (33%), housing (43%), tourism (33%) and agriculture (0%) (Table 6). The next class

Table 1   Valid GRDP atcurrent prices distribution and at constant prices years of 2000-2012 [5].

GRDP	At current prices (million rupiah)			At constant prices (million rupiah)		
	2000	2010	2012	2000	2010	2012
With oil	19,450,109	84,313,364	110,901,152	19,450,109	22,576,925	23,042,710
r (%)	-	333%	32%	-	16%	2%
Without oil	805,677	20,623,188	44,540,752	805,677	3,914,775	7,439,785
r (%)	-	2,460%	116%	-	386%	90%

Table 2   Distribution of GRDP by industry (%) years of 2008-2012 [5].

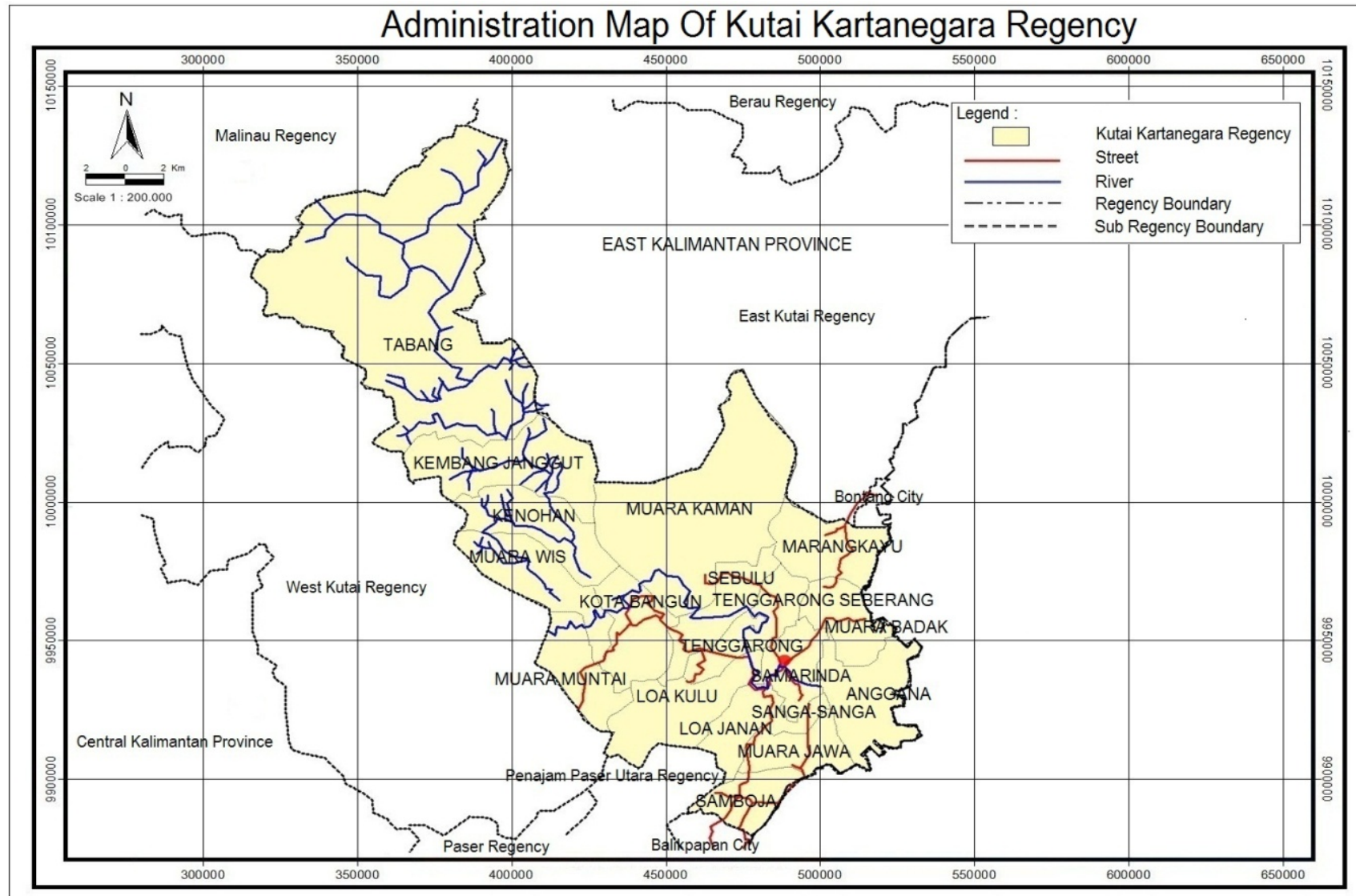| No.	Business field	2008	2009	2010	2011	2012	Average
1	Agriculture	5.01	6.26	17.11	18.07	15.45	12.38
2	Mining and quarrying	87.87	84.63	56.36	43.66	50.18	64.54
3	Processing industry	1.08	1.3	3.44	6.05	5.13	3.40
4	Electricity, gas and water	0.04	0.05	0.13	0.25	0.25	0.15
5	Building	2.6	3.27	8.68	11.84	11.05	7.49
6	Trade, hotel and restaurants	1.99	2.66	7.72	12.31	10.73	7.08
7	Freight and communications	0.34	0.42	1.16	1.98	1.88	1.16
8	Finance, real estate and corporative services	0.31	0.38	1.03	1.95	1.83	1.10
9	Services	0.76	1.03	4.37	3.87	3.49	2.70

