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MINING IMPACTS ON AGRICULTURAL PRODUCTION AND INCOME OF RURAL HOUSEHOLDS: AN EXPLORATORY SURVEY IN BURUNDI

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ABSTRACT

Mining activities create new activities, jobs and income for local communities. But they also withdraw land and labour force from the agricultural sector, not saying about other impacts like water pollution, which can modify composition of soils, and lead to reduction of agricultural production and income. In Burundi, mining activities formally began in 2014 and no study on their impacts on agriculture has been made up to now, while agriculture is the main livelihood for more than 90% of the population. This study aims to analyse the impacts of those mining activities on household agricultural production and income in the local studied communities. A survey among 210 households, 70 households per hill, and interviews with key informants were implemented in July and August 2022 in Mabayi commune. 140 households concerned experimental hills Gahoma and Ruhororo, where the foreign company “Tanganyika Mining Burundi-TMB” and the local cooperative “Dukorere Hamwe Dusoze Ikivi-DHDI” were carrying out their activities respectively. 70 other households concerned a reference hill Buhoro. Employees of “TMB” were nationals and mostly foreigners, while members/employees of “DHDI” were all nationals. According to results of the survey, it appears that at Gahoma hill, average agricultural production was reduced by 673 kg/household/year and average agricultural income decreased by 29,760 FBu/household/month compared to the reference hill, due to “TMB” company’s activities. At Ruhororo hill, average agricultural production increased by 17 kg/household/year and average agricultural income increased by 58,350 FBu/household/month compared to the reference hill, due to “DHDI” cooperative’s activities. Thus, impacts are contrasted from one mining hill to another.

Keywords: *Mining, agricultural production, agricultural income, livelihoods, Burundi.*

INTRODUCTION

African countries are increasingly turning to mining as a potential domestic resource for their economies (OCDE, 2016). A significant share of foreign direct investment is oriented towards the extractive industries sector (*Ibid.*). Currently, mining is a second sector of activities after agriculture for the economies of these countries, although research has shown that its economic and social benefits in rural areas remain considerably limited, and that the extent of its negative effects in mining areas raises questions about its ability to play an important role in local economic development (Musokotware, 2016). Indeed, it is true that mines stimulate the growth of the countries which own and value them, thanks to their positive effects on the Gross Domestic Product-GDP (Christiaensen *et al.*, 2014, cited by WB, 2015). But alongside, with their negative effects in mining areas, and given the low conversion of this growth into compensation for community losses in these areas, and into rural poverty reduction in African countries, questions remain as to whether they improve the livelihoods of local rural populations there; and more particularly their agricultural activities, since mines are an exhaustible resource (*Ibid.*). According to Musokotware (2016), the effects of mining are numerous, social and economic, and affect political leaders, local communities especially those who live in the vicinity of the sites, the environment and health, etc. Nevertheless, in-depth empirical studies on the effects of mining on agriculture remain limited, although they are currently emerging (WB, 2015).

In Burundi, to try to cope with the weakness of the economy, the government has since 2005 decided to diversify its income resources by valuing especially its mining sector considered as a potential source (Vircoulon, 2019). The latter holds 6% of the world's nickel reserves, and also reserves of gold, tantalum, tin, tungsten, vanadium, rare earths, building materials and industrial materials including kaolin, phosphates and limestone (AAIB, 2019). Actual mining began in 2014, after establishment of a new mining code in 2013 (*Ibid.*, 2019). It is the second largest source of export income after coffee and it employs, especially within cooperatives, a national workforce estimated at between ten (10) thousand and twenty-five (25) thousand people (Vircoulon, 2019). Also, although its share in state financing is still low as observed in 2019, i.e. 1% in GDP, 3% in export earnings and 1.71% in the general budget (AAIB, 2019), it is nevertheless the proof that it stimulates the country's growth in terms of its GDP, as has been highlighted elsewhere (Ishaq, 2014; WB, 2015; Mokam and Tsikam, 2017). But, despite this contribution to GDP growth and job creation, questions remain about whether mining activities also improve the livelihoods of farm households living around mining sites, even as Nsabimana's study (2019) identified them as causes and amplifiers of soil erosion in Mabayi. The purpose of this document is then to provide an overview on the effects of mining activities on the livelihoods (general income) of agricultural households, with a particular aspect on their agricultural production and income, at Gahoma and Ruhororo hills of Mabayi commune, where respectively the Russian company "Tanganyika Mining Burundi-TMB" and the local cooperative "Dukorere Hamwe Dusoze Ikivi-DHDI" were carrying out their

activities, while making a comparison with farm households of Buhoro hill, taken as a reference group to extract the real impact of mining on households agricultural production and income.

