Baseline Survey Report of DAS BODRI and Strategic Planning GEF-SGP 2023-2026

SGP The GEF Small Grants Programme

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I. Profile of Location

A. Site Selection

In 2009, the Bodri River Basin (DAS Bodri) was designated as a Priority Watershed in the 2010-2014 Medium Term Development Plan (RPJM). The Bodri watershed is one of 105 watersheds that need to rehabilitate both the forest and the land. However, ten years later the condition of the Bodri watershed did not improve. Based on data from the National Disaster Management Agency (2018) that in the past 10 years (2009-2018) there have been 103 floods recorded. Kendal District, which is a downstream area, experienced 105 floods and landslides during 2018-2022.[1]

The high frequency of floods and landslides indicates damage to the upstream area of the river. Tisnasuci et al (2021) stated that there has been a change in land cover in the upstream part of the Bodri watershed within 4 years (2016-2020). Forest cover showed the largest reduction in area, which was 38,039 km2, from 40% in 2016 to 34% in 2020. On the other hand, the open land cover had increased by 28,442 km2. From 7.8% in 2016 to 12% in 2020.

This is one of the considerations for intervening in the Bodri watershed. As a start, we conducted a baseline survey in several villages that were considered to represent upstream, middle and downstream, as well as contributing or having an impact on the sustainability of the Bodri watershed.

Table 1. Erosion Value of Bodri Sub-watershed

No	Sub Watershed	Village	Annual Average Erosion (ton/ha/year)
1	Bodri downstream	Wonosari, Singorojo, Pidodo Kulon, Sidodadi	99,397
2	Logung	Sidodadi, Nglarangan	262,394
3	Lutut	Igirmranak, Cemoro	144,193
4	Putih	-	282,118

[1] Processed from Indonesian Disaster Information Data from the National Disaster Management Agency (https://dibi.bnpb.go.id/)

B. Geographic Conditions, Demographics and Location Characteristics

1. Administrative division

Administratively, the Bodri watershed is located in 4 (four) district areas, namely Wonosobo District, Temanggung District, Kendal District and Semarang District. The total area of the Bodri watershed is 65,100.76 Ha. Kendal District has the Bodri watershed with the largest area and Wonosobo district has the Bodri watershed with the smallest area.

Table 2. Number and Area of BODRI Watershed Villages

District	Villages	Amount
Kendal	123	36.602,76
Semarang	6	652,19
Temanggung	73	27.797,93
Wonosobo	4	47,89
Total	**206**	**65.100,76**

2. Hydrological aspect

Hydrologically, the Bodri watershed has 4 sub-watersheds: the Lutut sub-watershed, Putih sub-watershed, Logung sub-watershed and upstream Bodri sub-watershed. These four sub-watersheds merge into the downstream Bodri sub-watershed and as a whole form the Bodri watershed.

The highest water discharge occurs in the period from January to April each year. The lowest discharge period occurs in August each year. Based on records from the Juwero station during the period 2010 to 2015 the highest discharge was recorded at 66.97 M3/s and the lowest was 0.56 M3/s [2].

Figure 1. The middle part of the Bodri watershed flow that passes through the Singorojo Village

[2] PUSDATARU Jateng

Figure 2. Map of the Bodri River Basin

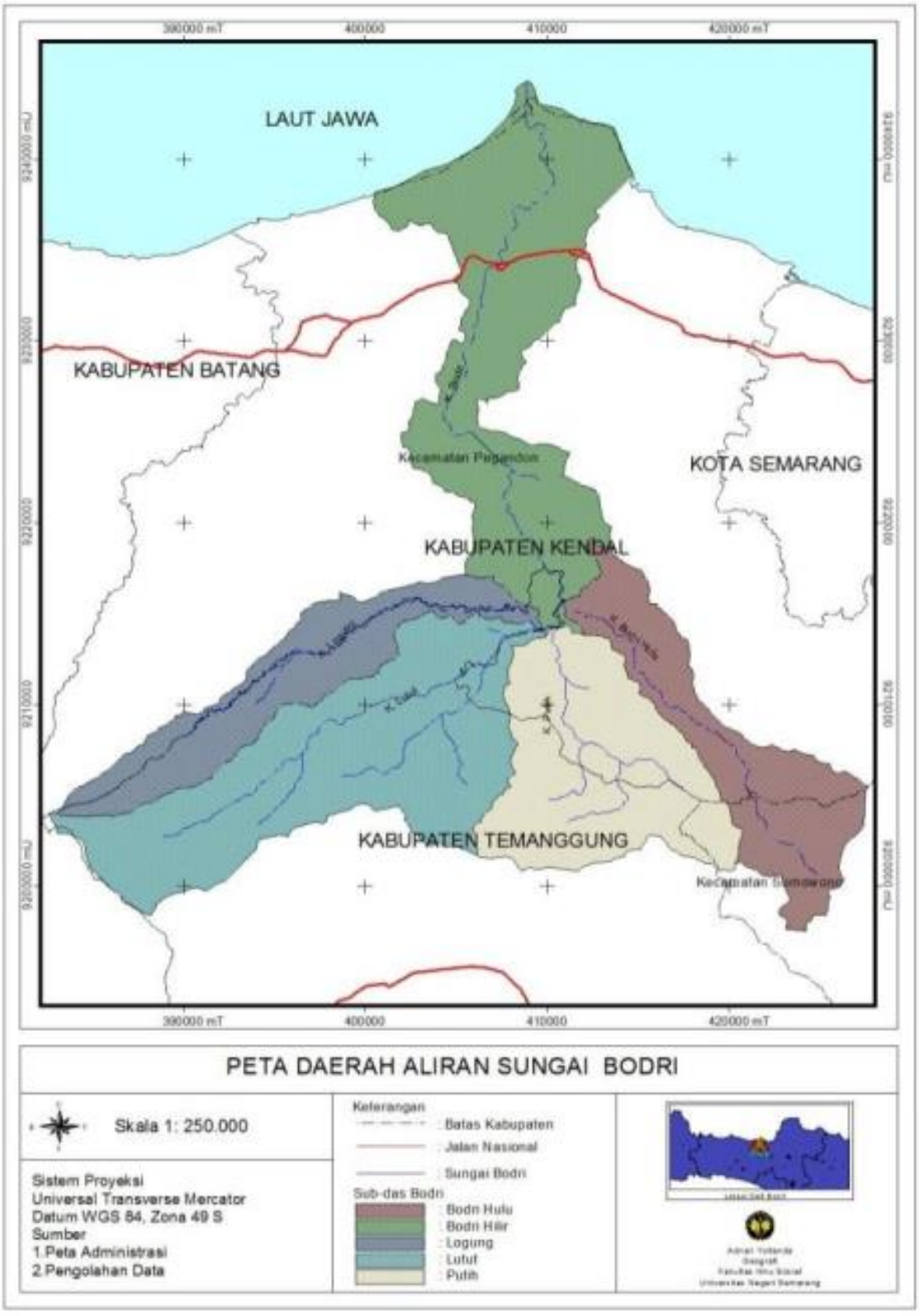


Table 3. Monthly Average Debit of the Bodri River (m^3/s)

Station Name	Juwero		River	Bodri					South latitude	06⁰58'00		
No Station	02-053-02-01		DAS		km2				East longitude	110° 08' 00"		
Year	**Jan**	**Feb**	**Mar**	**Apr**	**Mei**	**Jun**	**Jul**	**Ags**	**Sep**	**Okt**	**Nov**	**Des**	**Ket.**
2010	15,62	22,78	12,41	14,34	15,86	33,36	15,03	9,26	22,79	11,88	14,37	28,20	
2011	31,42	20,57	23,13	66,97	25,89	10,00	3,54	3,00	5,00	4,00	14,65	26,51	
2012	54,41	61,89	66,26	36,40	17,35	11,43	5,00	1,00	3,00	3,00	5,83	8,51	
2013	13,27	18,56	5,80	10,00	8,00	0,97	1,32	1,19	1,61	2,00	4,00	5,00	
2014	11,00	34,17	35,29	19,22	5,07	4,38	12,54	10,11	2,76	3,00	3,76	12,00	
2015	12,00	20,00	11,00	10,00	9,00	8,00	6,00	5,00	0,56	1,28	5,22	13,57	
Max	54,41	61,89	66,26	66,97	25,89	33,36	15,03	10,11	22,79	11,88	14,65	28,20	
Average	22,95	29,66	25,65	26,15	13,53	11,36	7,24	4,93	5,96	4,19	7,97	15,63	
Min	11,00	18,56	5,80	10,00	5,07	0,97	1,32	1,00	0,56	1,28	3,76	5,00	

3. Landscaping Typology

The Bodri watershed landscape is grouped into 3 parts, namely the upstream, middle and downstream parts. The upstream area is the catchment and water filling area, the middle part is the catchment and flow area and there is a possibility that there will still be water filling. The downstream area becomes the flow and overflow area of the Bodri River.

The division of the upstream, middle and downstream areas is classified based on the local elevation. The altitude of 0 – 100 meters above sea level is classified as a downstream area, 100 – 750 meters above sea level is classified as a middle area, and the upstream area is at an altitude of > 700 meters above sea level.

Figure 3. One of the springs that flows into the Bodri watershed in Cemoro Village