Fig. 1 Kutai Kartanegara regency.

Table 3   Overview of coal mining business area (Ha) in Kutai Kartanegara regency years of 1996-2011 [6-10].

Year	IUP sighting	IUP exploration	IUP exploitation	Total (ha)
1996-2006	-	-	39,105.56	39,105.56
2007	344,011.53	179,039.34	342,483.55	865,534.42
2009	532,369.00	319,507.00	116,352.00	968,228.00
2011	538,806.47	522,954.21	144,126.94	1,205,887.62
Total	1,415,187.00	1,021,500.55	642,068.05	3,078,755.60

Table 4   Distribution of land capability class with land status of coal mine closure (reclamation and not reclamation) [12].

No.	Land capability class	Amount (%)					
		Not reclamation	Reclamation	Total	Not reclamation	Reclamation	Total
1	V	6	6	12	50	50	100
2	VI	7	2	9	78	22	100
	Total	13	8	21	62	38	100

Table 5   Distribution of land capability classes with age of coal mine closure [11].

No.	Land capability class	After the age of coal mine (years)				Total
		0.25- <4	4- <7	7- <11	11-14	
1	V	6	4	1	1	12
2	VI	4	4	1	0	9
3	Total	10	8	2	1	21

Table 6   Distribution of land suitability classes (Ordos) for type development of coal mine closure region [12].

No.	Class (Ordos)	Type			
		Fishery	Settlement	Tourism	Agriculture
1	Not suitable	10	8	6	21
2	Moderate	4	4	8	0
3	Suitable	7	9	7	0
Total percentage (%)		21	21	21	21
1	Not suitable	48	38	29	100
2	Moderate	19	19	38	-
3	Suitable	33	43	33	-
Total		100	100	100	100

moderate land according to the aspects of the fishery (19%), housing (19%), tourism (38%) and agriculture (0%), while the class does not suitable the aspects of the fishery (48%), housing (38%), tourism (29%) and agriculture (100%), thus, the 4 aspects that do not have the potential for the development is agriculture.

Based on the above description, the post-coal mine majority are not in the suitable class. Each of risk in post coal mine area is land subsidence in the form of hollows or puddles, loss of topsoil containing humus/organic materials, and other forms of pollution,

tend to be non-productive economically, so that sustainable development will be hampered. This statement is reinforced by several studies that the post mine coal area has much risk hence the land is limited for using [11, 13-17].

Therefore, the authors need a strategy that involves the development of aspects of the development actors (stakeholders), aspects of land potential and feasibility of investment in order to construct a coal policy post-mining land, as presented in Table 7.

