

## GLOBAL JOURNAL OF ENGINEERING SCIENCE AND RESEARCHES THE IMPACT OF GOLD MINING ON THE LOCAL PEOPLE'S INCOME

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### ABSTRACT

Bombana district has 205.400 ha with volume 1.125.000 ton reserves of mineral resources gold mining. Mining activity in Bombana has been done since september 2008<sup>th</sup>. This study was to know changing people's livelihood before and after gold mining, (2) Analyzed people access on gold mining, and (3) Analyze impact of gold mining on increasing people's income. This study was descriptive analysis method with sign test analysis method. The population of this study was 5.573 north Rarowatu societies with 95 respondents were taken by cluster sampling method. The result showed impact of gold mining societies' income in north Rarowatu : (1) Gold mining contribute on social change as societies' original livelihood, it cause by mining income attractiive; (2) Total income of societies in gold mining was decrease, sign test showed total of societies' income has negative value (-Rp.1.578.316,-). Most of people's income decrease from seaweed farmers, pond workers and farmers, while income of redstone workers, contruction labour and traders have increased after gold mining existence in North Rorowatu.

**Keywords:** *Gold mining, Impact, people's income.*

### I. INTRODUCTION

Indonesia has many mineral resources potential, copper resources mostly from porphyry types were estimated 32 million ton include gold and silver (Malanuag, 2002). Many mineral resources in Indonesia is not agreement with social-economic condition in people who has live around maining area on 2017<sup>th</sup>, Central Bureau of Statistic (BPS) estimate 32.16% or 76.4 million from total population of Indonesia life in proverty. Paradoxical situation in Indonesia has described by Carolyn Marr "*Indonesia is fabulously rich and Indonesia is desperately poor*". Empirical evidence showed rich in mines and contributed to country income precisely ranks severe poverty. Case in Aceh, Riau, East Kalimantan and Papua are bad reality about profit sharing over natural wealth of mining materials between country and foreign investors, central government and local goverment, so that it become source of conflict which threatens disintegration of nation.

In generally, maining is not only potential to disturub physical environment but also can create social-economic disparities between group interests. It cause in maining need human resource with high level education and luxurious lifestyle, while society in around maining area still have low level education and simple lifestyle. As a result, local communities cannot join to maining activity, so that economic and social status differences between migrant and local communities will be high (Saleng, 2004).

Southeast Sulawesi has many potential mineral resources such as nickel, gold and asphalt. Large and volume reserves of mineral resources gold maining in Bombana district is 205.400 ha with volume 1.125.000 ton (BPS, 2018). Geologically, most of areas in Bombana cover by metamorphic rock which is form from mineralization process or gold deposition process (Figure 1).

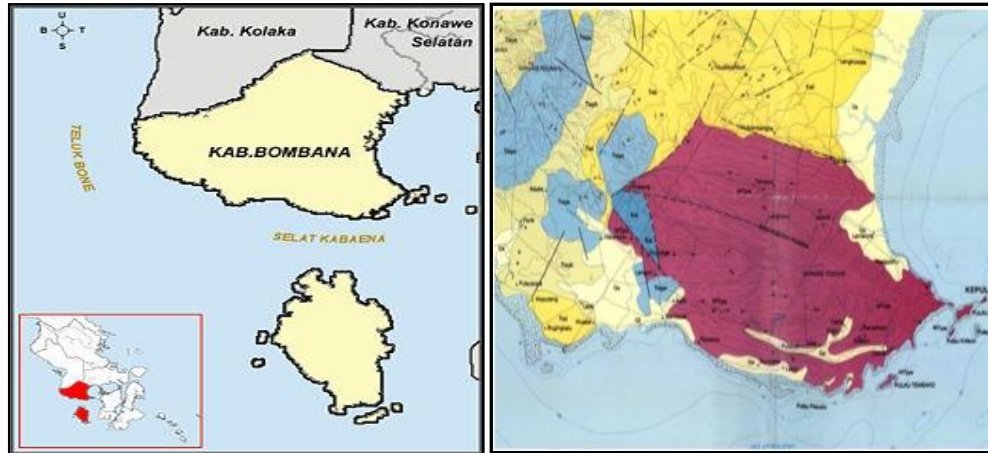


Figure 1. Bombana district geology map showed geography position and constituent rocks (maroon is metamorphic rocks).