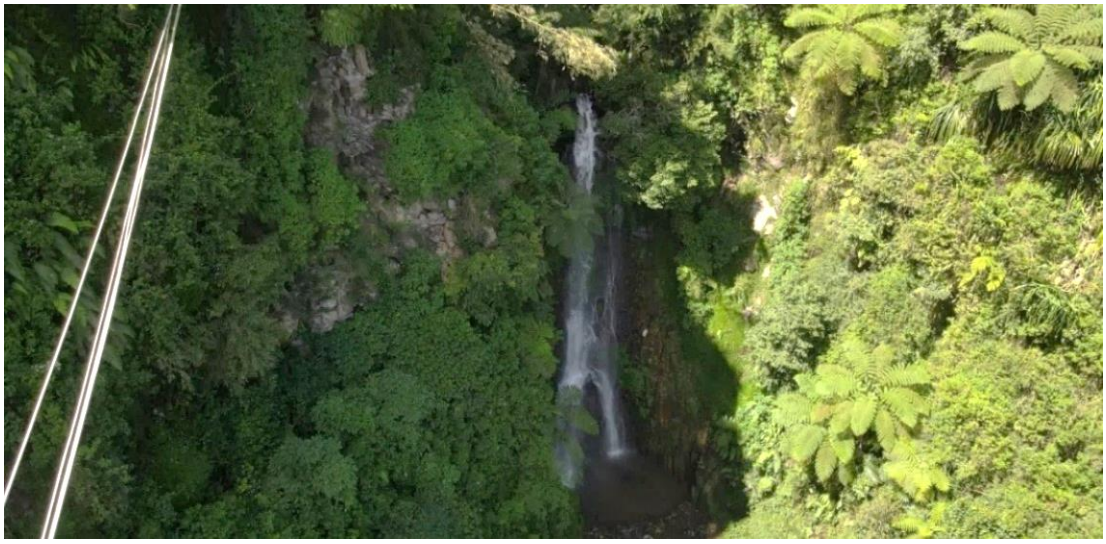


Figure 4. Map of the Bodri watershed elevation

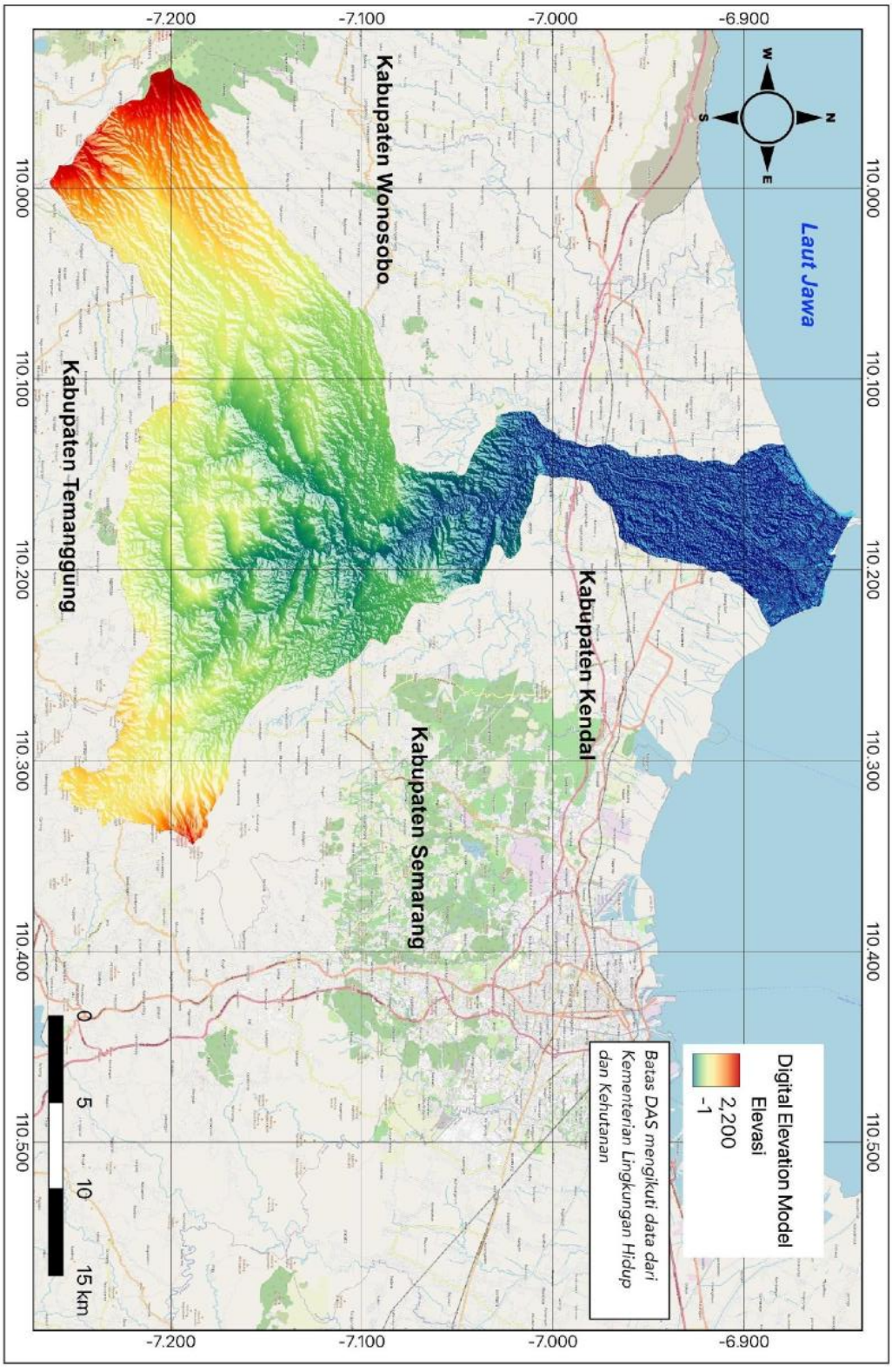


Figure 5. Typology Map of the Bodri Watershed

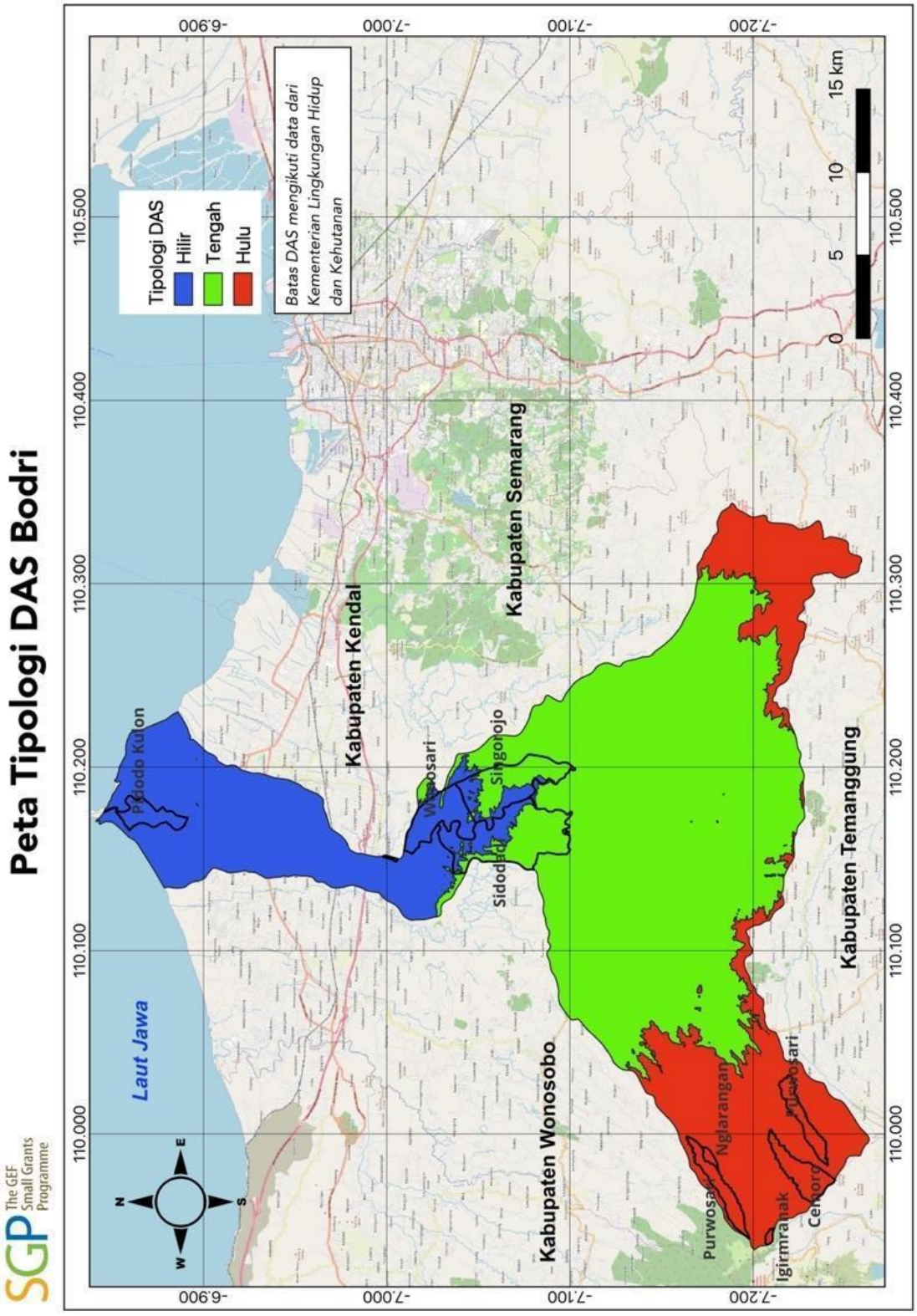


Table 4. Area of each watershed typology

Type	Amount (Ha)	Percentage
Upstream	15484.587	23.72%
Middle	36221.2024	55.48%
Downstream	13583.2281	20.80%
Total	65289.0175	100.00%

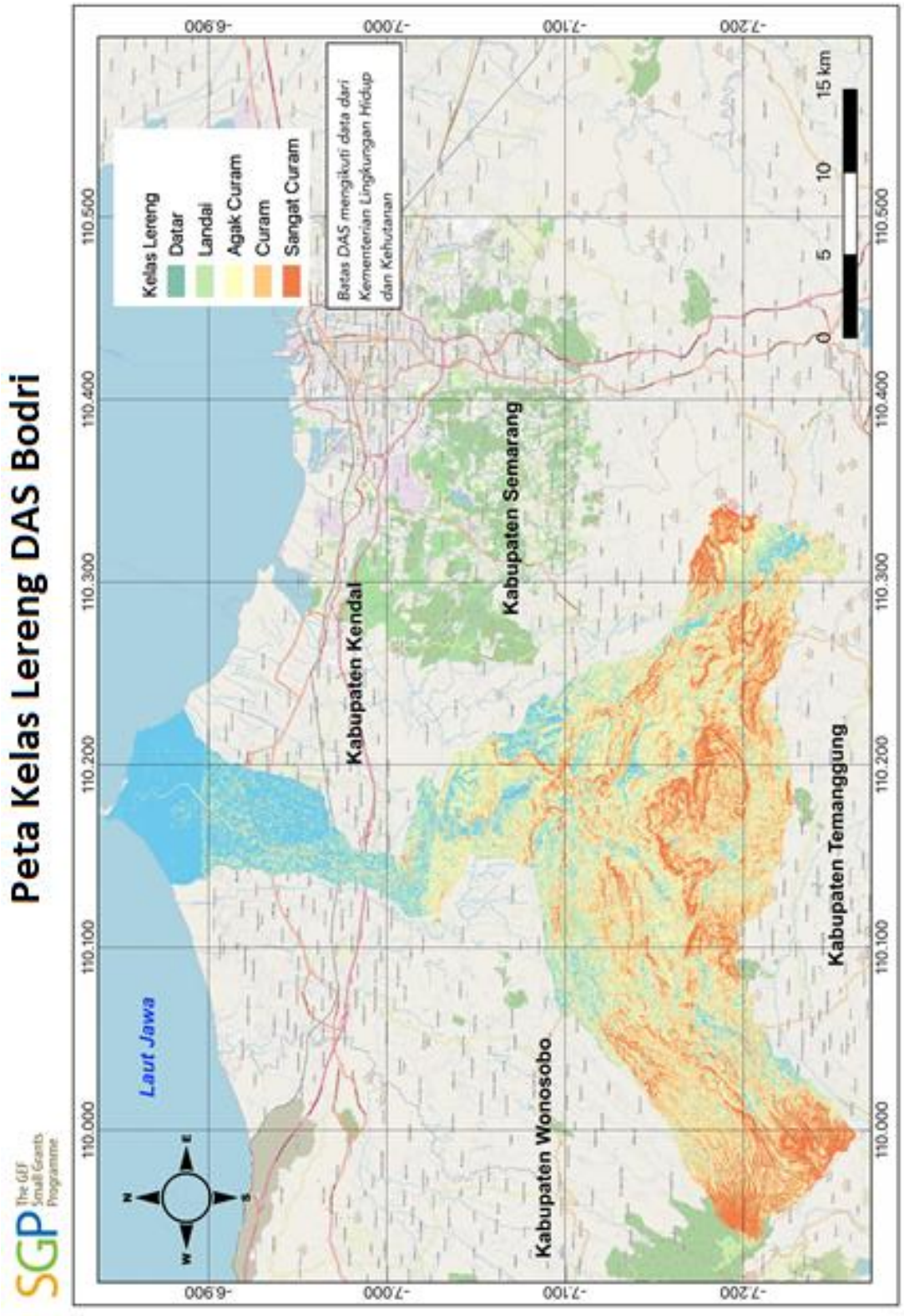
Based on the slope class, the Bodri watershed has 5 slope classes. Flat slope class is land with a slope of 0-8%, gently sloping 8-15%, rather steep 15-25%, steep 25-40% and very steep is land with a slope of > 40%.

Table 5. Slope Area Per Land Typology Bodri Watershed

Class	Amount Per Typology (Ha)		
	Upstream	Middle	Downstream
Flat (0-18%)	1067.203	4030.897	9155.335
Sloping (8-15%)	2018.768	7165.461	2824.089
Rather Steep (15-25%)	3317.325	10422.099	1157.788
Steep (25-25%)	5429.57	10777.126	339.234
Very Steep (45-100)	3568.32	3768.204	39.212
Total	**15401.186**	**36163.787**	**13515.658**

Figure 6. Settlements and vegetable gardens located on steep slopes

Figure 7. Map of the Bodri watershed Lerang Class



4. Land Cover and Its Changes

Based on remote sensing analysis, land cover in the Bodri watershed area is classified into 5 categories. The five categories are built-up areas, agricultural land, mixed gardens, forests and water bodies. Based on the current land cover, mixed gardens have the largest proportion of area in the Bodri watershed and bodies of water being the smallest area.

Table 6. Land Cover Area in the Bodri Watershed in 2022

Land Cover	Amount (Ha)	%
Agriculture	18359.22	27.78%
Building	5353.94	8.10%
Forest	15590.36	23.59%
Mix Plantation	23565.41	35.66%
Water	3220.03	4.87%
Total	**66088.96**	**100.00%**

If we trace the changes in land cover since 1990, most of the agricultural land has been cultivated since before 1990. There has been a reduction in forest land from 1990 – until now. Agricultural land increased from 1990 – 2010 but decreased in 2022. Changes also occurred in mixed gardens which decreased in 2000 but increased in 2010 and in 2022.

Figure 8. Farm field that are getting closer to the rest of the forest in the upper reaches of the Bodri watershed

Figure 9. Map of the 2022 Bodri Watershed Land Cover

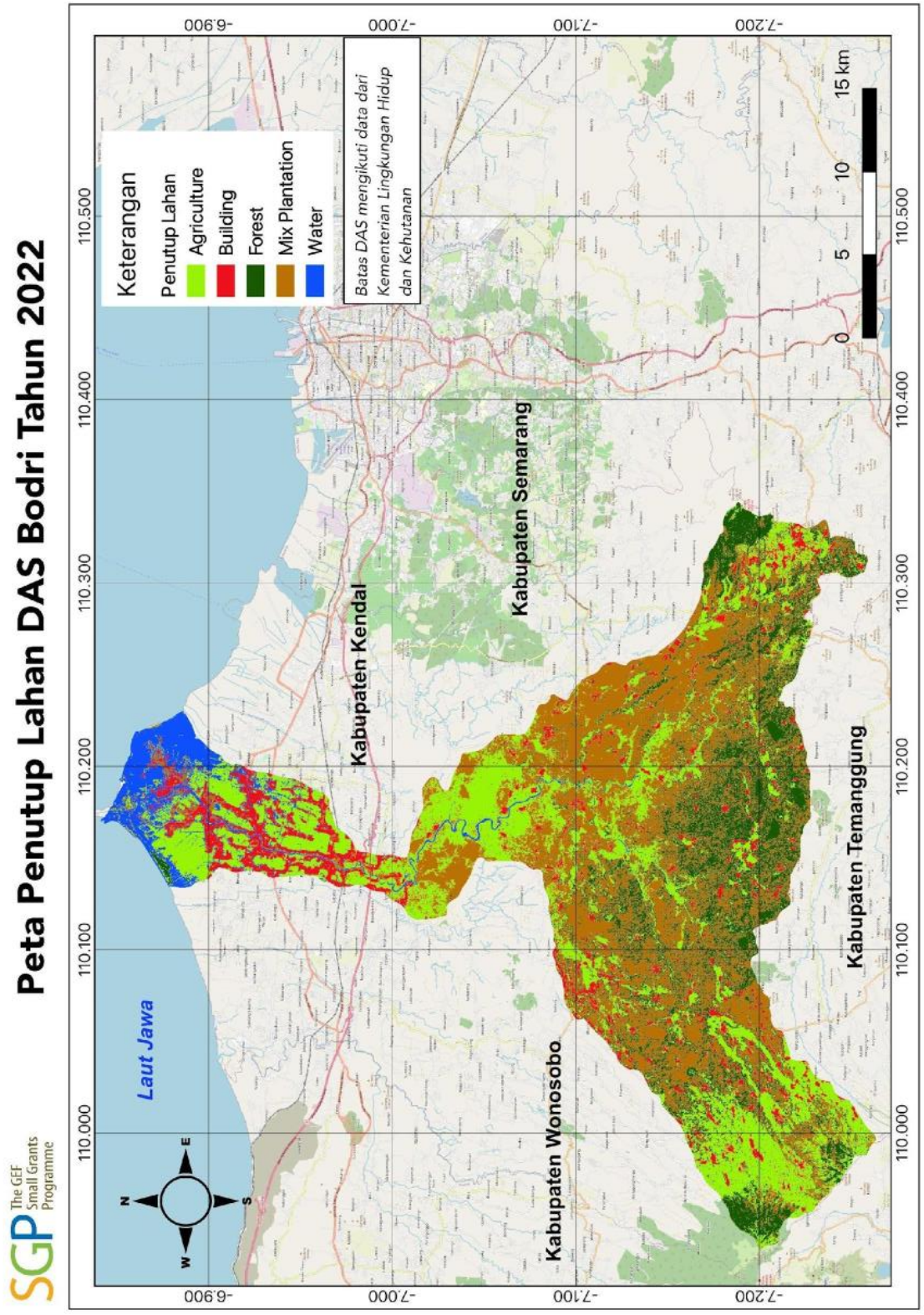


Figure 10. Classification and land cover changes in the Bodri watershed from 1990 to 2022