Table 7 shows that there are 3 scenarios in the development of regional decision of the post-coal mine

Table 7 Scenario decision region coal mine closure [12].

No.	Type	Aspect	Score			Total score	Scenario decision
			Potential land	Expert choice	Investment feasibility		
1	Recreational park	Tourism	2	3	2	7	Optimistic
2	Historical tours	Tourism	2	2	2	6	Optimistic
3	Tilapia	Fishery	2	1	3	6	Optimistic
4	Goldfish	Fishery	2	1	3	6	Optimistic
5	Patin/Catfish	Fishery	2	1	3	6	Optimistic
6	Reign	Service	2	1	2	5	Moderate
7	Housing	Service	2	1	2	5	Moderate
8	Cork fish	Fishery	2	1	2	5	Moderate
9	Damselfish/Puyu	Fishery	2	1	2	5	Moderate
10	Guava	Agriculture	1	1	3	5	Moderate
11	Melinjo	Agriculture	1	1	3	5	Moderate
12	Dragon fruit	Agriculture	1	1	3	5	Moderate
13	Education	Service	2	1	1	4	Pessimist
14	Economics	Service	2	1	1	4	Pessimist
15	Catfish	Fishery	2	1	1	4	Pessimist
16	Galah Shrimp	Fishery	2	1	1	4	Pessimist
17	Durian	Agriculture	1	1	2	4	Pessimist
18	Rubber	Agriculture	1	1	2	4	Pessimist
19	Toothless gum	Agriculture	1	1	2	4	Pessimist
20	Sugar palm	Agriculture	1	1	2	4	Pessimist
21	Durian Lae	Agriculture	1	1	2	4	Pessimist
22	Palm oil	Agriculture	1	1	1	3	Pessimist
23	Cocoa	Agriculture	1	1	1	3	Pessimist
24	Candlenut	Agriculture	1	1	1	3	Pessimist
	Maximum		2	3	3	7	
	Minimum		1	1	1	3	

that is the optimistic scenario on 2 aspects, tourism (recreational parks and historical tours) and aspects of the fishery (tilapia, goldfish, catfish). Later in the moderate scenario, there are 3 aspects of the services (administration and housing), fisheries (cork fish and damselfish) and agriculture (guava, melinjo and dragon fruit), while, others are included in the criteria as a pessimistic scenario.

Therefore, the land use in post-coal mine area need the planning based on the capability of land and result of scenario. This is in line with the results of research [13, 16, 18-23]. Structuring the coal mining region becomes very important, especially, the post-coal mine region is expected to provide solutions to problems of the region, and identify the characteristics of the land as well as other potential resources [24].

4. Conclusions

The conclusion from this study is that the strategy of development at the post-coal mine area has 2 decision scenarios, which is the optimistic scenario on 2 aspects namely: (1) tourism (recreational parks and historical tours) and (2) aspects of the fishery (tilapia, goldfish and catfish). Later in the moderate scenario, there are 3 aspects of development: (1) services (administration and housing), (2) fisheries (cork fish and damselfish) and (3) agriculture (guava, melinjo and dragon fruit). Optimizing the utilization of post-mining land in the district of Kutai Kartanegara coal can be carried out with reference to these two types of scenarios as a manifestation of an engine of regional development.

References

[1] Government of East Kalimantan. 2011. *Implementation Program Priority* (*MP3EI*) *of East Kalimantan*. Research report.

[2] Kotijah, H. R. 2007. *The Implication of Local Autonomy to the Issuance of Coal Mining Concession in Kutai Kartanegara Regency*. Research report.

[3] Mujayatno, A. 2011. "Kutai Kartanegara Regency Receive the Government Support for Poor Community." Accessed July 19, 2012. http://kaltim.antaranews.com:http://www.antarakaltim.com/berita/4358/kukar-terima-raskin-terbanyak-di-kaltim.

[4] Muta'ali, L. 2011. *Capita Selecta of Regional Development*. Yogyakarta: Agency Publisher of Geography Faculty.

[5] The Kutai Kartanegara Central Bureau of Statistics. 2014. *Data of Kutai Kartanegara between 2011 until 2013*. Tenggarong: The KutaiKartanegara Central Bureau of Statistics.

