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EFFECTS OF GOLD MINING ACTIVITIES ON RURAL HOUSEHOLDS' MATERIAL WELLBEING IN OSUN STATE, NIGERIA

Bello Monsuru Adekunle[*1], Oluwagbenga Titus Alao[1], Solomon Adedapo Adesoji[2] Idris-Adeniyi Kaothar Modupe[1], Olanrewaju Khadijat Olaitan[1]

[1]Department of Agricultural Extension and Rural Development, Faculty of Agricultural Production and Management, Osun State University, Nigeria
[2]Department of Agricultural Extension and Rural Development, Faculty of Agriculture, Obafemi Awolowo University, Ile Ife, Nigeria

Abstract: This study investigated the effects of gold mining activities on rural households' material wellbeing in Osun State, Nigeria. It described rural households' socio-economic characteristics, the living conditions, their perception and also their level of material wellbeing. A multistage sampling procedure was used for the selection of 415 rural household heads in the mining affected communities (AC) and the non-affected communities (NAC). Data was analyzed using descriptive statistics and independent t-test. Their mean annual household income was 772,320 ± 352800 and 2,682,720 ± 780,360 in the AC and NAC, respectively. Majority (78.1%) of the rural household heads in the AC now made use of borehole for domestic uses owning to high contamination of surface water while half (52.2%) of the NAC respondents were still using community stream or river. The rural household heads in the AC strongly opposed the statement that gold mining activities enhance marketing of agricultural produce (1.55 ± 0.64). Also, the NAC household heads disagreed with the statement that gold mining activities offer alternative incomes sources (1.49 ± 0.71). Virtually all (97.2%) AC household heads had significantly low material wellbeing due to high effects of the gold mining activities on them in contrast to the relatively high (99.5%) material wellbeing in the NAC. In conclusion, gold mining activities jeopardized the material wellbeing of its hosting rural community households. Strict policy-backed regulations should be implemented for the adequate relocation and compensation of rural household heads in gold mining areas.

[*]Corresponding Author. Email address: bellomansur64@gmail.com.
ORCID number: 0009-0003-4601-3878

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INTRODUCTION

Mining of mineral resources contribute significantly to generation of more revenue for the government through tax and foreign exchange. It creates rooms for employment opportunities in the host communities. Mining has been known to contribute significantly to national economic development [1]. Because of monetary value of gold in the world market and high demand as industrial raw materials across the globe [2]. Mining of gold has been a focal point in the economic diversification policy of the Federal Government of Nigeria. It is without doubt one of the main economic drivers for many countries in the world [3]. Large scale gold mining operations help in providing employment opportunities, generate income and foreign currency [4] for hosting countries and communities. However, despite all the benefits accrued to mining of gold, most literature established its negative environmental implications such as deforestation; land degradation, pollution of water sources and toxic substances exposure such mercury and heavy metals [5, 6,7].

Coupled with licensed gold mining activities are the persistence activities of artisanal gold miners in Nigeria. Artisanal gold mining activities are mainly characterized with the use of crude or rudimentary tools and techniques and mostly carried out illegally with result in environmental hazards and insecurity [8]. Most Nigerians in the mineral dominated rural areas engage in this type of mining as additional source of income [10] The impact of gold mining activities on the environment cannot be overemphasized. Environmental degradation which is mostly caused by mining gold enhances food insecurity, poverty and agricultural productivity suffered a serious setback [11]. The study conducted by [12] revealed that gold mining activities had led to a significant loss in farm revenue due to destruction of crops, soil degradation and water pollution as well as upsurge of criminal activities in the study area.

Prominent in the literature is that rural areas in developing countries such as Nigeria are usually neglected communities especially in the provision of infrastructural and social amenities, communication facilities, industries and absolutely engaged in farming.
[13] opined that rural area is an area or settlement in which half or more than half the adult male working population is engaged in farming.
Rural households are individuals living together under the control of a head in a lowly-populated areas where major occupation is farming. Rural households in developing countries, particularly in Sub-Saharan Africa, are reported to face a variety of developmental issues, including low purchasing power (poverty), low and poor food consumption (food insecurity and undernourishment), underemployment, and general poor welfare [14] and [15]. These challenges were further exacerbated by the perceived threats of gold mining activities to sustainable livelihoods which invariably affecting the material wellbeing of rural households in the study area. Material wellbeing refers to as the individual's satisfaction and fulfillment obtained from their economic resources [16].