MATERIAL AND METHODS

The paper is based on an in-depth review of secondary data, and primary data collected in July and August 2022 using a questionnaire, two individual interviews guides, a group interviews guide - the same as for focus groups - and observations. The questionnaire was administered to the heads of 210 households at their homes on the Gahoma, Ruhororo and Buhoro hills. Individual interviews were conducted with opinion leaders, public and community relations managers at the "TMB" company and the "DHDI" mining cooperative, and the communal agronomist. Group interviews were conducted with miners, students and other household members apart from heads of households; while focus groups were conducted with students. Questions, both in the questionnaire and in the interviews guides, were based on five variables corresponding to five basic capitals for rural households' livelihoods: natural capital, human capital, physical capital, financial capital, and social capital. For greater clarity, prices of products grown by the majority of households in Mabayi, especially maize, beans, bananas, cassava, sweet potato, potatoes and colocase, were recorded on the markets of Muhungu (for Gahoma hill), Ruhororo (for Ruhororo hill), and Nyarure (for Buhoro hill). All survey participants were 18 years of age or older, and must have lived in the community since before 2018, except the communal agronomist and public and community relations managers. Data analysis was done by "mixed triangulation" of qualitative and quantitative data, with a comparison between the two mining communities (Gahoma and Ruhororo) and the non-mining community (Buhoro).

RESULTS AND DISCUSSION

Various negative and positive effects of mining on agricultural production, agricultural income, and general household income at Ruhororo, have been present since December 2018. The negative effects are competition in land and labour markets (including loss of land and labour force respectively), environmental degradation (water erosion of soils and landslides that wash away crops), increased prices of lands and agricultural products, abandonment of some plantations due to the fear of land claims by the mining company/cooperative, and an increased burden of agricultural activities on women. The positive effects are jobs and income creation, money injection into the local economy, the circulation of money and the ease of selling goods and services (shorter sales cycle) at relatively more remunerative prices than before, the ease of borrowing from friends, the introduction and improvement of agricultural activities, capacity building in agriculture, the improvement of social infrastructures, as well as the creation of farmers' associations and mutual financial assistance. At Gahoma, the same effects are present except for the improvement of social infrastructure; but negative effects must be added, like water pollution that led to the disappearance of sorghum, maize

and bean crops grown in the marsh of the river 'Muhira' into which the mining wastes of the company are dumped, the collapse of land which caused the loss of crops and dwellings near the exploitation sites, and the corruption by local authorities in terms of households' compensation. The cooperative manually cleans minerals and discharges wastewater and tailings on site. At Ruhororo, these effects combined with the external factors to the mining cooperative, resulted in a slight average production loss of 136 kg/household/year, or about 4.6% of the average agricultural production before the mining cooperative (2017-2018 crop year); but with a share of positive contribution of its own, i.e. positive average differences in agricultural production, agricultural income, and general income of 17 kg/household/year, 58,350 FBu/household/month and 155,730 FBu/household/month, respectively if we compare the Ruhororo hill with the reference hill Buhoro. At Gahoma, these effects, combined also with the external factors to the mining company, resulted in a large average production loss of 826 kg/household/year, or 31.2% of the average agricultural production before the mining company; with its own negative contribution to agricultural production and income, i.e. negative average differences of 673 kg/household/year and 29,760 FBu/household/month, respectively; but with a positive difference in average general income of 48,690 FBu/household/month, if we compare the Gahoma hill with the reference hill Buhoro (Table 1).

Table 1. Comparison of production and income in relation to control

	Gahoma	Buhoro	Ruhororo	horizontal diff.% to control	
	average agricultural quantity(kg/household/year)	average agricultural quantity(kg/household/year)	average agricultural quantity(kg/household/year)	Gah% Buh.	Ruh% Buh.
2017-2018	2648	2230	2933	pairing before	
				418	703
2020-2021	1822	2077	2797	pairing during	
				-255	720
vertical differences	-826	-153	-136	diff. between pairings	
				-673	+17
	average agricultural income(FBu/household/month)	average agricultural income(FBu/household/month)	average agricultural income(FBu/household/month)	Gah% Buh.	Ruh% Buh.
				pairing before	
2017-2018	162.330	135.420	179.850	26.910	44.430
				pairing during	
2020-2021	197.400	200.250	303.030	-2.850	102.780
				diff. between pairings	
vertical differences	35.070	64.830	123.180	-	+58.350
				29.760	0
	general income average(FBu/household/month)	general income average(FBu/household/month)	general income average(FBu/household/month)	Gah% Buh.	Ruh% Buh.