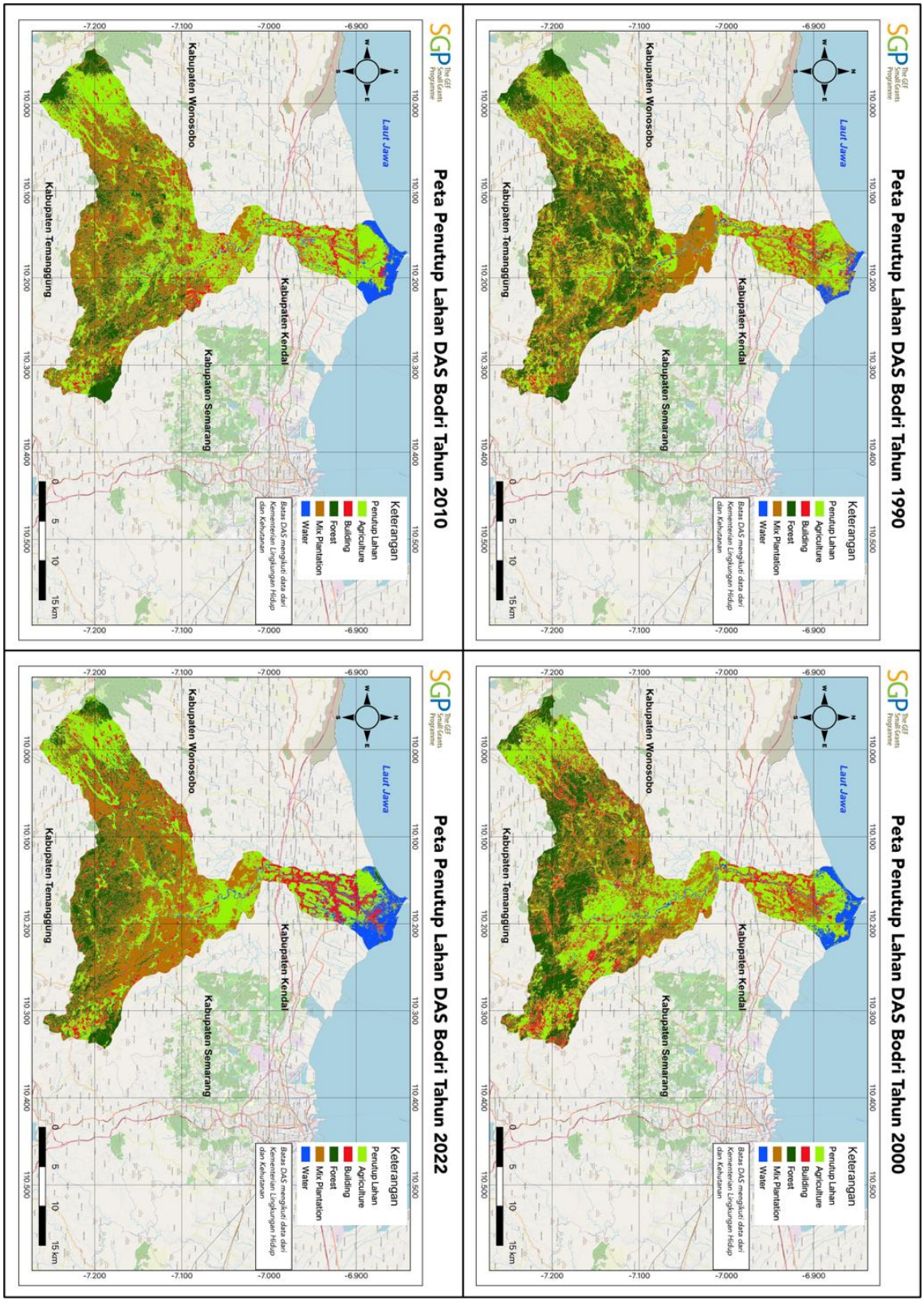


Table 7. Bodri Watershed Land Cover 1990 – 2022

Land Cover	Amount			
	2022	2010	2000	1990
Agriculture	18359.22	24336.10	23438.34	19126.31
Building	5353.94	5142.29	7595.44	4441.71
Forest	15590.36	15058.02	18258.90	20289.09
Mix Plantation	23565.41	19171.83	14597.77	21085.01
Water	3220.03	2380.72	2198.51	1146.84
Total	**66088.96**	**66088.96**	**66088.96**	**66088.96**

Vegetation cover plays an important role as a store and sink of carbon. Based on the type of land cover and its changes, carbon storage and changes in a certain period can be identified. To calculate carbon storage in the Bodri watershed, it is calculated using the average carbon storage data reference according to Tosiani (2015)[3]

Table 8. Carbon Storage Per Land Cover

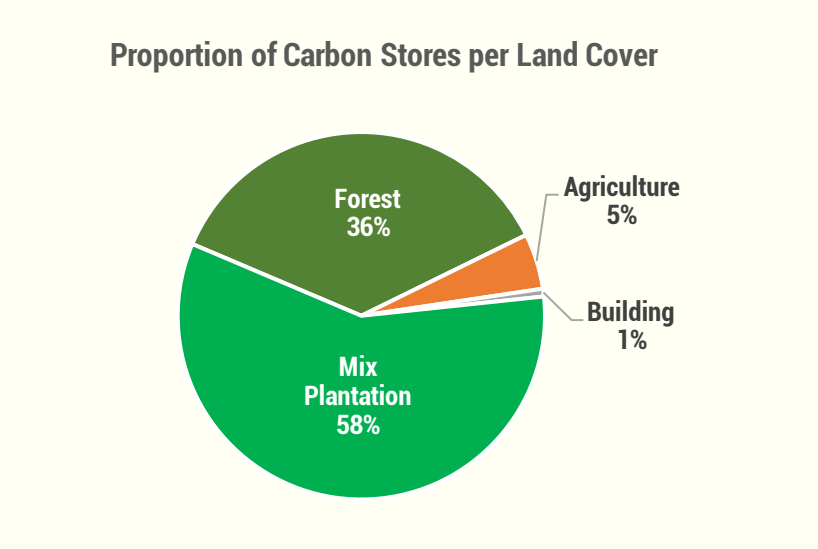
Land Cover	Average Carbon Store (tonnes/ha)	Land cover area 2022 (ha)	Carbon Storage (tonnes)
Java dryland forest	85.25	12962.6	1105068.5
Dryland farming	10.0	14889.3	148892.9
Plantation	63.0	28015.5	1764977.5
Settlement	4.0	5161.3	20667.9
Amount			3039606.9

Source: Tosiani, Anna. 2015.

Based on the average carbon storage above, carbon storage in the Bodri watershed based on land cover in 2022 is 3039606.9 tons. The biggest savings are found in mixed garden land cover which reaches 58.1% of all carbon storage. Forest land cover has carbon stores of 1105068.5 tons or 36.4% of all carbon stores in the Bodri watershed.

[3] Tosiani, Anna. 2015. Buku Kegiatan Serapan Dan Emisi Karbon. Direktorat Inventarisasi Dan Pemantauan Sumber Daya Hutan Direktorat Jenderal Planologi Kehutanan Dan Tata Lingkungan Kementerian Lingkungan Hidup Dan Kehutanan

Figure 11. Proportion of Carbon Storage per Land Cover



5. Social and Economic Conditions

Wonosobo District is one of the important potato-producing areas in Central Java, whose products are superior in the market, and famous for Dieng potatoes. Even though there was a decrease in the area and production of potatoes in 2020, potatoes are still the main source of income for farmers in Wonosobo.

Table 9. Harvested Area and Potato Production in Wonosobo District and Central Java Province

District / City	Harvested Area and Potato Production					
	Harvested Area			Production		
	2018	2019	2020	2018	2019	2020
Central Java Province	15 461	16 452	17 212	2 906 554	2 940 149	2 939 362
Wonosobo District	3 511	3 523	3 461	542 649	543 580	533 722

Source: jateng.bps.go.id

Meanwhile, based on the same source (BPJS Central Java), tobacco is an important source of income for Temanggung, which in 2019 produced 12,764.38 tons. In the upper reaches of the Bodri watershed, both potato and tobacco are the main seasonal crops grown on mountain slopes or highlands along Wonosobo and Temanggung Districts. Along the way, we will be able to see patches of annual plants on the slopes even at extreme slopes (above 45 degrees). If the rainy season is seen in several places there are traces of landslides.

In these villages, the farmers experienced the heyday of potatoes and tobacco which made their economic level increase considerably. But after that, when the prices of chemical inputs continued to rise, the quantity of inputs used increased, price instability and crop failures, farmers gradually fell into debt. Even so, the hope of being able to return to glory with these commodities never seems to be lost, unless there is another proven replacement commodity. The average farmer is in debt. Although ironic, farmers tell this casually. Even considering the debt as part of the enthusiasm for work. The average potato farmer is in debt to the bank. Meanwhile, most of the tobacco farmers are indebted to local bosses/collectors.

At the bottom after the upstream of the Bodri watershed, where corn is the prima donna, the same thing happens with debt problems. Even though the price of corn is quite cheap, farmers like it because the process of planting and caring for it is not a hassle. In addition, the identity of the corn farmer is a guarantee for making money loans to both banks and collectors.

Even though there are no research results that conclude whether the level of public debt is considered healthy or unhealthy, this tradition of debt shows that people's consumption is greater than production. Regardless of the level of basic consumption of luxury goods, debt is considered a normal activity and is a part of people's lives.

Table 10. Corn Harvested Area and Production 2018 – 2019 Kendal Regency

Sub-District	Harvested Area, Productivity, and Corn Production					
	Harvested Area (ha)		Productivity (quintal /ha)		Production (tonnes)	
	2018	2019	2018	2019	2018	2019
Plantungan	2260.39	1986.30	63.60	64.32	14375.55	12776.20
Sukorejo	4198.81	4672.00	63.80	54.80	26790.06	25602.00
Pageruyung	2638.82	3144.90	69.26	63.95	18275.92	20112.20
Patean	4871.50	6151.90	73.95	64.60	36022.71	39739.00
Singorojo	1458.82	2477.10	66.09	59.20	9641.36	14663.80
Limbangan	153.54	291.40	68.75	57.29	1055.49	1669.60
Boja	423.44	349.00	70.25	67.26	2974.57	2347.20
Kaliwungu	29.00	129.00	64.64	66.18	187.46	853.70
Kaliwungu Selatan	765.42	1577.90	67.44	59.53	5162.08	9393.40
Brangsong	487.00	293.00	67.56	68.70	3289.97	2012.90
Pegandon	1941.50	2345.60	69.71	61.21	13534.58	14358.20
Ngampel	1032.16	1464.80	67.42	57.31	6959.04	8394.40
Gemuh	3851.90	4175.70	71.65	66.11	27600.74	27606.60
Ringinarum	1328.49	1605.10	69.89	61.95	9284.40	9944.00
Weleri	1187.34	1201.00	68.39	60.95	8120.33	7319.80
Rowosari	35.00	0.00	65.05	0.00	227.69	0.00
Kangkung	1340.35	2027.60	71.19	61.37	9541.95	12443.70
Cepiring	339.24	400.70	66.42	64.60	2253.34	2588.50

Patebon	570.63	601.30	65.28	59.76	3725.33	3593.30
Kendal	26.01	73.30	70.04	61.06	182.16	447.40
Kabupaten Kendal	28939.36	34967.60	68.84	61.73	199204.72	215865.90
Patean District is the area with the largest corn production, where one of the villages is Sidodadi. We can see that the average sub-district in Kendal has quite significant corn production.						

Source: kendalkab.bpjs.go.id

On the coast, especially in Pidodo Kulon, most of the people are fishermen and/or milkfish farmers. However, there is no data available regarding the volume of fish catches or pond harvests per year at the village or Patebon sub-district levels which can describe the volume of production in the downstream region of Bodri. However, in general, the Kendal coast is known as an important fishing and pond location for Central Java.

There are only a few rice fields owned by this village. Their staple food is rice. Some of the Pidodo Kulon people live on village "bengkok" land. This means that these residents do not have their own land. The necessities of life are met by fishing, crabs, crabs, and oysters in the sea with a variety of fishing gear according to the season. The fish caught will usually be set aside for self-consumption first, then sold to collectors. In addition, if you have a motorboat, you can rent it out for guests who want to fish. The location of Pilangsari hamlet is indeed quite famous as a gateway for fishing for fishing enthusiasts who come from outside the city. According to them, guests are usually satisfied with the fishing results which are large in size.

6. Location of Baseline Survey

Based on initial information from the Forum DAS Bodri and BAPPEDA Wonosobo District, several villages were selected which were representatives of the upstream, middle and downstream areas of the Bodri watershed.

a. Upstream of Bodri Watershed

The upper reaches of the Bodri River are located on 2 mountains, namely Mount Prau and Mount Ungaran, which are included in 3 districts, namely Wonosobo District, Temanggung District, and Semarang District. In the survey preparation discussion, due to limited time, Forum DAS BODRI suggested visiting the upstream in Wonosobo and Temanggung only. According to them, the forest cover on Mount Ungaran in Semarang District is still very good and untouched. The following are the villages surveyed in the upstream Bodri watershed:

- Igirmranak Village, Kejajar Subdistrict, Wonosobo District
- Cemoro Village, Wonoboyo Subdistrict, Temanggung District
- Nglarangan Village, Tretep Subdistrict, Temanggung District

The village of Igirmranak, which is located on the slopes of Mount Prau and is part of the Wonosobo district, was the first place to be visited. This village was recommended by Bappeda Wonosobo and is the only intersection between Wonosobo and the BODRI watershed. According to the Head of Igirmranak Village, the spring that enters Bodri is Curug Sibengking, which is located between the villages of Wates and Igirmranak. Most of the water beneficiaries come from the village of Igirmranak. In the Temanggung area, Cemoro Village and Nglarangan Village have several springs. contribute to the Bodri watershed. In addition, Nglarangan is included in the Logung sub-watershed area which according to Islami et al (2017) has the second largest erosion value of the 4 Bodri sub-watersheds, namely 262.394 tons/ha/year.