II. MATERIALS AND METHODS

This research was hold in all villageson north Rarowatu, Bombana district. This area was gold maining with 11 companies operated in north Rarowatu. Research location determined by *purposive method*. Population was ±5.573 people of North Rarowatu, Bombana district with *cluster sampling method*. Samples of each cluster were collected base on *simple random sampling method* with equation:

$$n = \frac{NZ^2 p(1 - p)}{NE^2 + Z^2 p(1 - p)}$$

n = Sample size  
 N = Population size  
 Z = Confidance level (1.96 on α=0.05)  
 E = Sampling Error (10%)  
 P = Maximum population variability (50%)

Table 1. Distribution Unit Sample in Reasearch Area North Rarowatu, Bombana District

No	Villages	Population (Person)	Population Sample (Person)
1	Lantowua	676	676/5.573 x 95 = 11
2	Watumentande	456	456/5.573 x 95 = 8
3	Hukaea	785	785/5.573 x 95 = 13
4	Tunas baru	396	396/5.573 x 95 = 7
5	Tembe	387	387/5.573 x 95 = 7
6	Aneka Marga	1.121	1.121/5.573 x 95 = 19
7	Marga Jaya	1.222	1.222/5.573 x 95 = 21
8	Wumbubangka	530	530/5.573 x 95 = 9
	Total	5.573	95

Source: BPS Bombana, 2018.

Variabel in this research were (1) Livelihood before and after gold maining existence; (2) Income before and after gold mining existence.

(1) To know process of changing people’s livelihood after gold mining existence and community accessibility to gold mining was descriptive analysis.

(2) To analyze impact of gold mining to people's income used sign test analysis, with equation (Sudrajat, 1985 in Arikunto 1998):

$$P(X_A > X_B) = P(X_A > X_B) = 1/2$$

$X_A$  = People's income before gold mining existence  
 $X_B$  = People's income after gold mining existence

### III. RESULTS AND DISCUSSIONS

#### The Changes in People's Livelihoods in North Rarowatu District

The results showed that the types of people's livelihoods in North Rarowatu District are dominated by farmers and fisheries of 94.73% and 5.27% in the service and trade sectors. Pujiastuti (2009) stated that sociologically of the people in Bombana Regency are farmers communities, not mining communities.

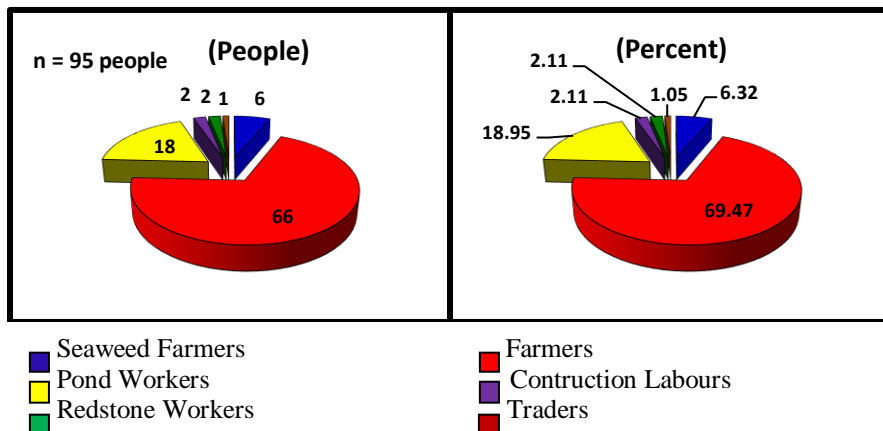


Figure 2. Livelihoods of the People Before the Gold Mine in North Rarowatu District.

