Environmental Overview of ANTAM Gold Mining Business Unit

Geographical Location and Area

ANTAM Gold Mining Business Unit . located in Bantar Karet Village, Nanggung District, Bogor Regency, West Java Province. Geographically it is located at coordinates 106^{O} 30' 1.0" - 106^{O} 35' 38.0" East Longitude and 02^{o} 6^{O} 36' 37.2" - 6^{O} 43' 11.0" South Latitude with an altitude of 400 – 1800 M.dpl. ANTAM Gold Mining Business Unit has a Mining Concession (KP) Exploitation area of KW 98 PP 0138 of 6,047 ha. Accessibility to the location ANTAM Gold Mining Business Unit Can be reached with a distance of ± 54 KM. The travel route from Bogor uses four-wheeled or two-wheeled vehicles via land. Below is a location map ANTAM Gold Mining Business Unit .

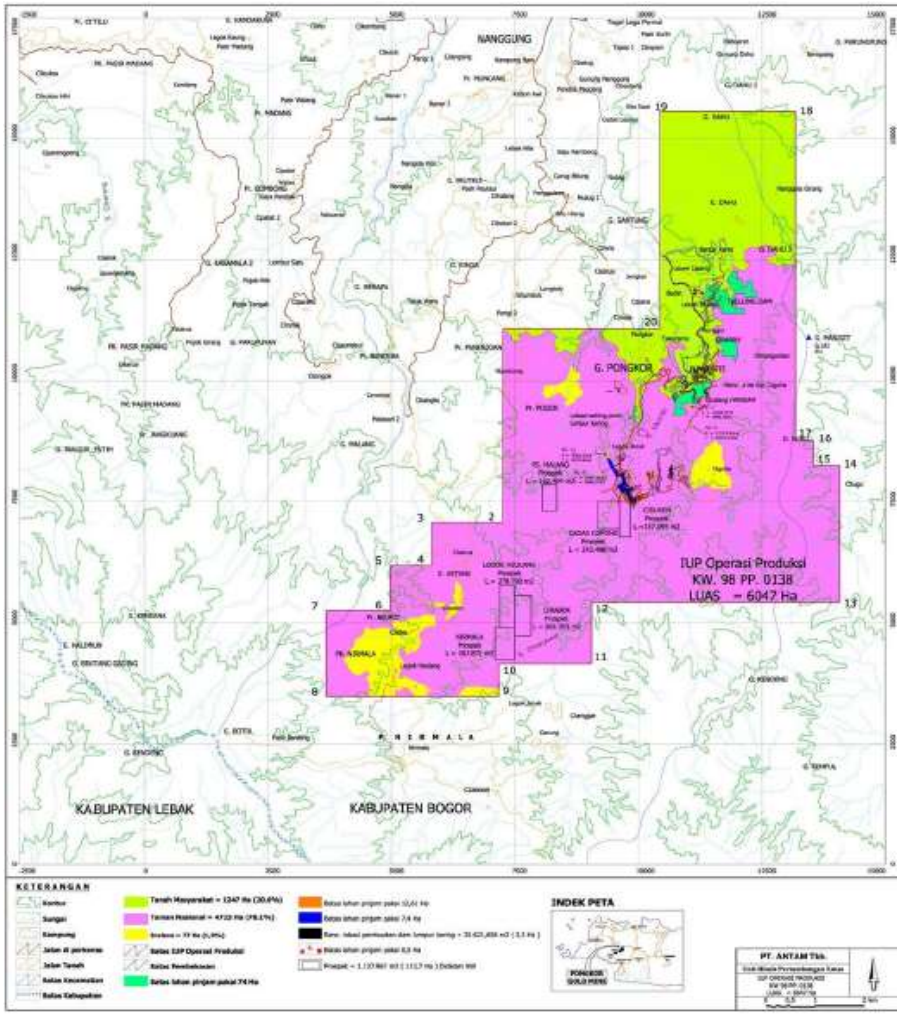


Figure 1. Location map ANTAM Gold Mining Business Unit

The Gold Mining Business Unit is one of the business units of ANTAM which manages underground gold mining & processing in Bogor Regency, West Java.

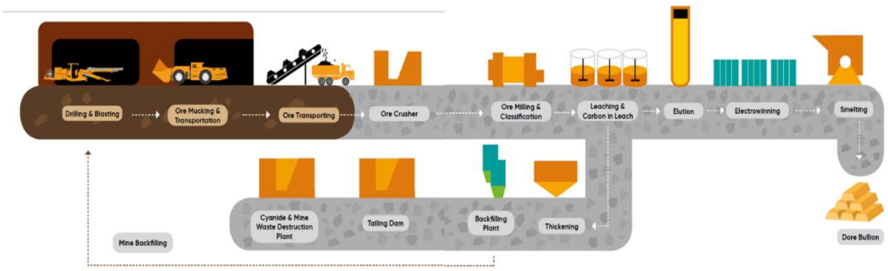


Figure 2. Production process ANTAM Gold Mining Business Unit

Underground gold ore mining is carried out using the method cut-and-fill both conventionally and mechanically with equipment jumbo *drill* and load *haul dump* (LHD). The gold ore processing plant uses the method leaching (leaching). In the initial stage, the gold ore that has been mined will be crushed using an ore *crusher* and fed in ball *mill* for advanced size refinement processes. Reagents are then added to the fine ore leaching in the form of cyanide and lime as a pH controller to produce *fines slurry* which will be fed into the circuit leaching. Then the leaching tank is filled with activated carbon which will progressively absorb the gold and silver metal contained within the fine *slurry*. The metal absorbed by carbon is then recovered through an elution process with the AARL system (*Anglo American Research Laboratory*) which will produce a rich solution (eluate) which has a high gold and silver content. The eluate will then flow to the circuit electrowinning where gold and silver will be deposited on the cathode stainless *steel*. The cathode will then be washed and dried and then melted into bullion.