	old/month)	old/month)	old/month)		
2017-2018	204.570	159.390	223.290	pairing before	
				45.180	63.900
2020-2021	330.300	236.430	456.060	pairing during	
				93.870	219.630
vertical differences	125.730	77.040	232.770	diff. between pairings	
				+48.690	+155.730

Source: Designed by the author

In effect, the mining cooperative has resulted in a slight improvement for most households (75.7% of households had a general income per adult member per day, greater than or equal to national poverty line of 2021, i.e. greater than or equal to 1,580 FBU/day/adult equivalent (ISTEEBU, 2021) at the survey time, compared to 21.4% of households before December 2018), with a deep decrease in a small number of households among the rest, especially among households which have lost lands and goods, but have not invested in agriculture despite being compensated. Hence the slight average production loss of 136 kg/household/year, but without forgetting that these loss is generally related to negative external factors. However, the mining company has resulted in a slight improvement for few households (47% of households had a general income per adult member per day, greater than or equal to 1,580 FBU/day/adult equivalent at the survey time, compared to 20% of households before December 2018), and a deep decrease in a large number of households among the rest, and this time especially in households which have lost land and goods, but which have not been compensated; and also among those which have been compensated but have not invested in agriculture. Hence the great average production loss of 826 kg/household/year, but without forgetting the losses related to the above-mentioned external factors. This can be summarised on the Figure 1, concerning the main effects of mining, and the adaptation and livelihood strategies that have been adopted by households in the concerned area.