Gold mining project was licensed and began operation in the year 2019 [17] for economic growth and development of the country, State and the hosting rural communities. Adequate use of the proceeds from the project is expected to enable the rural households lived well and satisfied in their communities. However, the rural households are combating the negative effects of gold mining activities such as high level of soil degradation, landscape damage, ground and surface water contamination, flooding, deforestation and destruction of arable and cash crops which consequently resulted in their poor living condition while the gold mining project was acclaimed for enhancing the State's internally generated revenue (IGR) and helping in diversifying the economy of the country. Various studies such as [18, 19, 20, 21], and others have been conducted in the study area on the impacts of gold mining activities but not in relation with material wellbeing of rural households. Therefore, the demographic characteristics (age, sex, marital status, household size, educational level) were described, the living conditions of rural households were examined, the perceived effects of gold mining activities on material wellbeing of rural households was investigated while the rural households' material wellbeing was also described to bridge the gap while no significant difference between the material wellbeing of rural household heads in the AC and NAC was hypothesized.

MATERIALS AND METHODS

Study Area

The study area is Ọsun State, inland state in Southwestern Nigeria having highest gold exploration compared to the other states in the region The state was formed from the Southeast of Oyo State on 27 August, 1991 and has its capital at the city of Osogbo. Of the 36 states of Nigeria, Osun is the ninth smallest in area and nineteenth most populous with an estimated population of above 4 million as of 2022 [22]. It is bounded in the North by Kwara State, in the East partly by Ekiti State and partly by Ondo State, in the South by Ogun State and in the West by Oyo State. There are three Agricultural zones in Osun State namely, Ife/Ijesha, Iwo, and Osogbo. The Ife-Ijesha zone is the most mineral rich with highest gold deposits. Gold mining is replete in many parts of the zone by licensed corporations as well as artisanal mining. There are 10 Local government areas and 2 of these namely Atakumosa East and Atakumosa West LGAs are the most intensively explored. Given this, this study focused on the host communities in these two LGAs as well as the adjoining communities to investigate the gold mining activities on the populace. Characteristically, the two LGAs are rural and the people derive livelihood mainly from agricultural activities. As such, they are dependent on the land resource for their farming as means of sustenance and economy. The advent of mining activities with attendant land degradation effects thus puts pressure on the livelihood and living conditions of the mining areas which are tagged as the affected communities in this study, while other areas not yet explore are referred to as the non-affected communities.

Sampling procedure and Sample size

The study population is the rural household heads in the affected and non-affected communities in the 2 mining LGAs (Atakumosa East and West) of Ife-Ijesha agricultural zone of Osun State.

The five most affected communities are namely Iperindo, Imogbara, Odo – Ijesha, Itagunmodi and Araromi. These communities are prominently explored by the miners, both artisanal and licensed corporations. As such they were purposively selected for the study. More so, neighbouring communities in the same LGs, characteristically about the same in terms of composition, size and infrastructure were purposively selected to serve as basis of comparison of the effects of the mining activities. These non-affected le communities are Ilu Isegun, Orisumbare-loode, Aasa, Odesomi and Balogun). From the total population (N) of 12,545 rural households in these 10 communities, representative sample calculated with Yamane formular (n=384 and approximated to 400) was distributed among the 10 communities based on probability proportion to size (PPS). Eventually a total of 214 and 201 household heads were randomly sampled from the affected and non-affected communities, respectively. Therefore, the total sample size for the study was 415.

Data Collection and Analysis

The instrument used for data collection was a validated interview schedule and reliable with the Cronbach Alpha score of 0.75. How rural households perceived the effects of gold mining activities on their material wellbeing compared to others was measured on a 5 – point Likert type scale "More than almost anyone, More than most people, About average, Less than most people and Less than almost anyone". The responses were scored 5, 4, 3, 2 and 1 respectively. Weighted Mean Score (WMS) was used for ranking of the responses. The material wellbeing of the rural household heads was by transposing the scores of the responses such that the rural household heads responded affected 'More than most people' indicated the lowest material wellbeing while the respondent with affected 'less than almost anyone' indicated highest material wellbeing. The minimum score (25), maximum score (71) and mean score (54.08 ± 7.76) were obtained for rural households' material wellbeing in the AC while in the NAC, the minimum score (19), maximum score (40) and mean score (24 ± 3.12) were obtained. The rural households' material wellbeing was categorized based on the mean score obtained. The rural household heads with below mean scores were categorized as having low material wellbeing in both AC and NAC while the rural household heads with mean score and above were categorized as having high material wellbeing in both AC and NAC. The collected data were analyzed using descriptive tools such as frequency counts, percentages, mean and standard deviation. Inferential tools such as Pearson Product Moment Correlation (PPMC), Chi – square and Independent sample test.