Overview of the ANTAM Gold Mining Business Unit Biodiversity Conservation Area.

The biodiversity of an area is an indicator of the success of an area in the balance and sustainability of an ecosystem. Efforts to maintain diversity continue to be made both in terms of regional legislation and intensive monitoring. The legality of areas in the eyes of the law, such as national parks, nature reserves and business management in forest areas, is also continuously monitored as a form of good performance in maintaining biodiversity. Efforts to preserve biodiversity cannot be separated from the protection, preservation and utilization of an area which can run simultaneously. Protection of an area can be done by patrolling and protecting protected species. Preserving an area can be done by cultivating plant species and breeding animals, and utilizing the area can be done by exploring the area's potential.

This is what ANTAM should do. Gold Mining Business Unit as a State-Owned Enterprise which operates in the underground gold mining sector where the ANTAM Mining Business Permit (IUP) Area. Gold Mining Business Unit is in the Gunung Halimun Salak National Park (TNGHS) area. Improvement efforts and restoration of forest ecosystems as a form of responsibility for the use of ANTAM area. Gold Mining Business Unit continues to be carried out, such as replanting local plant species,building a Biodiversity Conservation Center (PKKH), and a Research and Education Center for Native Trees and Plants (P4TA) in collaboration with the Gunung Halimun Salak National Park (TNGHS). Therefore, preserving biodiversity is important in the context of sustainable conservation efforts for the park's

flora and fauna. Mount Halimun Salak National Park is included in the IUP area of ANTAM Gold Mining Business Unit in it.

ANTAM Gold Mining Business Unit Most of them carry out conservation programs in the Gunung Halimun Salak National Park (TNGHS) area. The following are the characteristics of the Gunung Halimun Salak National Park (TNGHS) area.

SUCCESS OF BIODIVERSITY PROTECTION PROGRAMS
ANTAM GOLD MINING BUSINESS UNIT

1. DATA ABSOLUTE

The following is absolute data on ANTAM Gold Mining Business Unit's biodiversity protection program from 2019 – 2023 (June).

Table 1. Absolute Results of Biodiversity ANTAM Gold Mining Business Unit

No	Program	Type of Species / Area	Absolute Results										Unit
			2019		2020		2021		2022		2023*		
			Absolutely	Budget (Rp)	Absolutely	Budget (Rp)	Absolutely	Budget (Rp)	Absolutely	Budget (Rp)	Absolutely	Budget (Rp)	
1	Restoration of the Mount Halimun Salak National Park Ecosystem in Protected Forest Areas	Area	120	280.200.000	120	280.200.000	150	235.500.000	220	194.000.000	220	114.000.000	Ha
		Rasamala	18.000		33.000		48.000		58.000		70.000		child
		Puspa	15.000		30.000		43.000		50.000		60.000		child
		Hair			10.000		22.000		29.000		40.000		child
		Ganitri	3.500		3.500		3.500		10.500		10.500		child
		Kisireum							2.400		2.400		child
		Hamerang							1.500		1.500		child
		Famous							1.400		1.400		child
		Darangdan							700		700		child
		Immediately							500		500		child
		Caringin							500		500		child
		Kiputri			3.500		3.500		3.500		3.500		child
		Greetings					10.000		10.000		15.000		child
		Bayur	10.000		10.000		10.000		10.000		10.000		child
		Install	10.000		20.000		20.000		20.000		20.000		child
		Kiriung child	3.500		6.500		6.500		6.500		6.500		child
		Chimeras			3.500		3.500		3.500		3.500		child
		Index	1,64		2,38		2,49		2,82		2,42		H'
2	Biodiversity Conservation Program*On Site*	White Starling (*Sturnus*	72	52.000.000	74	57.000.000	77	75.000.000	80	62.000.000	82	75.000.000	tail

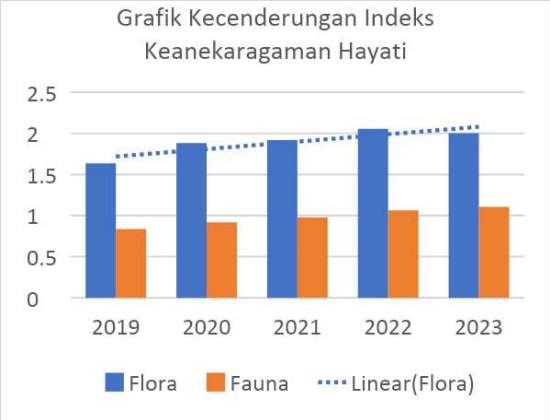
No	Program	Type of Species / Area	Absolute Results										Unit
			2019		2020		2021		2022		2023*		
			Absolutely	Budget (Rp)	Absolutely	Budget (Rp)	Absolutely	Budget (Rp)	Absolutely	Budget (Rp)	Absolutely	Budget (Rp)	
	through *In Breeding* & *Reintroduction* White Starling (*Sturnus melanopterus melanopterus*) with Status *Critical Endangered*-IUCN Red List in collaboration with the Cikananga Integrated Conservation Foundation (YCKT) and Mount Halimun Salak National Park	*melanopterus melanopterus*)											
3	Conservation of Native Animals – Release and Monitoring of Key Fauna/Animals in the Antam IUP area and Mount Halimun Salak National Park	Bido Snake Eagle (*Spilornis cheela*)	8	12.000.000	10	12.000.000	12	36.000.000	15	156.000.000	21	90.000.000	tail
		Owa Jawa (*Hylobates Moloch*)	8		10		12		18		18		tail
		Javanese Eagle (*Nisaetus bartered*)	8		10		12		14		15		tail
		Index	1,1		1,09		1,04		0,82		0,63		H'
4	Empowering Conservation Village Partner Communities through Local Plant Cultivation &	Rasamala	18.000	314.000.000	15.000	182.000.000	15.000	389.000.000	10.000	249.000.000	12.000	158.000.000	child
		Puspa	15.000		15.000		13.000		7.000		10.000		child
		Hair			10.000		12.000		7.000		11.000		child
		Ganitri	3.500						7.000				child
		Kisireum							2.400				child
		Hamerang							1.500				child