Figure 12. Sebengking Waterfall, a spring used by Igirmranak residents. The water from this waterfall flows into Kali Trocoh, which then flows into the Bodri River

b. Middle area of Bodri Watershed

The central part of the BODRI watershed is generally in villages where there is more land with a gentle or flat slope, and is already included in Kendal district. The following are the villages that became the baseline survey locations:

- Sidodadi Village, Patean Subdistrict, Kendal District
- Singorojo Village, Singorojo Subdistrict, Kendal District
- Wonosari Village, Pegandon Subdistrict, Kendal District

The central part of the BODRI watershed is generally in villages with more flat land, and it is included in the Kendal district. Some villages which are still around 300 meters above sea level, such as Sidodadi and Singorojo, have springs that flow into tributaries and into the Bodri river. In Singorojo there are Tuk (springs) Dandang, Tuk Tlaga and Tuk Kendil which are the main sources of water used by the people of Singorojo. According to residents, many springs have disappeared. In Sidodadi Village, out of around 14 Tuk that was informed by the public, the most Tuk was Tembelang and Rembes Hamlets. But even then it has decreased compared to before because there are many trees that have been killed slowly, torn off (the cambium is injured), and then cut down. Miren or candlenut forests that used to exist have also been cut down on the grounds that it is very difficult to harvest candlenuts from very tall trees. Sidodadi is also included in the Logung sub-watershed area which has contributed to the second-largest erosion rate.

Figure 13. Bodri River in the Administrative Area of Singorojo Village, Kendal

Farmers in the villages of Sidodadi and Wonosari informed that corn waste, the residue from the corn harvest, is usually thrown into the BODRI river. Within 2 times a year, the Bodri River will become a disposal site for waste from corn fields, namely in February/March and in July. According to information from the farmers, this is also done by some other corn farmers along the Bodri river. The Head of Wonosari Village, Pegandon sub-district, said that his cell phone would receive lots of WA messages containing complaints of corn waste in the river during the corn harvest. This is not surprising, because the area of the cornfields in the Wonosari village area is roughly 1,000 hectares. So that the corn waste that is dumped into the river, if only a small part of the whole will already reach a massive amount.

In Wonosari Village, which is still in the middle of the Bodri watershed which is located below, there are 1,200 hectares of "Perhutani" land that have been managed by the community through LMDH, although the legality has not yet been issued. Of that area, 5-10% should be planted with trees. Efforts to plant this tree is not easy. Starting from procuring tree seedlings that the community likes, such as mango fruit trees, to the community's expectations of whether these trees can increase their income later. If there is a suggestion to plant annual crops under stands, the farmers in Wonosari will only do so if one is successful. This happened because many planting projects that had previously been carried out on a large scale failed miserably, such as red ginger, lemon grass, porang and yam.

Figure 14. Cornfields along the Bodri River in Wonosari Village, Kendal

c. Downstream of Bodri Watershed

The downstream area of the Bodri watershed that was visited was the coastal area, Pidodo Kulon Village. The Bodri River, which flows through the village, carries mud and forms sediment at the mouth of the river and the banks of the river, which covers tens of hectares, based on information from Pidodo Kulon residents. Some of those that have been planted with mangroves and whose soil is solid are made into ponds, and some are just starting to be planted with mangroves. Around the estuary, there is a stretch of mangrove where fishermen look for fish and oysters. With their fishing facilities, fishermen can go out to sea up to 32 km from the coastline, but the main thing is around 3 reefs named: Karang Ujung Korowelang, Karang Tandes, Karang Rome-Rome which are 3.5 - 7.5 Km away.

Figure 15. Bodri River estuary in Pidodo Kulon Village, Kendal

If there is a flood from upstream, then the impact that most often occurs is the submerging of the ponds around the river. According to them, this is natural, because Bodri has 12 upstream while there is only 1 estuary. While flooding in settlements is more frequent due to tidal floods from the sea.

II. Analysis

A. Initial Assessment of the Village

The Initial Village Assessment uses the method introduced by the COMDEKS Project. The COMDEKS (Community Development and Knowledge Management for the Satoyama Initiative) project was launched in 2011 as the flagship program of the International Partnership for the Satoyama Initiative, and was implemented by UNDP in partnership with the Japanese Ministry of Environment, the Secretariat of the Convention on Biological Diversity (CBD), and the United Nations University – Institute of Advanced Studies (UNU-IAS). The project was funded by the Japan Biodiversity Fund and was designed to support local community activities to maintain and rebuild socio-ecological production landscapes (SEPLS), and to gather and disseminate knowledge and experiences from successful activities to be replicated and to scale up the project. in other places in the world. This project aims to build strong biodiversity management and sustainable livelihood activities with local communities by providing small-scale funding to local community organizations. Community resilience assessment uses the socio-ecological production landscapes (SEPLS) indicators developed by UNU-IAS and Biodiversity International to help measure and understand the resilience of selected land and seascapes. Then there were improvements to highlight issues related to climate change in coastal areas/small islands. The term SEPLS was coined to refer to the mosaic of productive landscapes formed through long-term harmonious interactions between humans and nature in the principle of enhancing well-being and maintaining biodiversity and ecosystem services at the same time (Gu and Subramanian 2012 in UNU 2013).[4]

Initial Assessment or Baseline Survey with the SEPLS method is an assessment of 5 aspects consisting of:

1. Diversity and Protection of Landscape and Seascape Ecosystems
2. Biodiversity (including agricultural biodiversity)
3. Knowledge and Innovation
4. Governance and Social Equality
5. Livelihoods and Welfare

This initial assessment was carried out by filling out a form with a score of 1-5 and the value of the tendency to go up, down, and constant by the respondents in the survey location village. (Survey form attached). This questionnaire is an initial assessment tool developed by the Satoyama Institute in collaboration with UN University.

[4] Informasi diambil dari P. Raja Siregar dkk., 2014, Country Programme Seascape Strategy for Community Development and Knowledge Management (COMDEKS) Indonesia, Siregar, Raja Bingkai Indonesia; GEF SGP Indonesi; Satoyama Initiative

1. Igir Mranak Village

a. Biodiversity

In general, the area of Igirmranak Village is a mountainous area and is an intensive dryland agricultural area. Cultivated plants are vegetable crops. With an altitude between 2,122 – 2,429 MDPL, the planting location reaches up to areas with very steep slopes. The technique that is commonly applied is by placing plastic mulch on the planting beds which are expected to reduce soil erosion.

In limited efforts to increase timber stands to increase erosion reduction have been made, among others, by planting timber trees on plot boundaries or ownership boundaries. The type that is mostly chosen is suren wood (Toona surenii). This type was chosen because it has leaves or a canopy that is loose so that it does not block the sun's rays from shining on the vegetable fields.

In the context of watershed management, the Igir Mranak Village area benefits from the existence of the Bodri watershed. Most of the springs used as a source of clean water are obtained from water sources upstream of the Bodri watershed. Others are obtained from springs in the Kendal area. Some of the water for watering plants during the dry season is also obtained from the Bodri watershed.

Figure 16. Agricultural cultivation on the slopes, Cemoro, Temanggung

In the aspect of biodiversity, some community members, especially senior citizens, have good knowledge regarding the use of various forest plants. Some villagers once had activities to collect forest plants as herbal medicine. Several types of them were Krangean (Litsea cubeba), Angin-angin (Usnea sp), and Sangkobak (Plantago major). However, according to the public's perception, especially women, accessing the forest was done because people's welfare is still minimal. Collecting food and forest plants as ingredients were done as a way to share roles in earning a living.

The results of the assessment based on the questionnaire on the diversity aspect of the landscape received a moderate rating. The trend of changes in diversity and ecosystem protection is decreasing. There is a tendency for the area to be vegetated with trees to decrease or the existing trees to be cut down.

In terms of biodiversity, there are not enough areas to support wildlife. However, in the aspect of agricultural biodiversity, including local food wealth, it still scores moderately. Although not the main commodity, most of the local food from tubers is still grown and utilized.

Figure 17. Residents around the top of Mount Prau are still looking for herbs through this road. Through this road also, flows one of the springs that flows into the Bodri River.

For the aspect of knowledge and innovation, Igirmranak residents consider that the community, which is dominated by farmers, is quite open to the development of knowledge and skills. There have been several changes in the pattern of seeding, maintenance, and watering of annual crops according to the type of commodity, although there are negative impacts that follow, such as the excessive use of chemical inputs that makes the soil drier. But the optimism of the Igirmranak people is evident in their increasing propensity for knowledge and innovation. In the future, they want to keep trying new breakthroughs. LMDH for example, sees that after the Dutch eggplant, there is an opportunity to plant python/star nuts and macadamia nuts trials in the LMDH-managed area with an altitude of 1500 MDPL and above. Before depending entirely on agricultural cultivation, when there is still a lot of forest land, there are farmers who carry out activities to mix materials obtained in the forest to make herbal medicine. Jamu is what became medicine to prevent or treat various diseases that were suffered by residents at that time. Knowledge of making herbal concoctions is not passed down specifically to their children because the location of the ingredients is far up in the mountains and the community's increased access to local health facilities and medicines that are sold freely in food stalls. However, people's memory still holds several names of plants that are believed to be medicines for certain diseases.

"Pranoto Mongso", namely the Javanese calendar system used for agriculture, is still used for corn and tobacco crops. According to farmers in the upstream, many are no longer compatible with this system. This change is confusing, so the cropping pattern also changes. Farmers tend to plant crops that are considered economical throughout the year. Even though it is known, for example, that potatoes or tobacco will not yield good results in the rainy season, because the seeds have already been prepared, they will still be planted. The crop failures that occurred added to the debts of farmers. Residents of Igirmranak still choose an auspicious day for hoeing in preparation for planting, namely Tuesday. Star readings can still be performed by very few old farmers. And this is not passed on to the younger generation, because young people are generally not interested in agriculture. In addition, farmers in Igirmranak still determine the arrival of the season by looking at the position of the sun.

b. Governance and Social Equality

The results of the assessment based on the questionnaire related to governance and social equity show a moderate rating with no changing trend.

Women and men in Igirmranak manage their fields jointly. The roles of spurring, weeding, harvesting, and even selling agricultural/field products are carried out together. The land they manage can also be inherited from the wife or husband. Those who do not own land, work as agricultural laborers in neighboring fields with unequal pay between men and women, namely Rp. 50,000 compared to Rp. 25.000 for half-day work (08.00 - 13.00). When the harvest season arrives, the wages for female and male workers are the same, namely Rp. 50,000 plus a share of the harvest to take home.

In Igirmranak, there is a savings and loan group chaired by a woman and only married women can join as a member. However, the husband is obliged to know the savings and loan activities of the wife. Accepting married women as group members is a strategy to ensure that there is a guarantor so that savings and loan activities do not get stuck. However, the women noted that the same groups managed by men always did not last long. Prior to this, there was a group of men who managed goats and rabbits with government assistance, but this group did not last long.

The Igirmranak women's savings and loan group was formed in 2007 with capital from a government assistance program of Rp. 55,500,000 (51 people). Currently, the funds managed by this group reach 116,000,000 and it consists of 77 women (the youngest is 23 years old). Funds borrowed from this group are generally used for agricultural activities, including KWT activities.

In addition, Igirmranak women are also managers of the Community-Based Water and Sanitation Program (PAMSIMAS). PAMSIMAS is considered a significant program for the welfare of society, especially women, who use a lot of water for various reproductive activities in their households. Before PAMSIMAS existed, the community had to walk quite a distance to the spring to be able to access clean water. Women play a role in collecting clean water and bringing it home before the PAMSIMAS program came into existence.

Women in Igirmranak are involved in decision-making at the household level, for example in determining the sale of agricultural commodities, as well as in managing household finances. However, in the public sphere, women are only involved as decision-makers in organizations that only have women as members. In the government structure of Igrimranak Village, for example, there are no women in it.

For livelihoods and welfare, the value is considered moderate with a tendency to increase. The fact is that the community already feels that there are infrastructure facilities such as markets, schools, and health facilities that are affordable. In addition, Igirmranak's position allows for a variety of businesses for the community by becoming vegetable/potato collectors, vegetable retail sellers, tour guides, farm laborers, and herbal concoctions.

Figure 18. Farmers in the upper reaches of the Bodri watershed have a high dependence on pesticides. As in this picture, farmers are spraying pesticides in large quantities without using any safety.

Table 11. Initial Assessment of Igirmranak Village

Categories	Grade	Trends				Conclusion
		No Change	Decrease	Increase	N/A	
1. Diversity and Protection of Landscape and Seascape Ecosystems	2.75	18	38	16	0	**Moderate, Trend is decreasing**
2. Biodiversity (including agricultural biodiversity)	3.24	17	22	15	0	**Moderate, Trend is decreasing**
3. Knowledge and Innovation	3.17	16	24	31	0	**Moderate, Trend is increasing**
4. Governance and Social Equality	3.14	27	20	25	0	**Moderate, Trend is no changing**
5. Livelihoods and Welfare	3.01	34	20	36	0	**Moderate, Trend is increasing**

2. Cemoro Village

a. Biodiversity

The Cemoro Village area is located at an altitude of 967-2076 MDPL, is a mountainous area and is an intensive dryland agricultural area. The mainstay commodity for the community is the tobacco plant. Other types of cultivated plants are vegetables and corn. The planting location extends to areas with very steep slopes. The technique that is commonly applied is by placing plastic mulch on the planting beds which are expected to reduce soil erosion.

There are almost no perennials on agricultural land. Some parts of the land are planted with cendani bamboo. This species is harvested every 4-6 months and used as a craft material. People generally sell this bamboo immediately after harvesting and cleaning it. There is no treatment or further processing of this bamboo before being sold.

The need for clean water for Cemoro village is fulfilled by making clean water channels from springs in the Wates Village area. In the area of Cemoro Village itself there are several springs that are utilized by residents of other villages whose topographical position is lower.

The community still makes good use of local food biological resources. Corn is one of them, apart from tubers. Consumption of corn rice is still commonly practiced by the community. Corn that is processed into rice is a type of local corn that is white and yellow in color.

The results of the assessment of the diversity aspect in the landscape received a moderate rating. The tendency of landscape diversity is decreasing in line with the increase in agricultural cultivation activities. There are no specific measures to protect important areas, such as watersheds by establishing or maintaining spring boundaries.

In terms of biodiversity, there are not enough areas to support wildlife. However, in the aspect of agricultural biodiversity, including local food wealth, it still scores moderate. Consumption of local food, in this case corn, is still widely practiced. Apart from that, the wealth of other food crops besides local corn (the yellow color is called turmeric, the white color is called kania), namely tubers: busil (a type of taro), jipang, cassava, sweet potato.