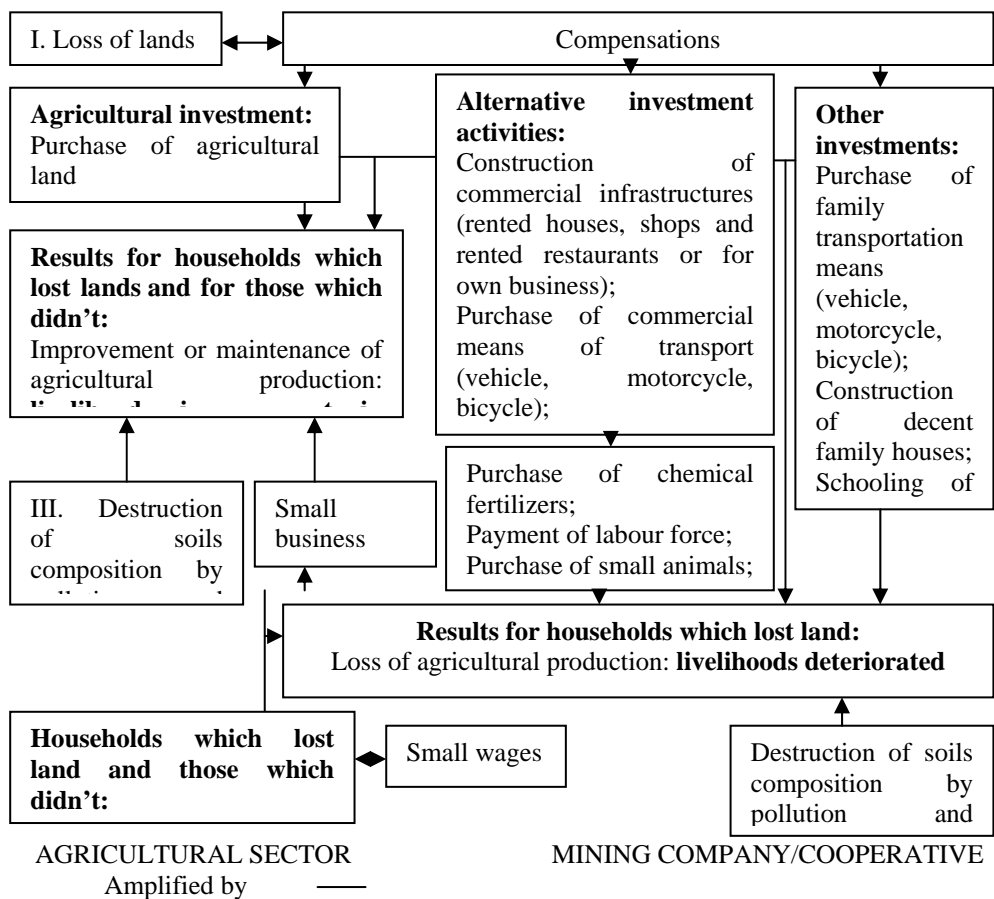


Figure 1. Adaptation and livelihood strategies

Source: Designed by the author

The main negative effects of mining on agriculture, both in Gahoma and Ruhororo, are the loss of land and goods, the loss of agricultural labour force, and the destruction of soils composition by water pollution and erosion, especially at Gahoma. But in return, some households which lost land and goods received compensations (all 17 households at Ruhororo; and only 20 households out of 35 households which lost land and were part of the sample at Gahoma). It should be noted here that the "TMB" mining company only compensated 25 households out of 80 households that lost land and goods on the entire Gahoma hill. The use of compensations received has been different, with different results. For some, they have allowed them to reinvest directly in agriculture by buying more farmland and domestic animals; others have invested in alternative activities such as the construction of commercial infrastructure, the purchase of commercial transport means, and trades; others have used their compensations in the two types of investments at once. The income from these alternative activities allowed them to

invest also in agriculture by buying chemical fertilizers, paying labour force, and buying animals, mainly pigs and goats. There are other households which have chosen to use their compensations in other investments such as the purchase of family transportation means, the construction of decent family houses, and the schooling of children. Some households which have not lost land, meanwhile, have embarked in complementary activities such as small business and trades cited in the figure. Alongside these investments, there are households among those who lost land, and among those who did not, of which some members had jobs in the mining company or cooperative. The wages of these jobs, because they are low, do not allow them to achieve much in terms of agricultural investment such as the purchase of land. They just allow them to buy chemical fertilizers, pay labour force, and buy a few small animals.

While prices of agricultural products have almost doubled over the period 2017-2021 including the duration of mining activities, the results show that only 2.8% and 21.4 % of the households surveyed were able to double their agricultural incomes respectively in Gahoma and Ruhororo. They nevertheless show that there was an improvement in general income in both two communities, because 27% of households at Gahoma had reached an income level greater than or equal to 1,580 FBu/day/adult equivalent, in addition to 20% of households which already had this level before the mining company; and 54.3% of households at Ruhororo had reached this level of general income, in addition to 21.4 % of households which already had this level before the mining cooperative. Rates of 47% and 75.7% include 17 households at Gahoma and 13 households at Ruhororo which lost land and goods, but which chose to invest their compensations directly in agriculture, or this one with investment in alternative activities at once. The remaining ones, i.e. 37 households at Gahoma (including 18 households which lost land, among which only 3 were compensated), and 17 households at Ruhororo (including 4 households which lost land, all compensated) had general incomes less than 1,580 FBu/day/adult equivalents at the survey's time. The three (03) households at Gahoma and the four (04) households at Ruhororo invested their compensations not directly in agriculture; but in alternative activities, or in other types of investment, or in both at once. These have had, even in presence of members working in the mining company or cooperative, a heavy loss of production. Two of these four households at Ruhororo, with the three households at Gahoma, are currently facing a crisis of livelihoods as well as the fifteen households who have not had their compensations at Gahoma.

CONCLUSIONS

Despite negative external factors, the local cooperative tries to respect its community commitments. Its positive results (compared with those of the reference group) regarding agricultural production and income, as well as general income, are promising, and are already improving the livelihoods of many households (75.7% of households of the sample), even if farm income is largely linked to the rise of products prices on the market. However, the Russian company does not

respect its community commitments, and its negative results (compared with those of the reference group) regarding agricultural production and income testify to this. It nevertheless allowed an improvement in general income, thanks to jobs created and alternative activities to agriculture developed by households. But this concerns a small number of households (47% of households of the sample). This leads to conclude that the mining company has deteriorated household livelihoods in general, especially by deteriorating their agricultural activities. In the case of the latter, it is questionable whether these alternative activities that are emerging can be viable and compensate the losses of agricultural production in the future, losses already evaluated at 673 kg/household/year, when mining companies are mechanizing overnight by using less and less labour force in a sector with exhaustible resources, and where the State is absent on the ground to monitor the implementation of commitments, and ensure a viable profit for households, by reconciling agricultural development and alternative activities development at once.

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