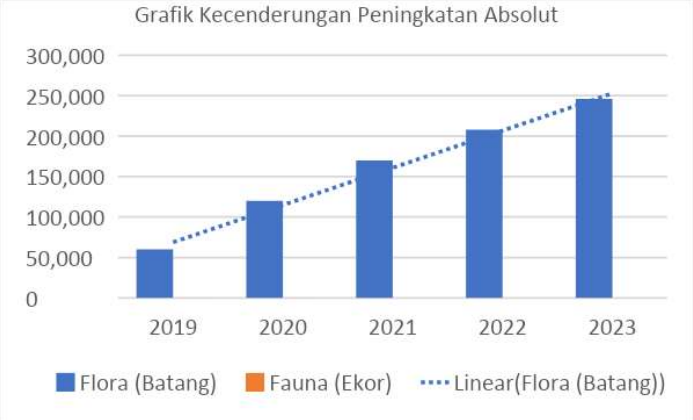
No	Program	Type of Species / Area	Absolute Results										Unit
			2019		2020		2021		2022		2023*		
			Absolutely	Budget (Rp)	Absolutely	Budget (Rp)	Absolutely	Budget (Rp)	Absolutely	Budget (Rp)	Absolutely	Budget (Rp)	
	Nursery Collaboration (*Silvicultur Trees Species Local*) Mount Halimun Salak National Park Area (TNGHS)	Famous							1.400				child
		Darangdan							700				child
		Immediately							500				child
		Caringin							500				child
		Kiputri			3.500								child
		Greetings					10.000				5.000		child
		Bayur	10.000										child
		Install	10.000		10.000								child
		Kiriung child	3.500		3.000								child
		Chimeras			3.500								child
		Index	1,64		1,77		1,3		1,49		1,14		H'
5	Implementation of Mycorrhizal Fungi for Ecosystem Recovery through Restoration in Conservation Forest Areas [Mount Halimun Salak National Park] Based on Community Empowerment Conservation Village Model [Social Forestry Farmers] – in Cisangku, Nanggung District, Bogor District	Number of Flora							38.000		38.000		child
		Index							1,49	192.000.000	1,14	134.000.000	H'

No	Program	Type of Species / Area	Absolute Results										Unit
			2019		2020		2021		2022		2023*		
			Absolutely	Budget (Rp)	Absolutely	Budget (Rp)	Absolutely	Budget (Rp)	Absolutely	Budget (Rp)	Absolutely	Budget (Rp)	
6	Genetic Conservation of Endangered Palahlar Plants in the Mount Halimun Salak National Park (TNGHS) area	**Palahs**									160	110.000.000	boy

*data until June

In general, there has been an increase in the biodiversity index value in all ANTAM conservation areas. ANTAM Gold Mining Business Unit's efforts to protect biodiversity are getting better. Gold Mining Business Unit can be seen from the following graph of the increase in the absolute value of the biodiversity protection program**.**





2. BIODIVERSITY INDEX CALCULATION METHOD

The biodiversity index value is calculated using the "Shannon-Wiener" index, namely by using the formula:

$$H' = -\Sigma pi \ln pi,$$

Where, pi $= \frac{in}{N}$

H' = Shannon-Wiener index

ni = Number of individuals of species i

N = Total number of individuals

The following are the criteria for the Shannon - Wiener Index value:

H' < 1: Low diversity;

1 < H' < 3 : Medium diversity;

H' > 3: High diversity.

3. PROOF OF ABSOLUTE DATA CALCULATION OF BIODIVERSITY PROTECTION PROGRAM

a. Mount Halimun Salak National Park Ecosystem Restoration Restoration Program in Protected Forest Areas

I. Program Description

ANTAM Gold Mining Business Unit also collaborates with the Gunung Halimun Salak National Park Office in terms of Restoration (Enrichment) as an effort to restore damaged forest ecosystems and restore the function of the TNGHS area in the form of planting native/local species by involving the surrounding community. The seeds used in this planting activity came from the ANTAM nursery. Gold Mining Business

Unit with the number of plants each year adjusted to the condition of degraded land. The number of seeds planted each year also represents the conservation program carried out by ANTAM Gold Mining Business Unit has been able to reduce damaged or degraded ecosystems every year.