Villagers value knowledge and innovation, especially in agriculture, which is quite high and the trend will continue to increase. This means that there are efforts to develop agricultural cultivation techniques to achieve better results. However, currently the condition of farmers is still dependent on the use of chemical fertilizers. If there is an option to use organic fertilizers that can produce yields that are not too different in weight, farmers are willing to switch to organic fertilizers. Most farmers work per family, namely fathers, mothers and children who have graduated from junior high school or are no longer in school. Knowledge of farming is directly taught along with practice.

b. Governance and Social Equality

Assessment of governance and social equality in Cemoro Village using a questionnaire shows a moderate level with an increasing trend. However, it should be noted that the involvement of Cemoro Village women in the public sphere has not been seen. It was stated that there were several KWTs in Cemoro, although these KWTs had not gone well.

In fact, individually and at the household level, women in Cemoro play a very important role in managing gardens/fields/natural resources. In farming families, women and men carry out activities in the garden together. There are women in Cemoro who do their own nurseries for local varieties of plants such as shallots, garlic, peas and chickpeas. These seeds are managed for generations and become the domain of women in their nurseries. The types of plants currently being managed are shallots, leeks, chilies, coffee, cabbage, avocados and eucalyptus, and no longer cultivate tobacco. Both the wife and husband both manage the garden, and the wife makes decisions, for example regarding sales.

On the other hand, there are many different combinations of husband and wife jobs in the same household. For example, there is a family where the husband is a village official, but the wife is a farmer, so for a long time the wife has been fully involved in land and livestock management, while the husband has not been involved at all. There is also a situation where both of them do not own land, so only the husband works in the arable fields by renting other people to others, while the wife works to look after the shop without being involved in agricultural matters at all.

In Cemoro there were also initiatives of young women farmers who managed their gardens using a more up-to-date system, by recording and using a planting calendar and using organic fertilizers even though they were not homemade (purchased from outside). These women farmers also bring their own agricultural products to the market.

Land managed in the form of fields can be inherited from the wife or husband. Furthermore, the land is given to children who are adults. For those who do not own land, they will work for neighbors with a labor system or rent land as cultivators. For the labor system, they will get a wage of Rp. 70,000 for men for hoeing and Rp. 50,000 for women for maturation or weeding.

Unfortunately, the various important roles of women, as well as young men, have not been formally accommodated and properly managed and there has been no significant involvement of these groups in decision-making or in village program planning.

It is known that in Cemoro Village there are no programs or activities related to waste management and women and children do not have many programs for capacity building or more structured socialization which is the view of women's groups, including with the wish that the deforested hills be re-planted with trees to reduce landslides and maintain.

For the livelihoods and welfare of residents, the current rate is low, and the trend continues to decline. This is due to uncertainty in the harvest of tobacco and corn, price uncertainty and production costs that continue to increase. In addition, most of the people are involved in debt with tobacco dealers or banks. However, the community is still able to survive because there are other incomes from vegetables and coffee, as well as goat, chicken and quail livestock.

Table 12. Preliminary Assessment of Cemoro Village

Categories	Grade	Trends				Conclusion
		No Change	Decrease	Increase	N/A	
1. Diversity and Protection of Landscape and Seascape Ecosystems	2.81	13	34	13	0	**Moderate, trend is decreasing**
2. Biodiversity (including agricultural biodiversity)	2.93	18	14	11	2	**Moderate, trend is no changing**
3. Knowledge and Innovation	3.69	11	9	40	0	**High enough, trend is increasing**
4. Governance and Social Equality	3.38	18	7	35	0	**Moderate, trend is increasing**
5. Livelihoods and Welfare	2.59	31	32	12	0	**Low, trend is decreasing**

3. Nglarangan Village

a. Biodiversity

Nglarangan village is also part of the upstream area of the Bodri watershed, located at an altitude of 1,113-1,290 meters above sea level. The landscape is hilly and mountainous with steep to very steep slopes. Most of it is in the form of intensive agricultural land with the main commodity being tobacco.

Apart from tobacco plants, the type of fruit plant cultivated is guava. Some are planted as intercrops, and some are in full gardening. Another plant that has been tried to be cultivated is cut flower of the Crysant type, but currently cut flower cultivation is no longer practiced. Ten years of upland rice is still grown and consumed, but now it is no longer there. In addition, there are white, yellow, and black-white (poleng) corn and tangerines. There is also tobacco that is still the seed of Javanese tobacco that was planted in ancient times, one of which is Genjah Sriwiti tobacco, which has long leaves and is small in size.

Figure 19. Residents' gardens located on slopes without land cover

Water needs are met by springs outside the village area. Most of the springs in the Nglarangan village area are used by residents of other villages with lower topographical positions.

Knowledge and innovation in agricultural cultivation is considered moderate but the trend is increasing. The community is very open to innovation and diversity of production plants. In Tretep District, there is a group of young people who organize themselves into a group of young farmers who use innovation as their mainstay. Its name is ST3 which stands for Sedulur Taruna Tani Tretep which promotes integrated farming whose members are spread across 9 villages in Tretep. Its members are on average junior high school graduates, because the schools available in Tretep are only up to junior high school. Their mainstay of innovation is the local sheep farming, commonly called wedus gembel. ST3 cooperates with farmers for fattening or raising livestock and facilitating animal feed, both dry and fermented. From livestock manure and urine, this group produces both solid and liquid organic fertilizers. ST3 is often facilitated by the Yogyakarta Agriculture and Animal Husbandry Development Polytechnic to broaden horizons and increase expertise. In Nglarangan itself, around 20% of farmers still use Pranoto Mongso. Exchange of agricultural knowledge and information usually occurs between gentlemen during Yasinan (recitation).

Figure 20. Sheep farming managed by members of Sedulur Taruna Tani Tretep

b. Governance and Social Equality

Assessment of governance and social equality in Nlarangan Village using a questionnaire shows a moderate level with no changing trend.

Although in the questionnaire the respondents chose answers that indicated moderate values for Governance and Social Equality, from the interviews other potential values were obtained. The women of Ngalarangan Village have not been part of the preparation of development plans, although they are active in various activities, for example PKK with waste management programs, stunting prevention, etc., SAR programs, and savings and loan groups. There was once an attempt to propose a program to the village, but it was ignored. In general, Nlarangan women are not prohibited from being involved and proposing programs, but usually they choose not to get involved because they have low self-confidence to be involved in this matter, moreover because they have had previous experiences where their suggestions were ignored. Women are considered not to have a profession as fishermen because they do not go to sea. The level of inclusiveness of development in Nglarangan Village still needs to be studied further.

Furthermore, there are many programs available for women based on religious activities, for example special recitation for women for each age group, Fatayat group, Muslimat, led by an ustadz.

Figure 21. Farmers are resting on the edge of the embung which is also a tourist spot in Nglarangan, one of the upper reaches of the Bodri watershed

On the other hand, activities for young people are mainly related to agricultural skills. Both young men and women are involved in this activity. Livelihoods and Welfare are considered moderate and tend not to change. Many of the infrastructure facilities needed are not yet available, such as senior high schools: SMA/SMK or markets. In addition, the limited land in Nlarangan is a challenge for meeting the increasing needs of families. Some farmers have to lease land to other districts. Meanwhile, the springs in the administrative area of Nglarangan cannot be used by the community because of their position under residential areas or community gardens. So that for water needs, the community pays contributions to people who have access to water sources. The community does not have many options for diversifying income because of the narrow land area, plus the location which is far from the market. In this village it is indicated that 100% of the farmers have debts either to the juragan, moneylenders/plecit banks or to government banks.

Table 13. Initial Assessment of Nglarangan Village

Categories	Grade	Trends				Conclusion
		No Change	Decrease	Increase	N/A	
1. Diversity and Protection of Landscape and Seascape Ecosystems	2.31	4.75	0.50	2.75	0	**Low, trend is no changing**
2. Biodiversity (including agricultural biodiversity)	2.50	2.33	4.67	1.00	0	**Low, trend is decreasing**
3. Knowledge and Innovation	3.41	2.00	2.00	4.00	0	**Moderate, trend is increasing**
4. Governance and Social Equality	2.69	5.00	1.50	1.50	0	**Moderate, trend is no changing**
5. Livelihoods and Welfare	3.25	4.20	0.00	3.80	0	**Moderate, trend is no changing**

4. Sidodadi Village

a. Biodiversity

The Sidodadi village area is in the middle of the Bodri watershed. This village area is in the altitude range of 26 to 393 MDPL. If in the upstream area the community relies heavily on cultivating seasonal crops, in Sidodadi Village the community has more variations between annual crops, especially fruits and seasonal crops. In the upper village land, many fruit trees are planted, such as jengkol and banana coffee. While at the bottom there are generally palawija gardens. On dry land which is an area of cooperation between Perhutani and the community, planting is carried out without intensive tillage. Commodity planted is generally corn. There have been suggestions to try growing patchouli under stands as an alternative to regular crop production.

The source of clean water comes from springs around the village. The spring discharge is stable and does not experience drought in the dry season. Several springs are located near settlements and are managed as communal bathing and washing facilities, while others are channeled to homes.

The results of the assessment through a questionnaire on diversity and ecosystem protection received a moderate rating. The trend of change is increasing. Sidodadi Village has made efforts to rehabilitate forest land on village-owned land and turned it into an educational forest managed by Bumdes.

Biodiversity (including agricultural biodiversity) is considered moderate with a declining trend. The community realizes that the types of plants in the village are decreasing day by day. There used to be a hazelnut forest, then it was cut down on the grounds that it was difficult to harvest. Then there is a type of tree that can mark the arrival of the rainy season, which has disappeared, namely the wart siwil.

Knowledge and innovation are rated low with a decreasing trend. The community feels that there is a lot of local knowledge being lost while innovation is almost non-existent. Reading the current season is difficult according to farmers because of changes in the landscape and the completeness of the ecosystem. For example, when the moths appear, the rainy season should have come, but now it is no longer appropriate. The sign in the form of falling wart siwil flowers was also one of the signs that the rainy season would come, but now the trees are no longer there. The tradition of gotong royong has also disappeared, because now farmers tend to be busier with activities on their respective fields. The thing that is still positive is, with the wealth of springs in Sidodadi, the ritual of spring salvation or Nyadran is carried out every year per hamlet in Sidodadi village. Besides that, there is also Nglampet, which is the ritual of maintaining irrigation canals. The day of the ritual is usually chosen in the month of Suro (Javanese) or Muharam (Islam) on Friday Kliwon.

For food storage systems, in ancient times it was located above the kitchen stove, called poro. But now some of them are gone, because the stove has been completely replaced by a gas stove and food ingredients such as corn are no longer planted in the fields.

b. Governance and Social Equality

Respondents rated Governance and Social Equality in Sidodadi Village as moderate, with an increasing trend. The average education of women in this village is relatively higher, namely up to the upper level of education (SMA, SMK). The age of early marriage also exceeds the age of 20 (22 years, 24 years, etc.) compared to women of the same age in other villages who marry at the age of 13.

Ownership of the land they manage can also come from the wife's line or the husband's line. For those who do not own land, the wages for daily work as laborers for both men and women are relatively the same, namely Rp. 75,000 for female workers and Rp. 80,000 for male workers. This distinction is called because women work longer duration than men.

The involvement of women can be seen both from the number of programs that women take part in (for example KWT, youth organizations, recitations), as well as from the variety of backgrounds of women who are involved in the program, not just the elite. However, there is not enough assistance for groups managed by women to be independent and run their groups/organizations properly. As a result, many women's groups did not last long.

Livelihoods and Welfare are considered moderate with a tendency to increase. The Sidodadi people have an average of quite large land, an average of 1 hectare, however, from interviews with women, it was found that their average land ownership is around 500 square meters, and is in the form of a Letter C. They grow a variety of crops so there is a diversity of income. from the garden, other than that there are opportunities such as truck driving, food business, laundry, clothes. Health facilities are available. However, senior secondary education facilities and markets are still far from the village. The community hopes and is optimistic that in the future the facility will be realized soon.

Figure 22. Representatives of women's farmer groups participated in a discussion on assessing the initial conditions in the Bodri watershed

Table 14. Initial Assessment of Sidodadi Village

Categories	Grade	Trends				Conclusion
		No Change	Decrease	Increase	N/A	
1. Diversity and Protection of Landscape and Seascape Ecosystems	3.04	18	19	27	0	**Moderate, trend is increasing**
2. Biodiversity (including agricultural biodiversity)	2.62	9	31	8	0	**Moderate, trend is decreasing**
3. Knowledge and Innovation	2.38	20	32	12	0	**Low, trend is decreasing**
4. Governance and Social Equality	3.22	19	9	35	1	**Moderate, trend is increasing**
5. Livelihoods and Welfare	3.14	33	8	37	1	**Moderate, trend is increasing**

5. Singorojo Village

a. Biodiversity

Singorojo village is a village in the central region of the Bodri watershed. Located at an altitude of 42-326 masl, the landscape is sloping to steep. The flow of the Bodri river in Singorojo Village is already an amalgamation of the existing sub-sub-districts in the Bodri watershed.

Agricultural land is generally in the form of lading. On dry land which is a collaboration area between Perhutani and the community, planting is carried out without intensive tillage. Commodity planted is generally corn.

Sources of clean water are fulfilled from springs in the village area, and some of it is channeled to other villages. Some springs have adequate spring boundaries with a radius of more than 50 m from the center of the spring with large trees.

Based on the assessment of the questionnaire, aspects of diversity and protection of ecosystems are ranked as moderate with a downward trend of change. The results of the same assessment occurred in the aspect of biodiversity.

Knowledge and innovation are considered moderate with a declining trend. The people of Singorjo feel that a lot of local knowledge still exists but is not developing, instead it tends to decrease. While innovation for agricultural cultivation is still not there. The Nyadran and Nglampet traditions are still maintained, as in Sidodadi village. Because it is still dominant to use firewood for the stove, there is still food storage on the stove. But usually there is only a small amount of local corn stored, and even then not all farmers grow local corn for family consumption.

b. Governance and Social Equality

The community's assessment of the situation in their village from the aspects of Governance and Social Equality shows a moderate value, with the trend Unchanging.

Generally, women and men in Singorojo Village work as farmers (70% of the population), but only a few are young farmers. Others work as textile factory workers, especially women, and migrant workers abroad. The male labor wage is Rp. 10,000 compared to the wages of female workers. The male labor wage without lunch is Rp. 50,000, while with lunch it is Rp. 40,000, while the wage for a female worker without lunch is Rp. 40,000, while with lunch it is Rp. 30,000.

Rice fields are jointly managed by women and men with the distribution of hard work roles being carried out by men, such as making rice fields, while women do work that is considered less energy-intensive, such as planting. Furthermore, women are the party whose role is to collect firewood. Sometimes they have to take it from Perhutani's territory if it is not found in their garden/field area.