[6] Mining Advocacy Network. 2011. *Inventory of Coal Mining Region in East Kalimantan*. Research report.

[7] Prasetya, L. A. 2012. "Governor Give Punish for Kutai Kertanegara Regency Regent about Mining Permit." Accessed August 20, 2015. http://bisniskeuangan.kompas.:http://bisniskeuangan.kompas.com/read/2012/04/22/20594088/Gubernur.Kaltim.Sentil.Bupati.Kukar.soal.Izin.Tambang.

[8] Department of Mining and Energy. 2006. *List of Mines Business Area Data in Tenggarong*. Research report.

[9] Regional Environmental Agency. 2007. *List of Coal Mines Data in Tenggarong*. Research report.

[10] Department of Mining and Energy. 2010. *List of Mines Business Area Data in Tenggarong*. Research report.

[11] FAO. 1976. *A Framework for Land Evaluation, Soil Resources Management and Conservation Service Land and Water Development Division*. Rome: FAO Soil Bulletin.

[12] Nasruddin, 2015. "Development of Post Coal Mining Area to Region Support in Kutai Kartanegara Regency." Ph.D. thesis, Gadjah Mada University.

[13] Muchlis, S. 2008. "Reclamation Model of Post Coal Mining Model Based on Argo Forestry (Case Study in Kutai Kartanegara East Kalimantan)." Ph.D. thesis, Bogor Agricultural Institute.

[14] Qomariah. 2003. "Impact of Coal Mining without Permit for Land Quality and Socioeconomic Community in Banjar Regency." Master thesis, Bogor Agricultural Institute.

[15] Choi, Y., Park, H. D., and Sunwoo, C. 2008. "Flood and Gully Erosion Problems at the Pasir Open Pit Coal Mine, Indonesia: A Case Study of the Hydrology Using GIS." *Bulletin of Engineering Geology and the Environment* 67 (2): 251-258.

[16] Malaviya, S., Munsi, M., and Joshi, G. O. 2009. *Landscape Approach for Quantifying Land Use-Land Cover Change* (*1972-2006*) *and Habitat Diversity in Mining Area in Central India* (*Bokaro, Jhark Land*). India: Elsevier Publishing.

[17] Li, F., Liu, X., Zhao, D., Wang, B., Jin, J., and Hu, D. 2011. "Evaluating and Modeling Ecosystem Service Loss of Coal Mining: A Case Study of Mentougou District of Beijing, China." *Ecological Complexity* 8 (2): 139-143.

[18] Maczkowiack, R., Smith, C., Slaughter, G., Mulligan, D., and Cameron, D. 2012. "Grazing as a Post-Mining Land Use: A Conceptual Model of the Risk Factors." *Agricultural Systems* 109 (June): 76-89.

[19] Rani, I. 2004. "Influence of Sand Mines Activity for Soil Quality, Land Productivity, and Vegetation, and Rehabilitation." Master thesis, Bogor Agricultural Institute.

[20] Yudilastiantoro, C., and Widianto, T. 2007. "Institutional Reclamation in Post Land Mining of Batu Apung, Lombok Timur, West Nusa Tenggara." *Socioeconomic Information* 7 (1): 1-15.

[21] Ernawati, R. 2008. "Characteristic of Soil Chemical in Coal Post Mining Land." *Technology Journal of Technoscientia* 1 (1): 85-93.

[22] Munawar, A., and Riwandi. 2010. "Chemical Characteristics of Organic Wastes and Their Potential Use for Acid Mine Drainage Remediation." *Nature Indonesia Journal* 12 (2): 167-172.

[23] Bambang Y. B., Munawar, A., and Gonggo, M. 2013. "The Influence of Organic Matter for Chemical Soil Characteristic in Coal Post Mining Land and Akasia Growth." Accessed August 28, 2015. http://repository.unib.ac.id/2005.

[24] Warhurst, A., and Noronha, L. 2000. *Environmental Policy in Mining: Corporate Strategy and Planning for Closure*. Boca Raton: Lewis Publisher.