Figure 3. Documentation of the Implementation of the Mount Halimun Salak National Park Ecosystem Restoration Program

II. Proof of calculation

Example of calculating the biodiversity index in the Mount Halimun Salak National Park Ecosystem Restoration Restoration Program using the Shannon – Wiener method:

Individual index calculation for 2022:

- Number of Rasamala = 58.000 children
- Total Conserved Flora = 208.000 children

- Rasamala Index

(H') : [– (58.000 /208.000) x Ln (58.000 /208.000)]

(H') : 0,356113048

Individual index calculation for 2022:

- Number of Puspa = 50.000 children
- Total Conserved Flora = 208.000 children
- Puspa Index

(H') : [– (50.000 /208.000) x Ln (50.000 /208.000)]

(H') : 0,342671893

Table 2. Recap of Individual Indexes for the Restoration Program for Ecosystem Recovery at Mount Halimun Salak National Park

Program	**Species Name**	**Number of Individuals**				
		2019	**2020**	**2021**	**2022**	**2023***
Empowerment of Conservation Village Partner Communities through Collaboration in Cultivation & Local Plant Nursery (*Silvicultur Trees Species Local*) Mount Halimun Salak National Park Area (TNGHS) Social] – in Cisangku, Nanggung District, Bogor Regency	Rasamala	0,36119	0,35502	0,35706	0,35611	0,35764
	Puspa	0,34657	0,34657	0,34769	0,34267	0,34414
	Hair	-	0,20708	0,26462	0,27470	0,29536
	Ganitri	0,16576	0,10310	0,07994	0,15074	0,13462
	Kisireum	-	-	-	0,05149	0,04517
	Hamerang	-	-	-	0,03557	0,03110
	Famous	-	-	-	0,03366	0,02942
	Darangdan	-	-	-	0,01916	0,01668
	Immediately	-	-	-	0,01450	0,01260
	Caringin	-	-	-	0,01450	0,01260
	Kiputri	-	0,10310	0,07994	0,06873	0,06050
	Greetings	-	-	0,16666	0,14591	0,17057
	Bayur	0,29863	0,20708	0,16666	0,14591	0,13019
	Install	0,29863	0,29863	0,25177	0,22517	0,20403
	Kiriung child	0,16576	0,15793	0,12480	0,10830	0,09601
	Chimeras	-	0,10310	0,07994	0,06873	0,06050

The absolute results of the Gunung Halimun Salak National Park Ecosystem Restoration Restoration Program can be seen in Table 3.

Table 3. Absolute Recap of the Gunung Halimun Salak National Park Ecosystem Restoration Restoration Program 2019 – 2023

Type of Species / Area	Absolute Results										Unit
	2019		2020		2021		2022		2023*		
	Absolutely	Budget (Rp)	Absolutely	Budget (Rp)	Absolutely	Budget (Rp)	Absolutely	Budget (Rp)	Absolutely	Budget (Rp)	
Area	120	Rp280.200.000,00	120	Rp280.200.000,00	150	Rp235.500.000,00	220	Rp194.000.000,00	220	Rp114.000.000,00	Ha
Rasamala	18.000		33.000		48.000		58.000		70.000		child
Puspa	15.000		30.000		43.000		50.000		60.000		child
Hair			10.000		22.000		29.000		40.000		child
Ganitri	3.500		3.500		3.500		10.500		10.500		child
Kisireum							2.400		2.400		child
Hamerang							1.500		1.500		child
Famous							1.400		1.400		child
Darangdan							700		700		child
Immediately							500		500		child
Caringin							500		500		child
Kiputri			3.500		3.500		3.500		3.500		child
Greetings					10.000		10.000		15.000		child
Bayur	10.000		10.000		10.000		10.000		10.000		child
Install	10.000		20.000		20.000		20.000		20.000		child
Kiriung child	3.500		6.500		6.500		6.500		6.500		child
Chimeras			3.500		3.500		3.500		3.500		child

b. Biodiversity Conservation Program*On Site* through*In Breeding* & *Reintroduction* White Starling (*Sturnus melanopterus melanopterus*) with Status*Critically Endangered* – *Red List* IUCN collaborates with the Cikananga Integrated Conservation Foundation (YCKT) and the Mount Halimun Salak National Park

I. Program Description

White Starling (*Sturnus melanopterus melanopterus*), is a medium-sized bird (23 cm) and black and white in color. In adult birds, starlings have all white feathers, except for the wings and tail which are black. When the bird is young, the head, neck, back and wing coverts are gray. White starlings have white backs and wing coverings in the Javanese and Madurese races (*Melanopterus*), dark gray on the Bali Island race (*third*), and a transitional race at the tip of East Java (*tricolor*). White starlings have yellow, featherless skin around their eyes and dark brown irises, a yellowish beak and yellow feet. White starlings have a loud and hoarse whistle. And white starlings are increasingly rare in the lowlands, including cities and yards, especially in East Java and Bali. White starlings have a habit of living in pairs or small groups, looking for food in open ground, such as grass fields and resting in trees.

Conservation program in collaboration with ANTAM Gold Mining Business Unit and the Cikananga Integrated Conservation Foundation have succeeded in increasing the population of white starlings in the area in *breeding* (In Situ conservation) Mount Halimun Salak National Park (TNGHS). ANTAM Gold Mining Business Unit is trying to innovate by providing papaya bait in the area*nest box* ANTAM IUP area. Gold Mining Business Unit and modifications nest *box* (habitat) as an effort to maintain and increase the population. This program has succeeded in having a positive impact on the status of the white starling by increasing its status to near critical or*Critically Endangered* which has been assessed by IUCN with results partially *successful*.

Table 4. Recap of animal monitoring

Program	Type	2019	2020	2021	2022	2023	Unit
Population	White Starling (*Sturnus melanopterus melanopterus*)	72	74	77	80	82	Tail
Enhancement			1,0278	1,04167	1,04167	1,0278	%

II. Proof of calculation

Calculation of the number of animals (white starlings) in conservation areas uses direct monitoring methods in the field. One of the methods used is:*binocular* and monitor directly from birdnest installed in several spots.