The changes in people's livelihoods are caused by two things, namely: (1) the attractiveness of the economic value (income) of the gold mining business that causes the loss of labor who work on land, rice fields, gardens and fishermen, (2) the existence of land conversion and external impacts (external impact) of gold mines that result in depletion of productive of farmers and fisheries land and reduced water sources and pollution of river and coastal waters. The shrinkage of land occurred due to the overlapping area of the gold mining business license with the subdistrict and village areas in North Raorowatu District. The phenomenon of changes in people's livelihoods in Bombana Regency, illustrated from the results of research in the District of North Rarowatu (Figure 3.) showed that from changes in people's livelihoods by 64 people or 67.37% of the total sample of 95 people. While those who did not experience changes were 31 people or 32.63%.

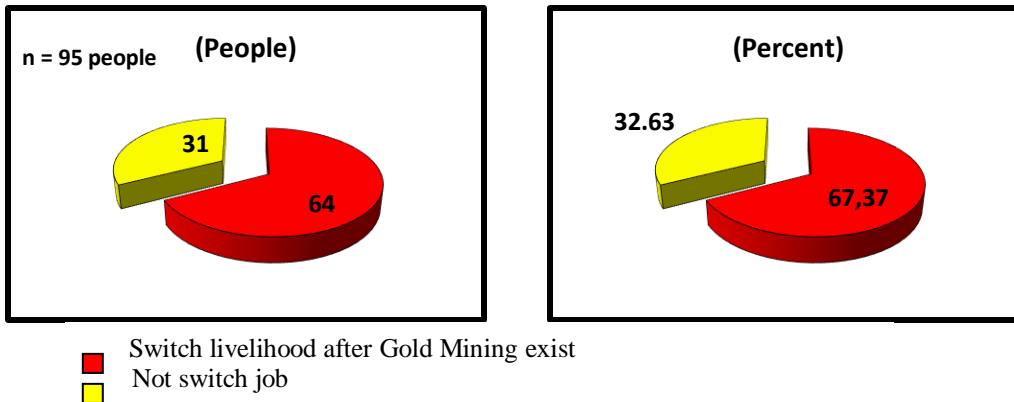


Figure 3. Changes in community livelihoods after the gold mining in Rarowatu District

There is a tendency for the majority of gold mining to be mine employees and illegal miners by 55.48%. Meanwhile, other new livelihoods were motorbike drivers and construction workers by 10.57%. Ironically, research facts show that there are 2.11% of people who do not have permanent livelihoods (odd jobs). The state of change in livelihoods after the existence of a gold mine in North Rarowatu District is presented in Figure 4.

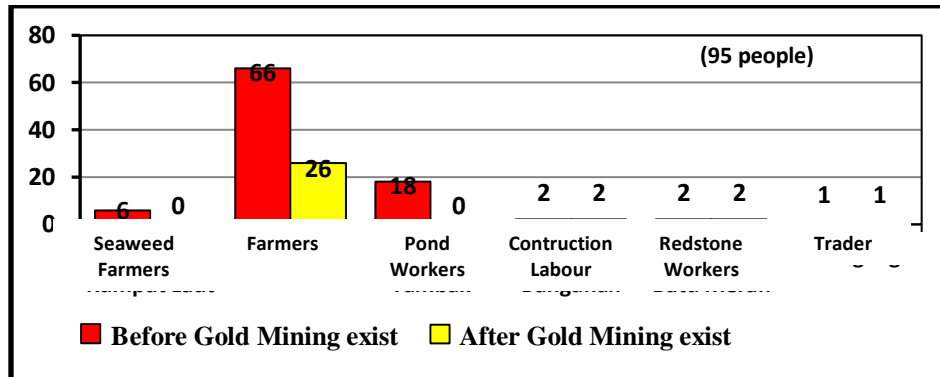


Figure 4. Shifting community livelihoods before and after the existence of gold mining in North Rarowatu District.

The amount of local people income that can be obtained from the gold mining activity is a hope to change their destiny and get out of the convoluted poverty problem. The evidence is visible from the amount of panning obtained every day on average gold between 10 to 50 grams, but after more and more miners joined in the pan, their income decreased to an average of 1 to 5 grams (Zulkarnain, 2009).