Furthermore, there are women's group activities in the form of savings and loans which are also chaired by women. In addition, there are mobile banks that lend money at high interest rates.

The average education of women in Singgorojo Village is high school, and a small number of them attend college.

Some of the social activities that women take part in are recitation/tahlilan, cooperation for 'women's work' and PKK for young women.

Livelihoods and welfare are considered moderate with no change in trend. However during the discussion, it was acknowledged that the socio-economic infrastructure, education and health facilities were sufficient. Many have been educated up to college.

The diverse cropping patterns of the Singorojo community and the activeness of both male and female farmers have made the Singorojo residents have enough options in terms of income diversity. One family can grow rice, corn, bananas, beans, tubers and also raise ducks and quail besides sheep.

In Singorojo there is a system of saving for women farmers called Farmer Savings, managed by a committee, called the Royong Committee. A farmer can be summoned by the Royong Committee to work on someone else's land, from 6.30 – 10.30 a.m. for a fee of 40 thousand rupiah without food, or 35 thousand rupiah with food. The work can include several types of activities: tandur (planting), matun (cleaning grass), and picking/harvesting corn. Payments are not taken immediately but are recorded by the Committee and then taken during the month of Ramadan. The arrangement of who's shift to work as well as money management is carried out by the Royong Committee.

Table 15. Initial Assessment of Singorojo Village

Categories	Grade	Trends				Conclusion
		No Change	Decrease	Increase	N/A	
1. Diversity and Protection of Landscape and Seascape Ecosystems	2.64	4.00	6.75	3.25	2.00	**Moderate, trend is decreasing**
2. Biodiversity (including agricultural biodiversity)	2.77	3.67	7.00	5.00	0.33	**Moderate, trend is decreasing**
3. Knowledge and Innovation	2.91	1.75	8.75	4.50	1.00	**Moderate, trend is decreasing**
4. Governance and Social Equality	2.88	7.50	5.25	3.25	0.00	**Moderate, trend is no changing**
5. Livelihoods and Welfare	2.75	7.60	4.40	4.00	0.00	**Moderate, trend is no changing**

6. Wonosari Village

a. Biodiversity

Wonosari village is located further downstream from the Bodri River than Singorojo and Sidodadi villages. The slopes tend to be more sloping and even practically flat compared to the previous villages. The height of this village is 18-131 MDPL.

If you look at the function map of the area, part of the Wonosari village area is in a production forest. The lands which are areas of community cooperation through LMDH are dry agricultural lands with the main commodity being corn. As is generally the case with the management of annual crops in forest areas, cultivation is carried out without intensive land management.

The residents' source of clean water is supplied from drilled wells. One drilled well is an artesian well. There are no special protected areas designated for the maintenance of groundwater recharge.

Based on the assessment of the diversity and ecosystem protection aspect questionnaire, it received a low rating with perceptions of an unchanged and increasing trend at the same rank. It is easy to understand, if the diversity of landscapes is given a low score because most of the village area is a production forest, most of which are planted with corn interspersed with other seasonal crops. Tree stands only exist on the sides of the road, and even then, very rarely.

Knowledge and innovation are rated quite high with a tendency to increase. The fact is that corn fields dominate almost all of the community's land, causing local knowledge to never be used. Some farmers even admit that they have never tilled their land since planting hybrid corn. According to him, one of the reasons why hybrid corn is preferred is because there is no need for soil maintenance as was done by farmers in the past. After planting is given chemical fertilizers, farmers can do other things. Local knowledge tends to be eroded in this area. The easier the practice, the higher the production costs because chemical inputs tend to increase in price. Farmers tend to think pragmatically, which is easy and fast. However, it is likely that the innovation knowledge that is considered quite high is related to the corn planting method with various inputs to produce an abundant harvest. In addition, in this village there are many carpenters for making houses or furniture whose skills have long been known. Therefore, many of the houses in this village are aesthetically very good.

b. Governance and Social Equality

In Wonosari Village, the value of Governance and Social Equality given by the community to the village situation is "moderate with an Increasing Trend".

The Wonosari woman is involved in managing natural resources, even in managing the Perhutani area together with her husband who is a member of LMDH. However, the husband entered his name as a member of LMDH.

The average education of women in Wonosari Village is senior high school (SMA/SMK), while men are up to college.

Livelihoods and Welfare are rated moderate with a steady trend. Wonosari farmers feel that education, health and road access facilities are good. There are many young people in college. The diversity of income is also quite varied, starting from agricultural products, selling broilers, laying hens, as well as small businesses such as printing, food, birds and selling plants. However, with debt owed to collectors and banks, economic conditions are increasingly difficult. Therefore around 15-20% of women in Wonosari become migrant workers in Hong Kong, Taiwan and Singapore.

Figure 23. LMDH secretariat office Wonosari Village

Table 16. Preliminary Assessment of Wonosari Village

Categories	Grade	Trends				Conclusion
		No Change	Decrease	Increase	N/A	
1. Diversity and Protection of Landscape and Seascape Ecosystems	2	8	0	8	0	**Low, trend is between no change and increasing**
2. Biodiversity (including agricultural biodiversity)	3.67	8	4	0	0	**High enough, trend is no changing**
3. Knowledge and Innovation	3.75	0	4	12	0	**High enough, trend is increasing**
4. Governance and Social Equality	3.25	4	4	8	0	**Moderate, trend is increasing**
5. Livelihoods and Welfare	2.8	16	0	4	0	**Moderate, trend is no change**

7. Pidodo Kulon Village

a. Biodiversity

Pidodo kulon village is the most downstream village with a height of 0.1 meters below sea level to 13 meters above sea level. The position of the village is near the mouth of the Bodri river, and some are even lower than sea level. The topography is flat to sloping. Land use in the form of agricultural land and ponds. There are still some mangrove forests and mud flats near the estuaries.

With its position on the coast, Pidodo Kulon Village is quite frequently flooded due to tidal floods. Although floods from rivers occur almost every year, they do not harm or reach settlements because the village government has built embankments. Tidal floods, or floods caused by rising sea levels, occur every day.

The water source is from a well, but it is brackish and cannot be used as drinking water. Drinking water is supplied from bottled water. Wells with a depth of more than 80 m only obtain fresh water.

The mud flats are visited by quite a lot of water birds, as well as around the riverbanks and mangrove forests. On direct observation, at least 6 (six) bird species were recorded.

Table 17. Fauna in the Bodri River Estuary

Local Name	Scientific Name
Cangak abu	*Ardea cinerea*
Kuntul perak	*Egretta intermedia*
Blekok sawah	*Ardeola speciosa*
Kuntul kecil	*Egretta garzetta*
Tekukur	*Streptopelia chinensis*
Bubut alang-alang	*Centropus bengalensis*

Figure 24. Little egret at the mouth of the Bodri River

Based on a questionnaire assessment of diversity and low ecosystem protection with a downward trend. A decrease may appear in the change from agricultural land to brackish water aquaculture ponds. A decrease may also occur in the form of reduced mangrove forests.

The biodiversity aspect received a moderate rating with a declining trend. Possibly caused by the expansion of cultivation land (greed), which reduced some agricultural land and changes in river borders overgrown with reeds.

Aspects of biodiversity management received a moderate rating with an increasing trend. Some fishermen have attempted to build FADs or fish houses to make it easier to catch fish. Awareness to utilize local food sources, in this case fish yields are quite good.

Knowledge and innovation are considered moderate with a tendency to increase. According to fishermen in Pidodo Kulon, the development of fishing gear is quite significant from time to time. This is their adaptation in dealing with various natural conditions and fishing seasons. The average fisherman still has the ability to read extreme weather before going out to sea. And on average they still have the knowledge to read signs of locations where there are fish. When they gather at the shop or elsewhere, they often discuss fishing, both the latest technology and new fish locations. With cell phones, fish locations are often shared with friends who haven't caught anything yet. Some fishermen who are also fishing guides even have an application to monitor the coordinates of fishing locations and save them.

Fishermen in Pidodo Kulon have their own seasonal calendar for certain types of catch, as shown below:

March-April	: Shrimp
May-July	: Pomfret/snapper
November-December & March-April	: Mackerel

In January and February, fishermen usually do not go to sea because of the peak season for the west wind.

Figure 25. The catch of fishermen from Pidodo Kulon

b. Governance and Social Equality

Based on the assessment using a questionnaire is High Enough with an Increasing Trend. There are quite several programs being carried out in this village, where young people, both men and women, can actualize themselves in the same group. However, activities for women are limited to recitations, while for men there are joint business groups (KUB) as well as recitations. The KUB does not have women members because women are considered non-fishermen because they do not go to sea.

Usually, boats used by parents are passed on to sons and daughters. If parents only have 1 boat, the inheritance will be divided in half. The social activity carried out by women apart from recitation is arisan, and in one of the Pilang Sari areas, there is a KUB which has just started operating where women are part of it.

In Dusun Pilang Sari, women, and men, both young and old, were both involved in searching for shrimp in the former pond area. The catch is used for family consumption or for sale. Apart from that, women and men were also involved in the activities of searching for seedlings and planting mangroves.

Livelihoods and Welfare are considered moderate with an increasing trend. Education, health, road and market facilities are adequate. However, tidal floods that often occur in settlements are very disturbing, causing an increase in the number of people affected by skin diseases. The land status of the residents of Pilangsari Hamlet which is Bengkok Village land does not seem to be seen as a big problem. However, there is latent tension between

residents of Pilangsari Hamlet and other hamlets whose cause is not clear. Pidodo Village, like other coastal villages close to the city, offers opportunities for various alternative income sources other than fishing and ponds. There are rice farmers, small food businesses, groceries, and clothing.

Table 18. Initial Assessment of Pidodo Kulon Village

Categories	Grade	Trends				Conclusion
		No Change	Decrease	Increase	N/a	
1. Diversity and Protection of Landscape and Seascape Ecosystems	2.54	14	28	4	0	**Low, trend is decreasing**
2. Biodiversity (including agricultural biodiversity)	2.93	11	13	24	3	**Moderate, trend is increasing**
3. Knowledge and Innovation	3.54	25	10	29	4	**Moderate, trend is increasing**
4. Governance and Social Equality	3.84	21	2	40	5	**High enough, trend is increasing**
5. Livelihoods and Welfare	2.77	35	8	37	5	**Moderate, trend is increasing**

B. Problems, Ecological Threats and Production Consumption

Erosion is one of the problems and threats in watershed management, especially in areas with steep slopes. The erosion hazard level of an area can be calculated using the erosion hazard level approach. The level of erosion hazard is classified into 5 categories based on the potential for soil loss (tonnes/ha/year). The determining factors for the level of erosion hazard are slope class, rain erosivity, soil erodibility and land cover and tillage factors.

Table 19. DEH Area Per Each Watershed Typology

Categories	DEH Area per Watershed Typology					
	Upstream		Middle		Downstream	
Very light	5124.08	33.27%	11701.66	32.36%	3327.06	24.87%
Light	1105.68	7.18%	5906.33	16.33%	5257.13	39.30%
Medium	2241.29	14.55%	7516.93	20.79%	3472.47	25.96%
Heavy	3140.40	20.39%	7775.45	21.50%	1020.56	7.63%
Very heavy	3789.74	24.61%	3263.42	9.02%	299.68	2.24%
Total	**15401.19**		**36163.79**		**13376.89**	

Meanwhile, in the context of the people's economy, the districts of Wonosobo, Temanggung and Kendal are highly dependent on crops from annual crops of potatoes, tobacco and corn. With this fact, the ecological threat is not an easy thing to overcome. Looking at the typical culture of local communities and the influence of their ecological and geographical conditions, ecological problems and threats as well as consumption production can be divided into 3 areas:

Figure 26. A stretch of cornfields in Wonosari, the central part of the Bodri watershed