2019 Program Calculation

Number of White Starlings observed (A) = 72

Number of dead White Starlings (B) = 0

Total Number of White Starlings at the End of Year (C=A-B)	=	72
total individuals (N)	=	72
2020 Program Calculation		
Number of White Starlings observed (A)	=	74
Number of dead White Starlings (B)	=	0
Total Number of White Starlings at the End of Year (C=A-B)	=	74
total individuals (N)	=	74
2021 Program Calculation		
Number of White Starlings observed (A)	=	77
Number of dead White Starlings (B)	=	0
Total Number of White Starlings at the End of Year (C=A-B)	=	77
total individuals (N)	=	77
2022 Program Calculation		
Number of White Starlings observed (A)	=	80
Number of dead White Starlings (B)	=	0
Total Number of White Starlings at the End of Year (C=A-B)	=	80
total individuals (N)	=	80
2023 Program Calculation		
Number of White Starlings observed (A)	=	82
Number of dead White Starlings (B)	=	0
Total Number of White Starlings at the End of Year (C=A-B)	=	82
total individuals (N)	=	82

Absolute results of the Biodiversity Conservation program *On Site* through *In Breeding* & ReIntroduction White Starlings can be seen in Table 5.

Table 5. Absolute Recap of the Biodiversity Conservation Program *On Site* through *In Breeding* & *Reintroduction* White Starlings 2019 – 2023

Type of Species / Area	Absolute Results										Unit
	2019		2020		2021		2022		2023*		
	Absolutely	Budget (Rp)	Absolutely	Budget (Rp)	Absolutely	Budget (Rp)	Absolutely	Budget (Rp)	Absolutely	Budget (Rp)	
White Starling (*Sturnus melanopterus melanopterus*)	72	Rp52,000,000,00	74	Rp57.000.000,00	77	Rp75,000,000,00	80	Rp62.000.000,00	82	Rp75,000,000,00	tail

III. Native Animal Conservation Program – Release and Monitoring of Key Fauna/animals in the Antam IUP area and Mount Halimun Salak National Park

I. Program Description

Animal conservation carried out by ANTAM Gold Mining Business Unit is collaborating with the Gunung Halimun Salak National Park Office as a destination for releasing wild animals, especially the Bido Snake Eagle, Javan Gibbon and Javanese Eagle. Apart from the release, ANTAM Gold Mining Business Unit also carries out monitoring to ensure that the population of native animals in nature and those resulting from reintroduction are still maintained and it is hoped that this program will increase every year. The number of animals released and monitored from 2019 to 2023 is presented in the table below.

Table 6. Recap of animal monitoring

Program	Species Name	Number of Individuals				
		2019	2020	2021	2022	2023*
Conservation of Native Animals – Release and Monitoring of Key Fauna/animals in the Antam IUP area and Mount Halimun Salak National Park	*Bido Snake Eagle*	8	10	12	15	21
	Owa Jawa	8	10	12	18	18
	Javanese Eagle	8	10	12	14	15

Figure 4. Documentation of Animal Release Program Implementation

II. Proof of calculation

Example of calculating the biodiversity index for the key fauna/animal conservation program in the ANTAM area. Gold Mining Business Unit with Shanon-Wiener method:

Individual index calculation for 2022:

- Number of Bido Snake Eagles = 8 Tails
- Total Fauna Conserved = 24 Tails

- Bido Snake Eagle Index

(H') : [– (8/24) x Ln (8/24)]

(H') : 0,366204096

Individual index calculation for 2022:

- Jumlah Owa Jawa = 8 Tails
- Total Fauna Conserved = 24 Tails
- Javanese Gibbon Index

(H') : [– (8/24) x Ln (8/24)]

(H') : 0,366204096

Individual index calculation for 2022:

- Number of Javanese Eagles = 8 Tails
- Total Fauna Conserved = 24 Tails
- Javanese Eagle Index

(H') : [– (8/24) x Ln (8/24)]

(H') : 0,366204096

Table 7. Recap of Individual Indexes for Key Fauna/Animal Conservation Programs in ANTAM Gold Mining Business Unit IUP areas.

Program	**Species Name**	**Number of Individuals**				
		2019	**2020**	**2021**	**2022**	**2023***
Conservation of Native Animals – Release and Monitoring of Key Fauna/animals in the Antam IUP area and Mount Halimun Salak National Park	*Bido Snake Eagle*	0,36620	0,36478	0,34657	0,29375	0,11684
	Owa Jawa	0,36620	0,36478	0,34657	0,21576	0,21576
	Javanese Eagle	0,36620	0,36478	0,34657	0,31441	0,29375

The absolute results of the endangered animal reintroduction program can be seen in Table 8.

Table 8. Absolute Recap of Key Fauna/Animal Conservation Program in ANTAM Gold Mining Business Unit IUP area 2019 – 2023

Program	Type of Species /Area	Absolute Results										Unit
		2019		2020		2021		2022		2023*		
		Absolutely	Budget (Rp)	Absolutely	Budget (Rp)	Absolutely	Budget (Rp)	Absolutely	Budget (Rp)	Absolutely	Budget (Rp)	
Conservation of Native Animals – Release and Monitoring of Key Fauna/animals in the Antam IUP area and Mount Halimun Salak National Park	Bido Snake Eagle	8	12.000.000	10	12.000.000	12	36.000.000	15	156.000.000	21	90.000.000	tail
	Owa Jawa	8		10		12		18		18		tail
	Javanese Eagle	8		10		12		14		15		tail
	Index	1,10		1,09		1,04		0,82		0,63		H'