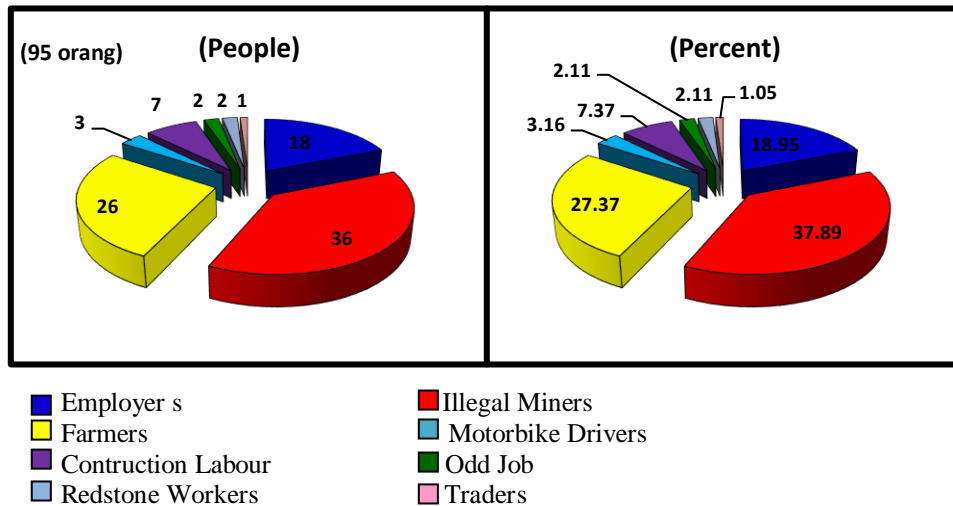


Figure 5. Situation of community livelihoods after the existence of gold mining in North Rarowatu District.

Figure 5. indicates that there has been a shift in the dominance of community livelihoods in North Rarowatu District after the existence of a gold mine. Whereas, the dominance of people who worked in the agricultural sector before the mine was now in the second position (27.37%) below that of those who worked in the mining sector (56.84%). Communities working in the mining sector are divided into 37.89% as illegal miners and 18.95% as mining company employees.

### The Impact of Gold Mining on Increasing Community Welfare From the Income Side

Table 6. shows that overall, the results of the yearly income sign test before and after the gold mining were negative (Rp. 1,578,316.-). This means that the existence of mining in the District of North Rarowatu has not had a positive impact on annual community income. Where, the existence of gold mining actually reduces the average income of the community by Rp. 1,578,316. -, compared to before the existence of gold mining in the area.

*Table 6. Analysis of Sign Test (average) of Community Income Before and After Gold Mining Activities Based on Community Livelihoods in North Rarowatu District.*

Respondent Groups	Income/year (Rp)		Deviation (Rp)	Sign Test
	Before	After		
Seaweed Workers	16,300,000.-	14,930,000.-	(1,370,000.-)	Negative
Pond Workers	20,653,333.-	17,070,000.-	(3,583,333.-)	Negative
Farmers	16,527,273.-	15,213,636.-	(1,313,636.-)	Negative
Red Stone Workers	18,000,000.-	19,440,000.-	1,440,000.-	Positive
Construction Labour	14,100,000.-	16,200,000.-	2,100,000.-	Positive
Trader	18,000,000.-	20,400,000.-	2,400,000.-	Positive
Total	17,290,105.-	15,711,789.-	(1.578.316.-)	Negative

Data Analysis, 2018

### Impact of Gold Mining on Income of Seaweed Cultivation Workers Changing Livelihoods in the Mining Sector

Before the existence of gold mining, the average community residing in the village of Lantowua was seaweed farming workers, this is because the village is a coastal area. Gold mining become the economic attraction so that some community decided to switch jobs to the mining sector by becoming local miners, and community income is quite increasing by switch their job. Marine aquaculture workers who turn jobs into illegal miners get a negative impact (negative sign test) where their income decreases after mining. While those who changed jobs to mine employees experienced an increase in income (positive sign test).