RESULTS AND DISCUSSIONS

Socio-Economic Characteristics of Rural Households

The results of the findings in Table 1., reveal that mean ages of 54.87±10.53 years and 54.35±7.57 years at the AC and NAC, respectively were obtained.

This indicates that higher proportions of the rural household heads in the study area were already ageing and thus old enough to express their mind on the effects of gold mining activities on their material wellbeing in the study area. [23] Omotayo (2020) revealed similar average age category among rural household heads in his study in Southwest, Nigeria. The findings on sex also indicate that majority (72.9% and 71.6%) of the rural households were male headed in both AC and NAC respectively. The high proportion of male headed rural households in the study area might be as a result of the fact that men have more access to productive resources most especially farmland than women. This agrees with earlier reports such as [24] affirming the dominance of males over females as household heads in their separate studies. The findings on the marital status show that in the AC and NAC respectively, majority (78.5% and 71.6%) of the rural households were married.

The mean household size in both AC and NAC were 5.4 ± 1.49 and 8.81 ± 2.41 respectively. The larger household size in the NAC implies that rural household heads have more number of people under them being used as farm labour than in the AC. Moreover, the average years of education in the AC and NAC respectively were 4.79 ± 4.95 and 6.23 ± 3.150 years respectively. The implication of this is that low formal education accessed could affect their decision making on the effect of gold mining activities on their material wellbeing as the higher educational status is expected to be accompanied by better decision making.

1. Results of Socio-Economic Characteristics of rural household heads in AC and NAC

Variables	(AC) Freq %	Mean ± SD	NAC Freq %	Mean ± SD
Age (years)		54.87 ±10.53		54.35 ± 7.59
20 – 40	28 13.1		11 5.5	
41 – 60	120 56.1		168 83.6	
Above 60	66 30.8		22 10.9	
Sex				
Male	156 72.9		144 71.6	
Female	58 27.1		57 28.4	
Marital status				
Single	1 0.5		1 0.5	
Married	168 78.5		144 71.6	
Separated	22 10.3		32 15.9	
Divorced	12 5.6		5 2.5	
Widowed	11 5.1		19 9.5	
Household size		5.4 ± 1.49		8.81 ± 2.41
1 – 4	64 29.9		8.0 4.0	
5 – 8	148 69.2		67 33.3	
Above 8	2 0.9		126 62.7	
Annual income (#)		772,320 ± 352800		2,682,720 ± 780,360
1,200,000 and below	207 96.7		12 6.0	
1,212,000 – 2,400,000	7 3.3		97 48.3	
2,412,000 – 3,600,000	0 0.0		84 41.8	
3,612,000 – 4,800,000	0 0.0		8 4.0	

Source: Field survey (2024).

The living conditions of rural households in the study area

The rural household heads were asked questions on possession of some material items that enhance the living condition as stated in Cummins scale 1997 and adopted by [25].

The responses were analyzed using descriptive statistics. Results in Table 2., show the living conditions of the rural households in the study area.