IV. Conservation Village Partner Community Empowerment Program through Local Plant Cultivation & Nursery Collaboration*(Silvicultur Trees Species Local)* Mount Halimun Salak National Park Area (TNGHS)

I. Program Description

Cisangku Village is in the Malasari Village area which is one of the villages in the Mount Halimun Salak National Park (TNGHS) area. Cisangku Village has a lot of potential natural resources ranging from cool air, abundant water, fertile soil to beautiful natural views. All the advantages of these natural resources of course have the potential to be developed into tourist destinations. The potential of natural resources is also supported by the openness and friendliness of the residents as a characteristic of village life. However, behind all the advantages in Cisangku Village, there is a potential impact on the sustainability of the livelihoods of its residents.*(sustainable livelihood)*, as well as the preservation of natural resources. This can happen because most of the residents of Cisangku Village work in the agricultural sector and the land used for agriculture is quite limited, because the residents' agricultural land is in the Gunung Halimun Salak National Park (TNGHS) area. Since 2019, ANTAM Gold Mining Business Unit through the Cisangku Conservation Village Model Group (MKK) is committed to carrying out Community Empowerment activities based on Environmental Conservation, one of which is in terms of cultivating and providing local plant seeds which will then be used for the conservation and reclamation needs of ANTAM Gold Mining Business Unit .

Figure 5. Documentation of the Implementation of the Community Empowerment Program for Conservation Village Partners

II. Proof of calculation

Example of calculating the biodiversity index for the Conservation Village Partners Community Empowerment Program using the Shanon-Wiener method:

Individual index calculation for 2022:

- Number of Rasamala = 10.000 children
- Total Conserved Flora = 38.000 children

- Rasamala Index

(H′) : [– (10.000/38.000) x Ln (10.000/38.000)]

(H′) : 0,35131607

Individual index calculation for 2022:

- Number of Puspa = 7.000 children
- Total Conserved Flora = 38.000 children
- Puspa Index

(H′) : [– (7.000/38.000) x Ln (7.000/38.000)]

(H′) : 0,311624528

Individual index calculation for 2022:

- Total Rent = 7.000 children
- Total Conserved Flora = 38.000 children
- Huru Index

(H′) : [– (7.000/38.000) x Ln (7.000/38.000)]

(H′) : 0,311624528

Individual index calculation for 2022:

- Number of Ganitri = 7.000 children
- Total Conserved Flora = 38.000 children
- index counter

(H′) : [– (7.000/38.000) x Ln (7.000/38.000)]

(H′) : 0,311624528

Individual index calculation for 2022:

- Number of Kisireum = 2.400 children
- Total Conserved Flora = 38.000 children
- Index Kisireum

(H′) : [– (2.400/38.000) x Ln (2.400/38.000)]

(H′) : 0,174449521

Individual index calculation for 2022:

- Number of Hamerangs = 1.500 children
- Total Conserved Flora = 38.000 children
- Hamerang Index

(H′) : [– (1.500/38.000) x Ln (1.500/38.000)]

(H′) : 0,127583726

Individual index calculation for 2022:

- Number of Famous = 1.400 children
- Total Conserved Flora = 38.000 children

- Famous Index

(H′) : [– (1.400/38.000) x Ln (1.400/38.000)]

(H′) : 0,121619987

Individual index calculation for 2022:

- Number of Darangdan = 700 children
- Total Conserved Flora = 38.000 children
- Darangdan Index

(H′) : [– (700/38.000) x Ln (700/38.000)]

(H′) : 0,073578494

Individual index calculation for 2022:

- Number of Maras = 500 children
- Total Conserved Flora = 38.000 children
- Mara Index

(H′) : [– (500/38.000) x Ln (500/38.000)]

(H′) : 0,056983333

Individual index calculation for 2022:

- Number of Caringin = 500 children
- Total Conserved Flora = 38.000 children
- Ketapang Index

(H′) : [– (500/38.000) x Ln (500/38.000)]

(H′) : 0,056983333

Table 9. Recap of Individual Index of Conservation Village Partners Community Empowerment Program

Program	**Species Name**	**Number of Individuals**				
		2019	**2020**	**2021**	**2022**	**2023***
Empowering Conservation Village Partner Communities through Local Plant Cultivation & Nursery Collaboration (*Silvicultur Trees Species Local*) Mount Halimun Salak National Park Area (TNGHS) Social] – in Cisangku, Nanggung District, Bogor Regency	*Rasamala*	0,36119	0,34657	0,36119	0,35132	0,36400
	Puspa	0,34657	0,34657	0,35024	0,31162	0,35132
	Hair	-	0,29863	0,34251	0,31162	0,35886
	Ganitri	0,16576	-	-	0,31162	-
	Kisireum	-	-	-	0,17445	-
	Hamerang	-	-	-	0,12758	-
	Famous	-	-	-	0,12162	-
	Darangdan	-	-	-	0,07358	-
	Immediately	-	-	-	0,05698	-
	Caringin	-	-	-	0,05698	-
	Kiputri	-	0,16576	-	-	-
	Greetings	-	-	0,32189	-	0,26686
	Bayur	0,29863	-	-	-	-
	Install	0,29863	0,29863	-	-	-
	Kiriung child	0,16576	0,14979	-	-	-
	Chimeras	-	0,16576	-	-	-

The absolute results of the Conservation Village Partners Community Empowerment program can be seen in Table 10.