*Table 7. Analysis of Seaweed Farmer Revenue Test Analysis Before and After the Existence of Gold Mining in North Rarowatu District*

New Livelihoods	Income/year (Rp)		Deviation (Rp)	Sign Test
	Before	After		
Employer	7,800,000.-	15,600,000.-	7,800,000.-	Positive
Employer	7,200,000.-	18,000,000.-	10,800,000.-	Positive
Illegal miner	25,200,000.-	18,000,000.-	(7,200,000.-)	Negative
Illegal miner	26,400,000.-	19,260,000.-	(7,140,000.-)	Negative
Illegal miner	16,800,000.-	8,760,000.-	(8,040,000.-)	Negative
Illegal miner	14,400,000.-	9,960,000.-	(4,440,000.-)	Negative
Total	97,800,000.-	89,580,000.-	(8,220,000.-)	Negative

Data Analysis, 2018

### The Impact of Gold Mining on the Income of Pond Workers Who Switch to Livelihoods in the Mining Sector

Before the existence of gold mining, the average coastal community who lived in the villages of Lantowua, Watumentande and Tunas Baru were pond workers. The fact shows that almost all of those who became illegal miners experienced a decrease in income, while those who were employees of mining companies experienced an increase in income, although the increase was not significant with their energy expenditure and working time at gold mining companies. In fact, before the existence of gold mining, Bombana Regency was known as a shrimp-producing fishpond area.

Table 8. Analysis of Pond Employee Revenue Test Analysis Before and After the Existence of Gold Mining in North Rarowatu District

New Livelihood	Income/year (Rp)		Deviation (Rp)	Sign Test
	Before	After		
Employer	10,200,000.-	18,000,000.-	7,800,000.-	Positive
Employer	4,800,000.-	14,400,000.-	9,600,000.-	Positive
Employer	5,760,000.-	18,000,000.-	12,240,000.-	Positive
Illegal Miner	21,000,000.-	19,260,000.-	(1,740,000.-)	Negative
Illegal Miner	30,000,000.-	19,260,000.-	(10,740,000.-)	Negative
Illegal Miner	21,000,000.-	14,880,000.-	(6,120,000.-)	Negative
Illegal Miner	18,000,000.-	18,480,000.-	480,000.-	Positive
Illegal Miner	30,000,000.-	20,160,000.-	(9,840,000.-)	Negative
Illegal Miner	24,000,000.-	15,300,000.-	(8,700,000.-)	Negative
Illegal Miner	27,000,000.-	19,260,000.-	(7,740,000.-)	Negative
Illegal Miner	30,000,000.-	21,600,000.-	(8,400,000.-)	Negative
Illegal Miner	30,000,000.-	18,480,000.-	(11,520,000.-)	Negative
Illegal Miner	13,200,000.-	11,880,000.-	(1,320,000.-)	Negative
Illegal Miner	18,000,000.-	14,400,000.-	(3,600,000.-)	Negative
Illegal Miner	14,400,000.-	13,800,000.-	(600,000.-)	Negative
Illegal Miner	24,000,000.-	13,200,000.-	(10,800,000.-)	Negative
Illegal Miner	30,000,000.-	21,600,000.-	(8,400,000.-)	Negative
Illegal Miner	20,400,000.-	15,300,000.-	(5,100,000.-)	Negative
Total	371,760,000.-	307,260,000.-	(64,500,000.-)	Negative

Data analysis, 2018

### Impact of Gold Mining on Income of Farmers Switch Livelihoods into the Mining Sector and others.

Table 9. Analysis of Farmer's Income Sign Test Before and After the existence of Gold Mining in the District of North Rarowatu District.