Analysis on the type of house the rural households were living shows that majority (65.5% and 73.1%) of them respectively in the AC and NAC were living in a - wing apartment, the apartments were personally owned by close to half (48.1% and 46.8%) of them respectively in the AC and NAC while most (90.0% and 83.6%) of the rural households in the NAC and AC, respectively made use of mud block for their building constructions. This might be as a result of the fact that mud or earthen houses are considered to be environmentally friendly and affordable as compared to houses built with concrete or fired clay bricks [26]. Data on roofing shows that most (93.0%) of the rural households' houses have short span aluminum roofing sheet in the NAC while the same materials were used by majority (82.2) of them in the AC. Also, majority (78.1%) of the rural households in the AC were making use of borehole available in their community while half (52.2%) of them were using stream or river water for drinking and domestic use in the NAC. The higher proportion of respondents using the available borehole might be as a result of change in quality of the available water in the AC while the quality of the available water remains intact in the NAC. Firewood happened to be source of energy for cooking by larger percentage (89.5%) of rural households in the NAC while many (65.9%) of them were also using firewood for cooking in AC. Information collected and analyzed on the type of toilet used by the rural households in the study area reveals throwing in the bush. This was indicated by majority (80.1%) of them in the NAC while little above average (55.1%) used the same method to comfort themselves in the AC. Toilet availability has a great influence in the health condition of individuals in society. It is an integral part of building as it determines the environmental wellness and influences the occurrence of water and food borne diseases like cholera, diarrhea and typhoid fever [27].

Fig. 1.1. Building structure affected by blasting in the AC
Source: Field survey (2024).

Fig. 1.2. Building structure in the NAC
Source: Field survey (2024).

Fig. 1.3. Rural water contaminated by gold mining activities in the AC
Source: Field survey (2024).

Fig. 1.4. Building structure in the NAC
Source: Field survey (2024).

Table 2. Living condition of rural households in the study area, n = 415

Material wellbeing questions / statements	Housing features	AC (n=214)		NAC (n=201)	
		Freq.	%	Freq.	%
Where do you live?	A room	4	1.9	1	0.5
	A room and parlour	62	29.0	39	19.4
	A wing	139	65.0	147	73.1
	A flat / apartment	9	4.2	14	7.0
	A duplex	-	-	-	-
Type of ownership of the building	Inherited	32	15.0	69	34.3
	Family / Friend's house	27	12.6	2	1.0
	Rent	52	24.3	36	17.9
	Personally own	103	48.1	94	46.8
	Hut	-	-	1	0.5
Type of materials used for building	Mud block	179	83.6	181	90.0
	Stored rain water	2	0.9	2	1.0
Sources of drinking water	Stream / River	2	0.9	105	52.2
	Well	42	19.6	33	16.4
	Tap	-	-	-	-
	Borehole	168	78.5	61	30.3
Sources of household energy	Firewood	141	65.9	180	89.5
	Charcoal	61	28.5	15	7.5
	Kerosine	-	-	-=	-
Type of toilet used	Throwing or burying in the bush	118	55.1	161	80.1
	Public pit toilet	1	1.9	1	0.5
	Residential pit toilet	65	30.4	21	10.4
	Semi – water closet	14	6.5	9	4.5
	Water closet	13	6.1	9	4.5

Source: Field survey (2024).

Perceived Effects of gold mining activities on material wellbeing of the rural households

How the rural households perceived the effects of gold mining activities on their material wealth compared to others was shown on Table 2. The result reveals that respondents in the AC ranked effects of gold mining activities on arable land and cash crop land 1st with the mean values of 4.45± 0.81 and 4.45 ± 0.86 respectively. There was a similar ranking (1st) of the effect of gold mining activities on arable land and cash crop land with mean scores of 1.02 ± 0.28, 1.02 ± 0.28 and 1.02 ± 0.28 respectively in the NAC. The result of this finding implies that the rural household heads felt high effects of gold mining activities on their material possession such as arable land and cash crop land more than most people in the AC but in the NAC, the rural household heads felt the effect of gold mining activities less than almost anyone because no mining is taken place there. The resultant implication of this in the AC might be persistence poverty and food insecurity which might negatively impact their material wellbeing. The buildings of rural household heads were impacted next (ranked 2nd) with the mean score of 4.29 ± 1.02 in the AC while in the NAC, the effects of gold mining on the rural buildings was ranked 1st with the mean score of 1.02 ± 0.28.

This indicates that the rural household heads in the AC were more impacted than most people by the gold mining activities effects on their building while the NAC rural household heads' building were less affected than almost anyone. The higher impact on the AC buildings might be consequent on gold mining activity known as blasting. Blasting results into cracking and dilapidation of most of the buildings in the AC and this might force most of the rural households out of their comfort zones. Movement of vehicles (ranked 3rd) in the AC (4.10 ± 1.08) became more difficult for rural household heads because of pits from gold mining while the view was also similar in ranking (3rd) for the NAC (1.01 ± 0.21) rural household heads.