Table 10. Absolute Recap of Conservation Village Partners Community Empowerment Program 2019 – 2023

Program	Type of Species / Area	Absolute Results										Unit
		2019		2020		2021		2022		2023*		
		Absolutely	Budget (Rp)	Absolutely	Budget (Rp)	Absolutely	Budget (Rp)	Absolutely	Budget (Rp)	Absolutely	Budget (Rp)	
Empowerment of Conservation Village Partner Communities through Collaboration in Cultivation & Nursery of Local Plants (Silvicultur Trees Local Species) in the Gunung Halimun Salak National Park Area (TNGHS)	Rasamala	18.000	314.000.000	15.000	182.000.000	15.000	389.000.000	10.000	249.000.000	12.000	158.000.000	child
	Puspa	15.000		15.000		13.000		7.000		10.000		child
	Hair			10.000		12.000		7.000		11.000		child
	Ganitri	3.500						7.000				child
	Kisireum							2.400				child
	Hamerang							1.500				child
	Famous							1.400				child
	Darangdan							700				child
	Immediately							500				child
	Caringin							500				child
	Kiputri			3.500								child
	Greetings					10.000				5.000		child
	Bayur	10.000										child
	Install	10.000		10.000								child
	Kiriung child	3.500		3.000								child
	Chimeras			3.500								child
	Index	1,64		1,77		1,30		1,49		1,14		H'

V. Mycorrhizal Fungi Implementation Program for Ecosystem Recovery through Restoration in Conservation Forest Areas [Mount Halimun Salak National Park] Based on Community Empowerment Conservation Village Model [Social Forestry Farmers] – in Cisangku, Nanggung District, Bogor District

I. Program Description

ANTAM Gold Mining Business Unit in an effort to restore contaminated land/degraded land in the Mount Halimun Salak National Park Conservation Forest Area [TNGHS] is carrying out an Ecosystem Recovery program through Restoration in the Conservation Forest Area [Mount Halimun Salak National Park] Based on Community Empowerment with the Conservation Village Model [Social Forestry Farmers] in Cisangku. This recovery program is combined with the use of Mycorrhizal Fungi which can accelerate plant growth and absorption of heavy metals through plant roots (Phytoremediation).

Providing Mycorrhizal Fungi to plant seeds in the Conservation Village Partner Community Nursery Area in Cisangku provides efficiency in terms of seed maintenance which initially took 12 months to 8 months. In addition, the use of Mycorrhizal fungi is able to increase the percentage of plant survival from 65-75% to 96% , so that the cost of replanting seeds is also reduced.

Figure 6. Documentation of the Mycorrhizal Fungi Implementation Program

II. Proof of calculation

Example of calculating the biodiversity index in the Transitional Mycorrhizal Fungi Implementation Conservation program using the Shanon-Wiener method:

Individual index calculation for 2022:

- Number of Rasamala = 10.000 children
- Total Conserved Flora = 38.000 children
- Rasamala Index

(H') : [– (10.000/38.000) x Ln (10.000/38.000)]

(H') : 0,35131607

Individual index calculation for 2022:

- Number of Puspa = 7.000 children
- Total Conserved Flora = 38.000 children
- Puspa Index

(H') : [– (7.000/38.000) x Ln (7.000/38.000)]
(H') : 0,311624528

Individual index calculation for 2022:

- Total Rent = 7.000 children
- Total Conserved Flora = 38.000 children
- Huru Index

(H') : [– (7.000/38.000) x Ln (7.000/38.000)]
(H') : 0,311624528

Individual index calculation for 2022:

- Number of Ganitri = 7.000 children
- Total Conserved Flora = 38.000 children
- index counter

(H') : [– (7.000/38.000) x Ln (7.000/38.000)]
(H') : 0,311624528

Individual index calculation for 2022:

- Number of Kisireum = 2.400 children
- Total Conserved Flora = 38.000 children
- Index Kisireum

(H') : [– (2.400/38.000) x Ln (2.400/38.000)]
(H') : 0,174449521

Individual index calculation for 2022:

- Number of Hamerangs = 1.500 children
- Total Conserved Flora = 38.000 children
- Hamerang Index

(H') : [– (1.500/38.000) x Ln (1.500/38.000)]
(H') : 0,127583726

Individual index calculation for 2022:

- Number of Famous = 1.400 children
- Total Conserved Flora = 38.000 children
- Famous Index

(H') : [– (1.400/38.000) x Ln (1.400/38.000)]
(H') : 0,121619987

Individual index calculation for 2022:

- Number of Darangdan = 700 children
- Total Conserved Flora = 38.000 children
- Darangdan Index

(H') : [– (700/38.000) x Ln (700/38.000)]

(H') : 0,073578494

Individual index calculation for 2022:

- Number of Maras = 500 children
- Total Conserved Flora = 38.000 children
- Mara Index

(H') : [– (500/38.000) x Ln (500/38.000)]

(H') : 0,056983333

Individual index calculation for 2022:

- Number of Caringin = 500 children
- Total Conserved Flora = 38.000 children
- Ketapang Index

(H') : [– (500/38.000) x Ln (500/38.000)]

(H') : 0,056983333

Table 11. Recap of Individual Index of Mycorrhizal Fungi Implementation Program

Program	**Species Name**	**Number of Individuals**	
		2022	**2023***
Implementation of Mycorrhizal Fungi for Ecosystem Recovery through Restoration in Conservation Forest Areas [Mount Halimun Salak National Park] Based on Community Empowerment Conservation Village Model [Social Forestry Farmers] – in Cisangku, Nanggung District, Bogor District	*Rasamala*	0,35132	0,36400
	Puspa	0,31162	0,35132
	Hair	0,31162	0,35886
	Ganitri	0,31162	-
	Kisireum	0,17445	-
	Hamerang	0,12758	-
	Famous	0,12162	-
	Darangdan	0,07358	-
	Immediately	0,05698	-
	Caringin	0,05698	-
	Kiputri	-	-
	Greetings	-	0,26686
	Bayur	-	-
	Install	-	-
	Kiriung child	-	-
	Chimeras	-	-

The absolute results of the mycorrhizal fungus implementation program can be seen in Table 12.