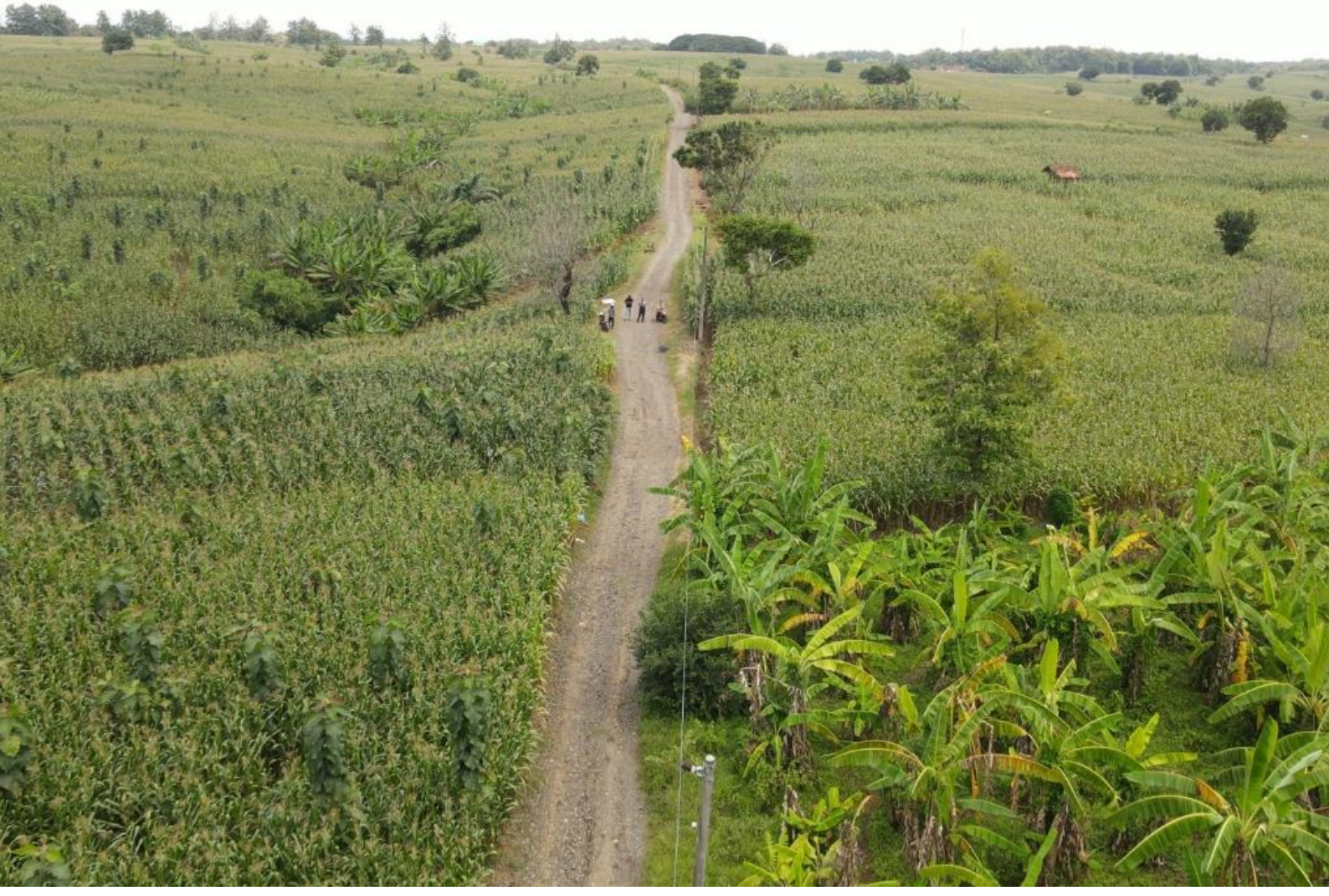
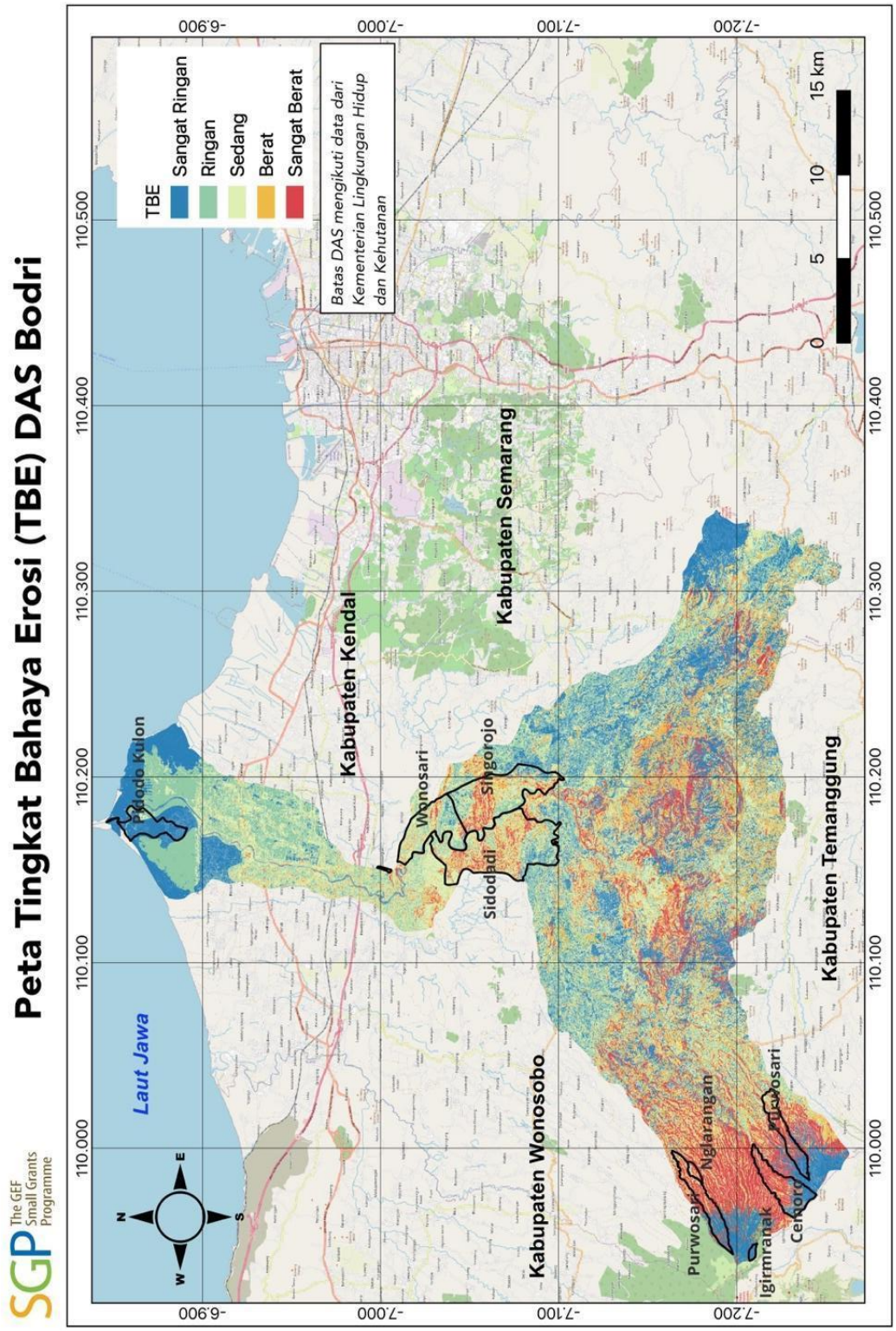


Figure 27. Erosion Hazard Level of the Bodri Watershed



Description of Erosion Hazard (DEH) Level

Very Light : <15 ton /ha /year
Medium : 60 – 180 ton /ha /year
Heavy : 180 – 480 ton /ha /year
Very Heavy : > 480 ton /ha /year

The level of erosion hazard is different for each watershed typology. The level of severe and very severe erosion is more dominant in the upstream area and has a tendency to decrease in the middle and downstream areas.

1. Upper Watershed Area

a. Ecological Problems and Threats

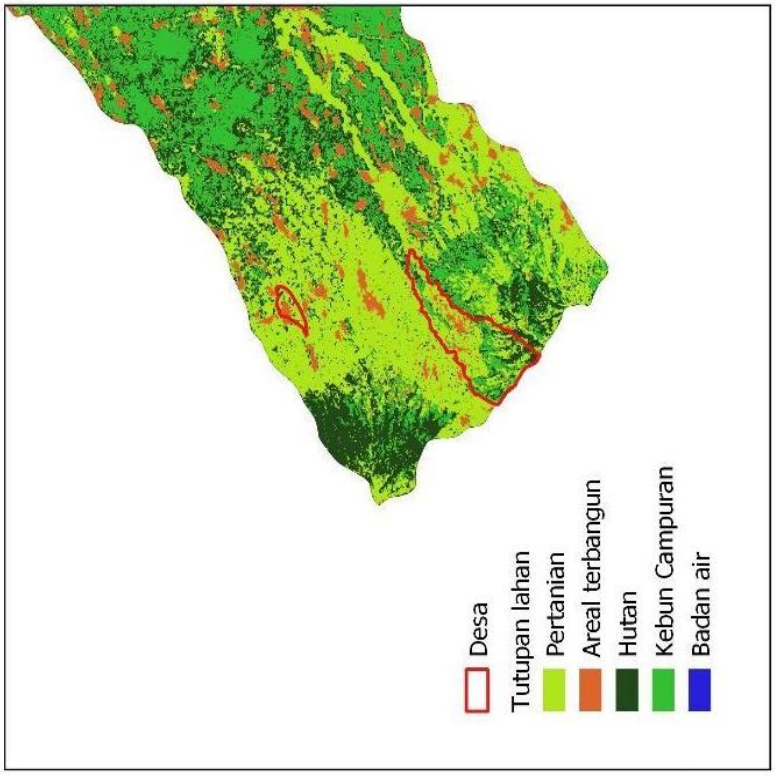
The upstream area has a tendency to have a large erosion risk due to the steep slope of the land. Vegetation factors become another determinant of the amount of erosion in the upstream area. Agricultural land on steep or very steep slopes has a greater risk of erosion than forests and mixed gardens. If seen from the table above, it can be seen that in the upstream region the area of agricultural land on steep and very steep slopes is quite large.

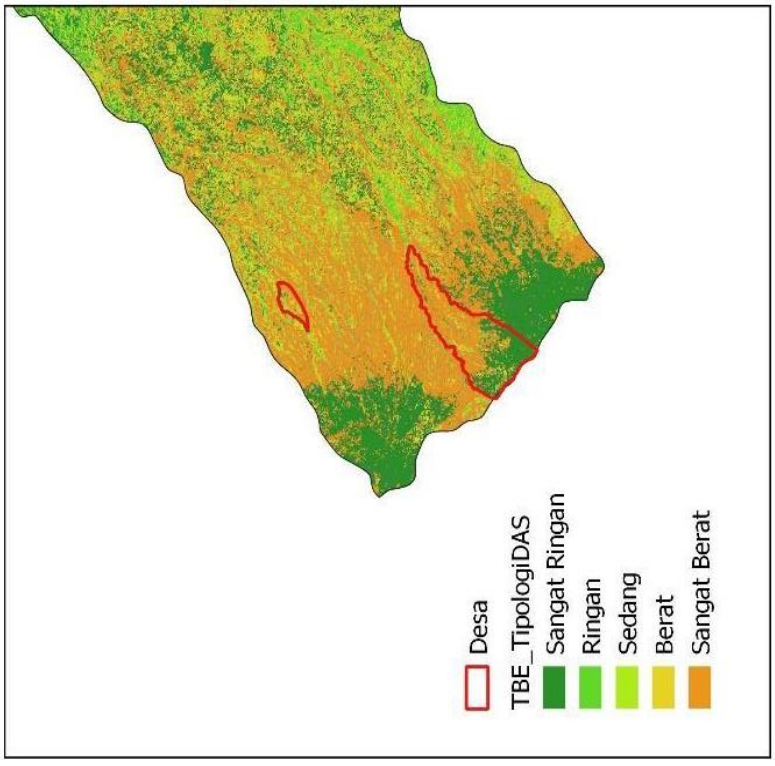
Table 20. Land Cover Area in the Upstream Section for each Slope Class

Land Cover (upstream)	Area Per Slope Class (Ha)				
	Flat	Slope	Rather Steep	Steep	Very Steep
Agriculture	520.66	879.48	1242.86	1824.16	1113.35
Building	231.03	345.18	306.84	179.58	36.94
Forest	152.53	405.38	942.75	1924.64	1623.28
Mix Plantation	176.60	416.15	869.53	1579.21	848.75
Water	3.34	4.62	7.94	8.04	2.69

To see the risk of erosion in the surveyed village areas (Cemoro and Nglarangan) can be seen in the image below. From the picture it can be seen that Cemoro Village has a severe to very heavy erosion risk, because there is quite a lot of agricultural land on steep slopes. The same conditions and risks exist in Nglarangan Village.

Figure 28. Map of Erosion Level and Land Cover in the Upper Bodri Watershed





Land in the upstream watershed area is dominated by agricultural use on mountain slopes with moderate to extreme slopes. As far as the eye can see, plots of land are planted with seasonal crops, namely potatoes, tobacco, vegetables, chilies and corn. Even though they realize that annual crops have a high potential for erosion if planted on slopes, farmers feel they have no other choice. Most farmers said that limited land forces them to plant crops that are considered to have economic value. In Cemoro Village, for example, the community's agricultural expanses are seasonal crops without any tree stands. According to the community, several water sources are already discharged compared to the past. In this area the source of ground water is called Tuk.

b. Production and Consumption

The use of chemical inputs in tobacco has become known since the ITR (People's Tobacco Intensification) program existed in the 1980s. Tobacco itself is a plant that has been known since the 17th century by people who live on the slopes of Sumbing, Sindoro and Prau mountains. Around the 1980s, potatoes started to enter Wonosobo, and slowly replaced tobacco, although now there are still those who grow tobacco in Wonosobo. Corn, called local corn, which used to be grown as a staple food for most Javanese people after rice, was brought to Indonesia by the Portuguese around the 17th century. Some are yellow in color, some are white. What is now widely grown is for self-consumption as corn rice is white corn. A small portion of the residents of Temanggung who live on the slopes of the mountains still consume corn rice both principally and recreationally. Apart from corn, tubers are also still consumed for snacks. On average they have taro, cassava, sweet potato and canna. Most who still consume are the older generation. They remember that in the past, if they brought food to the fields, it must have been corning rice because it was more filling and could delay hunger longer than rice made from rice. In the 1980s hybrid corn was introduced to farmers. Since then, local maize cultivation has been pushed aside. A lot of land was cleared for planting hybrid maize, which is sold as the main ingredient for livestock feed.

Some farmers who have debts to both collectors and banks use the crop yields as collateral to be able to pay off debts, so that they can make new debts. Each loan given is usually the term of one growing season, which is 6 months. Farmers in the upstream areas, whose main products are tobacco or potatoes, on average have debts to either collectors or banks. They usually use debt to cover the production costs of planting and maintaining the plants throughout the growing season. Tobacco farmers in Igirmranak admit that production costs continue to increase because of rising fertilizer prices and increasing use, while the prices of the crops do not increase. There are even certain times when it goes down, because the price of tobacco is determined by collectors.

2. Middle Watershed Area

a. Ecological Problems and Threats

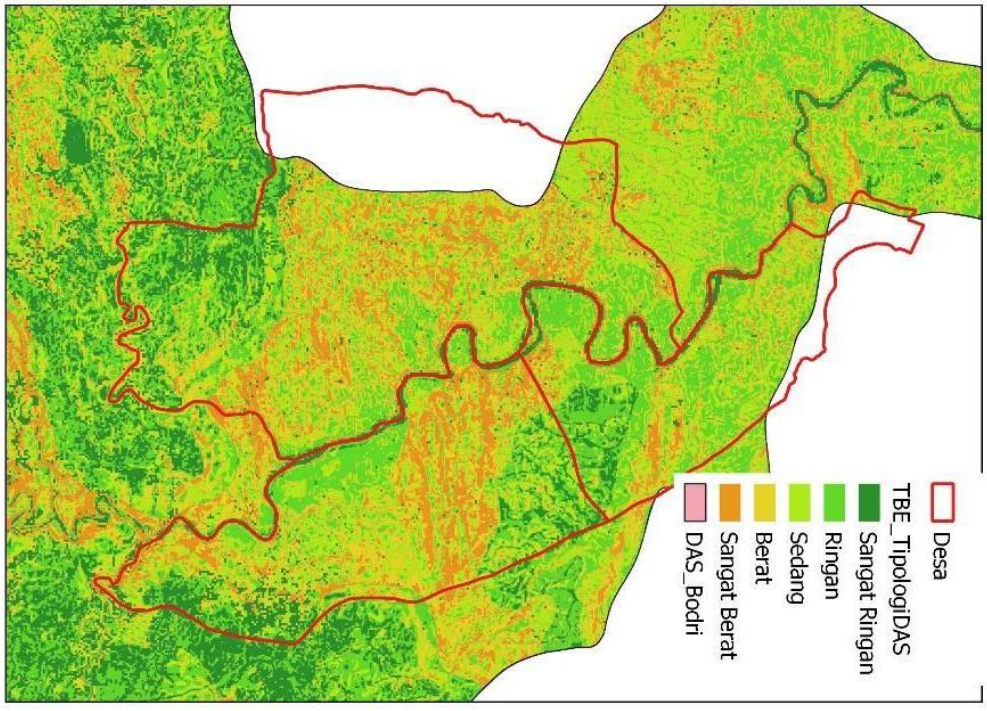
The central region has a land cover that is more dominated by mixed gardens and forests. The erosion risk is less in the central region, although there are still areas with a severe to very severe erosion hazard. Overall, in the central region of the Bodri watershed there are still areas with a severe to very severe erosion hazard of around 30%..