Furthermore, the rural household heads' forest land, livestock, processing equipment, farm tools / equipment and use of ICT tools were ranked (4th, 5th, 6th, 7th and 8th respectively with Mean and Standard Deviation closer to 4.0) in the AC while in the NAC, the forest land, livestock, processing equipment, farm tools / equipment and use of ICT tools were all ranked 3rd with Mean and Standard Deviation of 1.0. This finding also shows that the rural household heads in the AC faced high effects of gold mining activities on the listed material items more than most people while in the NAC, the rural household heads felt the effect of gold mining activities on the material items less than almost anyone. In a nutshell, as the rural household heads felt more effects of gold mining activities on all the material items considered in the study, the material wellbeing of the rural household might be jeopardized and the likelihood of being demoralized from continue their livelihood activities in the area is close to certainty. Therefore, there is need for consideration of the general wellbeing of the rural households in the gold mining affected areas.

Table 3. How rural households perceived the effects of gold mining activities on their material wealth compared to others

Material items	AC		NAC	
	Mean ± SD	Rank	Mean ± SD	Rank
Gold mining activities affect arable land	4.45 ± 0.81	1st	1.02 ± 0.28	1st
Gold mining activities affect cash cropland	4.45 ± 0.86	1st	1.02 ± 0.28	1st
Gold mining activities house / building structure	4.29 ± 1.02	2nd	1.02 ± 0.28	1st
Gold mining act.s affect vehicles movement on the farm	4.10 ± 1.08	3rd	1.01 ± 0.21	3rd
Gold mining activities affect forest land	3.88 ± 1.32	4th	1.01 ± 0.21	3rd
Gold mining activities affect livestock	3.72 ± 1.40	5th	1.01 ± 0.00	3rd
Gold mining activities affect processing equipment	3,69 ± 1.35	6th	1.0 ± 0.00	3rd
Gold mining activities affect farm tools / equipment	3.67 ± 1.40	7th	1.0 ± 0.00	3rd
Gold mining activities affect the use of ICT	3.39 ± 1.48	8th	1.0 ± 0.00	3rd

Source: Field survey (2024).

Level of material wellbeing of the rural households

Results in Table 4., show the material wellbeing level of the rural households. It was revealed that virtually all (97.2%) of the rural household heads in the AC had low material wellbeing due to high effects of the gold mining activities while it was high (99.5%) in the NAC since they were not affected by the mining activities.

With this low level of material wellbeing of the rural household heads that are primarily in production of food and cash crops might relocate from the areas. This might result in food insecurity and high rate of poverty for those that remain in the area and attainment of Sustainable Development Goals (SDGs) objectives one, two, three and six (Eradicate poverty, banish hunger, guaranteeing a healthy life / wellbeing and provide clean water and sanitation) could be difficult to achieve. Also, NAC rural household heads' over population and competition for the available farming resources might be the consequent as a result of the relocation of the mining affected rural households heads. The pictures in the appendix indicated a significant difference between the AC and NAC material wealth which validated the result of this finding. [28] concluded that gold mining activities had potentials for rapid loss of farm economic trees, water pollution, land degradation and problems associated with mine wastes management that will eventually devastate their material wellbeing. Segilola Gold Mining Activities had been reported by [29] to have a great effect on the land use and land cover in the areas, as land use and land cover types such as rock outcrop, shrub, forest and a little portion of built-up area had been converted into a bare land and thereby reducing the material wealth possession of the rural household heads.

Table 4. Distribution of respondents based on level of the material wellbeing of the rural household heads, n = 415

Communities	Level Materialwellbeing	Freq	%	Mean / SD	Minimum score	Maximumm score
AC (n=214)	High	6	2.8	54.08±7.759	25	71
	Low	208	97.2			
NAC (n=201)	High	200	99.5	24.74±3.123	19	40
	Low	1	0.5			

Source: Field survey (2024).

Test of Hypothesis

Table 5., reveals that significant difference (t= -49.83; at P=0.000) exists between the rural household heads' material wellbeing of AC and NAC. This implies that the material wellbeing of the rural household heads in the AC had been seriously impacted by the operations of the gold miners. This might demotivate them from living in the area and future consequence on food security, income and poverty level might be unimaginable.