Table 12. Absolute Recap of Mycorrhizal Fungi Implementation Program 2019 – 2023

Program	Type of Species / Area	Absolute Results				Unit
		2022		2023*		
		Absolutely	Budget (Rp)	Absolutely	Budget (Rp)	
Implementation of Mycorrhizal Fungi for Ecosystem Recovery through Restoration in Conservation Forest Areas [Mount Halimun Salak National Park] Based on Community Empowerment Conservation Village Model [Social Forestry Farmers] – in Cisangku, Nanggung District, Bogor District	Number of Flora	38.000	192.000.000	38.000	134.000.000	child
	Index	1,49		1,14		H'

VI. Palahlar Plant Genetic Conservation Program*Endangered Plant* in the Mount Halimun Salak National Park (TNGHS) area

I. Program Description

Palahlar exploration was carried out in the protected forest area of ANTAM Gold Mining Business Unit and the Gunung Halimun Salak National Park (TNGHS) area which is also a Mining Business Permit (IUP) area from ANTAM Gold Mining Business Unit . Palahlar species are not evenly distributed throughout the region and their growth tends to cluster in a population. Palahlar populations are not found in protected forest areas and are only found in national park areas which are also IUP areas from ANTAM Gold Mining Business Unit . A total of 13 palahlar individuals were found in one population and there were 2 (two) palalahar individuals that were in the reproductive (fruiting) phase. According to Anggoro (2023), the distribution pattern of palahlar that grows naturally in natural forests occurs in clusters due to the limited agents that spread palahlar seeds, namely wind and water if the population is located around river flow areas. The seeds of plants that live in natural forests will fall around the parent tree and become the beginning of the spread of the palalah plant population.

Conservation process carried out by ANTAM Gold Mining Business Unit through the breeding of Palahlar tree seedlings or seeds that fall around the parent tree, which is hoped will produce healthy Palahlar plants ready to be replanted in the ANTAM IUP Area. Gold Mining Business Unit thereby increasing the Palahlar plant population.

Figure 7. Documentation of the Implementation of the Palahlar Plant Genetic Conservation Program

Table 13. Recap of Plant monitoring

Program	Type	2019	2020	2021	2022	2023	Unit
Seeding	Palahs (*Dipterocarpus hasseltii*)					160	Seedlings
Enhancement							%

II. Proof of calculation

Calculation of the number of palalah chicks to be bred will begin in 2023.

2023 Program Calculation

Amount of Palahlar bred (A) = 160

Number of dead Palahlars (B) = 0

Total Number of Palahlars at the end of the Year (C=A-B) = 160

total individuals (N) = 160

Absolute results of the Palahlar Plant Genetic Conservation program *Endangered Plant* in the Gunung Halimun Salak National Park (TNGHS) area seen in Table 2.

Table 14. Absolute Recap of the Palahlar Plant Genetic Conservation Program *Endangered Plant* in the Mount Halimun Salak National Park (TNGHS) area for 2019 – 2023

Type of Species / Area	Absolute Results		Unit
	2023*		
	Absolutely	Budget (Rp)	
Palahs	160	Rp110,000,000.00	child

4. RECAPITULATION OF BIODIVERSITY PROTECTION RESULTS

The following is a table for biodiversity protection in 2022.

Table 15. Results of Flora Biodiversity Protection ANTAM Gold Mining Business Unit

No.	Local name	Amount	pi (ni/N)	ln pi	pi ln pi
1	*Rasamala*	58.000	0,2788462	1,277095	0,356113
2	*Puspa*	50.000	0,2403846	1,425515	0,342672
3	*Hair*	29.000	0,1394231	1,970242	0,274697
4	*Ganitri*	10.500	0,0504808	2,986163	0,150744
5	*Kisireum*	2.400	0,0115385	4,462069	0,051485
6	*Hamerang*	1.500	0,0072115	4,932073	0,035568
7	*Famous*	1.400	0,0067308	5,001066	0,033661
8	*Darangdan*	700	0,0033654	5,694213	0,019163
9	*Immediately*	500	0,0024038	6,030685	0,014497
10	*Caringin*	500	0,0024038	6,030685	0,014497
11	*Kiputri*	3.500	0,0168269	4,084775	0,068734
12	*Greetings*	10.000	0,0480769	3,034953	0,145911
13	*Bayur*	10.000	0,0480769	3,034953	0,145911
14	*Install*	20.000	0,0961538	2,341806	0,225174
15	*Kiriung child*	6.500	0,03125	3,465736	0,108304
16	*Chimeras*	3.500	0,0168269	4,084775	0,068734
	Amount	**208.000**	**diversity index (H')**		**2,055865818**

Table 16. Results of ANTAM Fauna Biodiversity Protection. Gold Mining Business Unit

No.	Local Name	Scientific name	Amount	pi	ln pi	PI * ln pi
1	Bido Snake Eagle	*Spilornis cheela*	15	0,625	0,470004	0,293752
2	Owa Jawa	*Hylobates Moloch*	18	0,75	0,287682	0,215762
3	Javanese Eagle	*Nisaetus bartered*	14	0,5833333	0,538997	0,314415
Number (Tail)			47			0,823928448
Biodiversity Index			**0,823928448**			