New Livelihood	Income/year (Rp)		Deviation (Rp)	Sign Test
	Before	After		
Employer	7,200,000.-	12,000,000.-	4,800,000.-	Positive
Employer	4,200,000.-	15,600,000.-	11,400,000.-	Positive
Employer	21,000,000.-	18,000,000.-	(3,000,000.-)	Negative
Employer	15,000,000.-	12,000,000.-	(3,000,000.-)	Negative
Employer	15,600,000.-	14,400,000.-	(1,200,000.-)	Negative
Employer	15,000,000.-	14,400,000.-	(600,000.-)	Negative
Employer	19,200,000.-	18,000,000.-	(1,200,000.-)	Negative
Employer	14,400,000.-	12,000,000.-	(2,400,000.-)	Negative
Employer	21,600,000.-	21,000,000.-	(600,000.-)	Negative
Employer	18,000,000.-	16,800,000.-	(1,200,000.-)	Negative
Employer	21,600,000.-	18,000,000.-	(3,600,000.-)	Negative
Employer	24,000,000.-	18,000,000.-	(6,000,000.-)	Negative
Employer	15,600,000.-	16,800,000.-	1,200,000.-	Positive
Illegal Miner	19,800,000.-	15,600,000.-	(4,200,000.-)	Negative
Illegal Miner	14,400,000.-	12,960,000.-	(1,440,000.-)	Negative
Illegal Miner	19,200,000.-	16,800,000.-	(2,400,000.-)	Negative
Illegal Miner	18,000,000.-	15,600,000.-	(2,400,000.-)	Negative
Illegal Miner	19,200,000.-	15,300,000.-	(3,900,000.-)	Negative
Illegal Miner	14,400,000.-	10,800,000.-	(3,600,000.-)	Negative
Illegal Miner	8,400,000.-	12,000,000.-	3,600,000.-	Positive
Illegal Miner	18,000,000.-	20,400,000.-	2,400,000.-	Positive



Illegal Miner	19,800,000.-	15,600,000.-	(4,200,000.-)	Negative
Illegal Miner	15,000,000.-	12,000,000.-	(3,000,000.-)	Negative
Illegal Miner	15,600,000.-	14,400,000.-	(1,200,000.-)	Negative
Illegal Miner	14,400,000.-	12,960,000.-	(1,440,000.-)	Negative
Illegal Miner	15,000,000.-	14,400,000.-	(600,000.-)	Negative
Illegal Miner	19,200,000.-	18,000,000.-	(1,200,000.-)	Negative
Illegal Miner	14,400,000.-	12,000,000.-	(2,400,000.-)	Negative
Illegal Miner	21,600,000.-	21,000,000.-	(600,000.-)	Negative
Illegal Miner	18,000,000.-	16,800,000.-	(1,200,000.-)	Negative
Construction Labour	14,400,000.-	18,000,000.-	3,600,000.-	Positive
Construction Labour	12,000,000.-	15,600,000.-	3,600,000.-	Positive
Construction Labour	13,200,000.-	16,800,000.-	3,600,000.-	Positive
Construction Labour	18,000,000.-	20,400,000.-	2,400,000.-	Positive
Construction Labour	15,600,000.-	16,800,000.-	1,200,000.-	Positive
Construction Labour	25,200,000.-	18,000,000.-	(7,200,000.-)	Negative
Motorbike Driver	8,400,000.-	12,000,000.-	3,600,000.-	Positive
Motorbike Driver	15,600,000.-	16,800,000.-	1,200,000.-	Positive
Odd Jobs	14,400,000.-	10,800,000.-	(3,600,000.-)	Negative
Odd Jobs	13,800,000.-	11,400,000.-	(2,400,000.-)	Negative
<b>Total</b>	<b>647,400,000.-</b>	<b>620,220,000.-</b>	<b>(27,180,000.-)</b>	<b>Negative</b>

Data Analysis, 2018

The existence of gold mining causes the mobility of people in and out of mining sites is very high. This phenomenon makes farmers who change their livelihoods as motorbike drivers actually get an increase in income after the mine (positive sign test). However, there is also a very sad fact that occurs when there is gold mining, where farmers lose their permanent livelihoods and do not have permanent jobs, which continue to lead to a decrease in income (negative sign test). This research also shows another phenomenon when the magnetism of gold mining in the North Rarowatu Subdistrict actually many people who still survive on their livelihoods as farmers. This phenomenon can be caused by farmers not having access to companies and gold mining sites, not having mining skills, and farmers feeling confident enough that their livelihoods (hereditary) can maintain the value of their income for their living sustainability. Table 10. shows that overall the income of farmers who did not experience changes in livelihoods after the existence of a gold mine has decreased (negative sign test).