Table 5. Test of significant difference in the gold mining effects on material wellbeing of affected and non-affected households

		Mean of effects on material wellbeing	Std. Deviation	T	Sig	Decision
Material wellbeing	NAC	24.76	3.11	-49.827	0.000	S
	AC	53.49	7.80			

Source: Field survey (2024).

CONCLUSION

The study depicts rural households' resident in mud houses where they prominently rely on firewood as source of cooking energy in both the AC and NAC. The exploration of gold in the communities was generally affirmed to cause land degradation, reduce land availability for farming and jeopardise agricultural productivity and income. The first-hand experience of the mining effects by the rural households in AC was reflected with near consensus agreement of the adverse social, economic and environmental effects on wellbeing while

those in the NAC were mostly neutral in dispositions to the statements. As a result, the material wellbeing of the households in the AC was grossly low while their counterparts in the NAC had relatively high material wellbeing. It was concluded that gold mining activities undermined the material wellbeing of rural households resident in the mining areas. It was recommended that policy backed legislation should be put in place for the strategic relocation and adequate compensation of rural households in areas of gold exploration of Osun State, Nigeria.

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UTICAJI AKTIVNOSTI KOD RUDARENJA ZLATA NA MATERIJALNO BLAGOSTANJE SEOSKIH DOMAĆINSTAVA U DRŽAVI OSUN, NIGERIJA

Bello Monsuru Adekunle[1], Oluwagbenga Titus Alao[1], Solomon Adedapo Adesoji[2] Idris-Adeniyi Kaothar Modupe[1], Olanrewaju Khadijat Olaitan[1]

[1]Department of Agricultural Extension and Rural Development,
Faculty of Agricultural Production and Management,
Osun State University, Nigeria
[2]Department of Agricultural Extension and Rural Development,
Faculty of Agriculture, Obafemi Awolowo University, Ile Ife, Nigeria

Abstract: Ova studija je istražila efekte aktivnosti kod rudarenja zlata na materijalno blagostanje seoskih domaćinstava u državi Osun, Nigerija. Opisane su socio-ekonomske karakteristike seoskih domaćinstava, uslovi života, njihova percepcija, a takođe i njihov nivo materijalnog blagostanja.
Za izbor 415 nosilaca seoskih domaćinstava u zajednicama pogođenim rudarstvom (ZPR) i zajednicama koje nisu pogođene rudarstvom (ZNPR) korišćen je višestepeni postupak uzorkovanja.
Podaci su analizirani korišćenjem deskriptivne statistike i nezavisnog t-testa. Utvrđen prosečan godišnji prihod domaćinstva bio je 772.320 ± 352.800 i 2.682.720 ± 780.360 u ZP i ZNPR, respektivno. Većina (78,1%) nosilaca seoskih domaćinstava u ZPR sada koristi bušotine za kućnu upotrebu zbog visokog zagađenja površinskih voda, dok polovina (52,2%) ispitanika u ZNPR i dalje koristi potok ili reku za potrebe zajednice. Nosioci seoskih domaćinstava u ZNPR snažno su se protivili tvrdnji da aktivnosti vađenja zlata poboljšavaju marketing poljoprivrednih proizvoda (1,55 ± 0,64).
Takođe, nosioci domaćinstava u ZNPR nisu se složili sa tvrdnjom da aktivnosti rudarenja zlata nude alternativne izvore prihoda (1,49 ± 0,71).

Gotovo svi nosioci domaćinstava (97,2%) u područjima sa rudarenjem zlata (zajednice pogođene rudarstvom-ZPR) imali su značajno nisko materijalno blagostanje zbog velikog uticaja aktivnosti-posledica rudarenja zlata na njih, za razliku od relativno visokog (99,5%) materijalnog blagostanja u severozapadnom delu područja-oblasti, bez uticaja rudarenja zlata (zajednice koje nisu pogođene posledicama rudarenja-ZNPR).

Zaključno, aktivnosti rudarenja zlata značajno su ugrozile materijalno blagostanje domaćinstava u predelu-oblasti gde se obavlja rudarenje.

Treba sprovesti stroge regulacione propise, zasnovane na politici, radi adekvatnog preseljenja i nadoknade nosiocima domaćinstava u oblastima sa rudarenjem zlata.

Ključne reči: *Ugrožene zajednice, neugrožene zajednice, degradacija zemljišta; percepcija; nosioci seoskih domaćinstava.*

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