Table 10. Analysis of Farmer's Income Sign Test Before and After Gold Mining Activities in the District of North Rarowatu District.

Livelihood	Income/year (Rp)		Deviation (Rp)	Sign Test
	Before	After		
Farmer	18,000,000.-	20,400,000.-	2,400,000.-	Positive
Farmer	26,400,000.-	19,260,000.-	(7,140,000.-)	Negative
Farmer	16,800,000.-	8,760,000.-	(8,040,000.-)	Negative
Farmer	14,400,000.-	9,960,000.-	(4,440,000.-)	Negative
Farmer	13,800,000.-	11,400,000.-	(2,400,000.-)	Negative
Farmer	25,200,000.-	18,000,000.-	(7,200,000.-)	Negative
Farmer	26,400,000.-	19,260,000.-	(7,140,000.-)	Negative
Farmer	14,400,000.-	15,600,000.-	1,200,000.-	Positive
Farmer	15,600,000.-	18,000,000.-	2,400,000.-	Positive
Farmer	16,800,000.-	8,760,000.-	(8,040,000.-)	Negative
Farmer	14,400,000.-	9,960,000.-	(4,440,000.-)	Negative
Farmer	13,800,000.-	12,000,000.-	(1,800,000.-)	Negative
Farmer	15,600,000.-	18,000,000.-	2,400,000.-	Positive
Farmer	15,000,000.-	12,000,000.-	(3,000,000.-)	Negative
Farmer	15,600,000.-	14,400,000.-	(1,200,000.-)	Negative

Farmer	14,400,000.-	12,960,000.-	(1,440,000.-)	Negative
Farmer	15,000,000.-	14,400,000.-	(600,000.-)	Negative
Farmer	19,200,000.-	18,000,000.-	(1,200,000.-)	Negative
Farmer	14,400,000.-	12,000,000.-	(2,400,000.-)	Negative
Farmer	15,600,000.-	14,400,000.-	(1,200,000.-)	Negative
Farmer	14,400,000.-	12,960,000.-	(1,440,000.-)	Negative
Farmer	25,200,000.-	21,600,000.-	(3,600,000.-)	Negative
Farmer	15,000,000.-	15,600,000.-	600,000.-	Positive
Farmer	13,200,000.-	16,800,000.-	3,600,000.-	Positive
Farmer	13,800,000.-	11,400,000.-	(2,400,000.-)	Negative
Farmer	21,000,000.-	18,000,000.-	(3,000,000.-)	Negative
<b>Total</b>	<b>443,400,000.-</b>	<b>383,880,000.-</b>	<b>(59,520,000.-)</b>	<b>Negative</b>

Data Analysis, 2018

There are only 6 (six) farmers who have increased income (positive sign test). This condition can occur for established farmers who have capital and technology and productive agricultural land and crops. Because the agricultural products can support the stock of food raw materials for 11 mining companies in the study area.

#### IV. CONCLUSION

Based on the results, conclusions can be drawn: (1) Gold mining contributes to social change in the form of changes in the people's original livelihoods in North Rarowatu District which are driven by the attractiveness of income from mining. The number of people experiencing changes in livelihoods was 67.37% or 64% of the total respondents. Farmers and pond workers experienced a change in livelihoods of 68.75%. New livelihoods of the community after the mine became employees of mining companies and illegal miners by 56.84%, motorbike drivers and construction workers (10.57%). Ironically, there are 2.11% of the people who actually have temporary livelihoods (odd jobs); (2) Gold mining in North Rarowatu District Bombana Regency has not had an impact on improving the income of local communities. There are 69.47% or 66 people of the total respondents who experienced a decrease in income after the gold mining. Overall, the total income of the community experienced a decrease in income after the existence of gold mining, which shows from the test results of a sign that the total community income was negative (-Rp. 1,578,316.-). Most people who experienced a decline in income were seaweed workers, pond workers and farmers. Meanwhile, red stone, construction workers and traders actually experienced an increase in income after the existence of gold mining in the District of North Rarowatu.

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