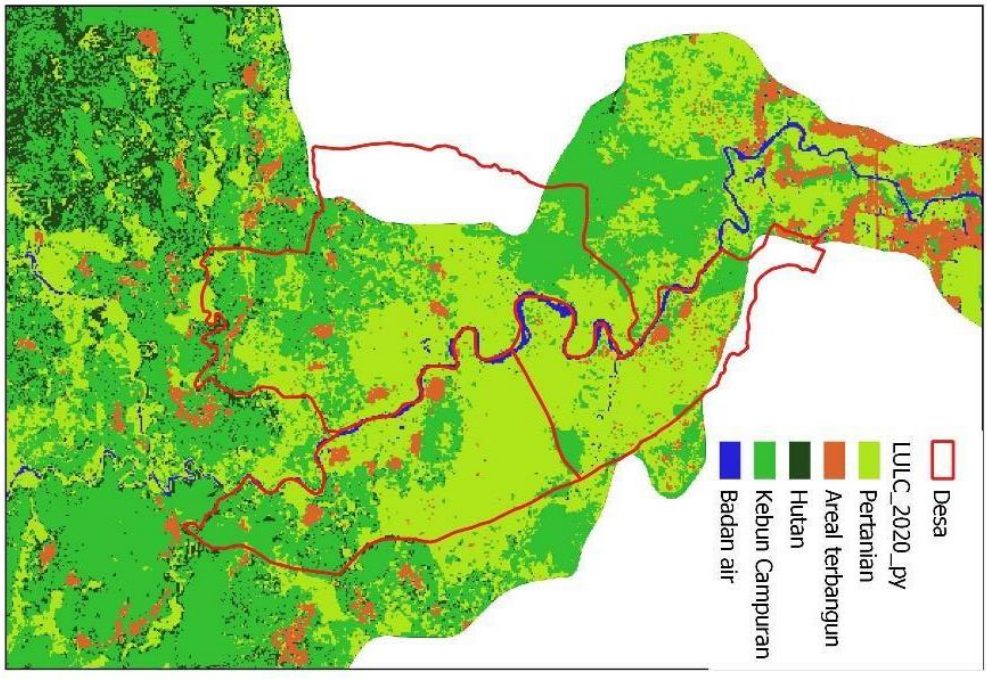
Table 21. Land cover area in the middle of each slope class

Land Cover	Area Per Slope Class (Ha)				
	Flat	Slope	Rather steep	Steep	Very steem
Agriculture	1311.80	1904.84	1990.47	1116.01	190.15
Building	495.17	607.44	423.15	163.30	12.34
Forest	547.06	1310.55	2656.34	4103.81	1843.20
Mix Plantation	1720.76	3436.63	5501.59	5553.40	1778.66
Water	18.72	17.49	13.15	9.41	2.99

To see the amount of erosion risk in the villages of Sidodadi, Singorojo and Wonosari can be seen from the image below. Sidodadi Village is the area with the highest level of severe to very severe erosion hazard, followed by Singorojo and the lowest is Wonosari Village. Wonosari Village has the least land cover in the form of mixed gardens but has the least area of heavy erosion due to its gentler slope.

Figure 29. Map of Erosion Level and Land Cover in the Central Region of the Bodri Watershed





b. Production and Consumption

In the central region of Bodri, corn is the main product of farmers. The community no longer has staple food crops for consumption. Most of the rice field owners also sell their paddy on the spot to collectors immediately after harvest. If there are those who set aside for consumption, the amount is at most only 20% of the needs per year. The rest still buy rice. In this area, the main crop besides corn is bananas. Just followed by nuts and vegetables. For livestock, these two villages are dominated by Javanese goats and wedus (sheep) kacang.

Indebtedness is also part of the traditions of the people in the central region. In Sidodadi it can be said that 70% of people are in debt even though most of them are healthy debtors. Indebtedness to collectors or banks is very common in farming communities along the Bodri watershed. What's interesting, for Wonosari Village, which is a corn farmer, debt has become a necessity because the produce from corn cannot meet the needs of the family. Surviving as a corn farmer is a way to maintain the identity of a corn farmer, one of which is to get into debt. Lenders will see the commodities produced before giving debt. Corn is a crop product that is considered not at high risk.

Apart from being in debt, one of the solutions considered to be a solution to meeting the needs of families in Wonosari is working as TKI (Indonesian Workers) abroad. Women dominate to take this job. They work in Hong Kong, Taiwan and Singapore. About 15-20% of Wonosari village family members become migrant workers. If a family member becomes a TKI, this can be seen from the shape of the house that stands out, looks good and is made of quality materials such as teak wood. This village is also a production site for limasan and joglo houses made of teak wood.

3. Downstream Watershed Area

a. Ecological Problems and Threats

In the downstream area, erosion is no longer a problem. But the downstream area becomes a deposition area from erosion that occurs in the area above it. Precipitation can occur along the body of the river and cause siltation. Siltation can result in reduced water-holding capacity during a flood. Sedimentation can also shallow rivers which disrupt shipping lanes for fishing vessels.

Figure 30. Sedimentation along the Bodri River

Table 22. Land Cover Per Slope Class
in the Downstream Area of the Bodri Watershed

Land Cover	Area Per Slope Class (Ha)				
	Flat	Slope	Rather Steep	Steep	Very Steep
Agriculture	3861.50	1575.59	637.08	169.80	21.46
Building	1942.74	522.01	75.13	11.91	1.18
Forest	72.13	3.37	3.12	1.84	0.37
Mix Plantation	706.72	510.18	368.69	92.86	5.67
Water	2706.39	255.02	91.18	67.93	11.13

Differences in land cover do not have a significant effect on the risk of erosion in the downstream areas. Agricultural land, built-up areas and mixed gardens all three have a level of erosion hazard which is in the range of very mild to mild.

b. Production and Consumption

In coastal areas, clean water sources are a major problem. Residents' wells can only produce brackish water which is not consumed for drinking. The average family on the coast buys gallons of water for drinking. Meanwhile, for cooking, sometimes you can still use drilled well water.

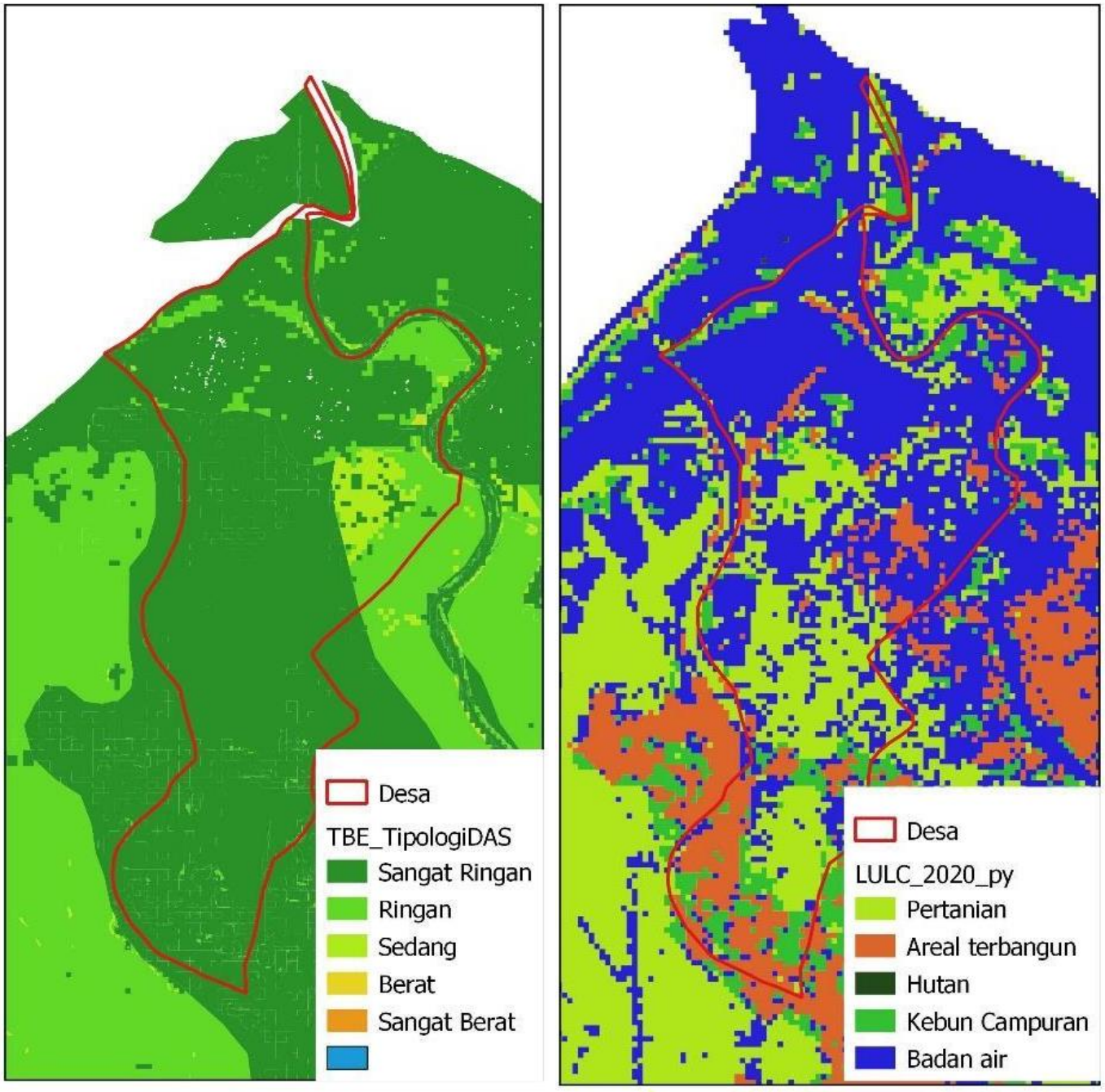
Most of the people in Pidodo Kulon are fishermen and/or milkfish farmers. There are only a few rice fields owned by this village. Their staple food is rice. Some of the Pidodo Kulon people live on village bengkok land. This means that these residents do not have their own land.

The necessities of life are met by fishing, crabs, crabs and oysters in the sea with a variety of fishing gear according to the season. The fish caught will usually be set aside for self-consumption first, then sold to collectors. In addition, if you have a motor boat, you can rent it out for guests who want to fish. The location of Pilangsari hamlet is indeed quite famous as a gateway for fishing for fishing enthusiasts who come from outside the city. According to them, guests are usually satisfied with the fishing results which are considered to be large in size.

The interesting thing is when asked whether there was an impact on the flooding from the Bodri river on fish catches, the fishermen answered that actually fresh water that goes far into the sea brings along river fish and it attracts the attention of large sea fish to prey on. Thus, fishermen can easily catch large sea fish. However, there are also fishermen who feel that the distance to sea is getting farther with the siltation around the estuary. This means that flooding from the Bodri River has a positive or negative impact on fishermen's catches.

According to information from Pidodo Kulon fishermen, 80% of fishermen are in debt. Mostly to collectors. However, the current conditions are different from before, where the position of fishermen who are in debt is no longer under pressure because they have to sell their catch to collectors, the creditors. These fishermen can sell their catch anywhere at the highest price. After that, he can repay the debt at any rate without any sanctions. In contrast to before, fishermen who are in debt are required to sell their catch at a price determined by collectors. This resulted in the condition of being in debt not being considered a worrying condition for fishermen. Even some say debt is encouragement for work.

Figure 31. Land Cover Map of the Downstream Bodri Watershed



C. Situation of Social Equality, Gender Responsiveness and Inclusion of the Young Generation

1. An overview and analysis of the situation regarding social equality, especially for women and young people from various classes

In general, women and men in all seven villages along the Bodri watershed carry out field or paddy field management activities together. Likewise in other production activities such as the processing of marine products as happened in the downstream area of the Bodri watershed. Scavenging, field care, harvesting, raising livestock, planting mangroves, catching fish, processing seafood and even selling agricultural products are carried out by the husband and wife together. Sometimes farming or fishing families also involve daily laborers, who are generally their neighbors.

In all villages, it was found that there were many situations where women, like men, played an important role in managing the gardens/fields. The wife often determines the selling price and regulates household finances. In addition, in various location, women are responsible for supplying firewood as well as clean water and plant nurseries for planting in the following planting season. Situations were also found where only the wife was involved in natural resource-based work, while the husband traded or worked in the village, or vice versa.

Knowledge of traditional medicines originating from the forest is now only owned by parents who are over 60 years old. Accessing the forest to collect herbal ingredients is seen by the younger generation as a way to make ends meet during times of hardship. Currently, the community considers that there are more sources of livelihood available in the village, so they no longer need to access the forest to collect medicinal plants to sell as herbal medicine. Some adults no longer have knowledge of using traditional medicines, other than what they have in TOGA, such as ginger, turmeric, betel nut, and others.

The land managed by the community along the Bodri watershed is generally inherited, both from the wife and the husband, both owned by themselves and cultivated in the Perhutani area. There is no difference in the distribution of inheritance, especially with regard to the means of production, for boys and girls. In the upstream area, the land owned by parents is divided equally between their children, both boys and girls, as happened in Igirmranak Village and in Cemoro Village. Meanwhile, boats owned by parents will be inherited equally for girls and boys, as happened in Pidodo Kulon Village. Even though the parents are still alive, the means of production can already be passed on to their adult children, and especially if they start having their own family.

In general, people own land with an area of 500 m2 to 5000 m2. It is very rare for a family to own up to 2 hectares of land, which is actually mentioned by FAO as a requirement for a prosperous farming household.

Furthermore, people who do not own their own land work as agricultural laborers in their neighbors' fields/rice fields. The daily pay is different in each district. Kendal and Temanggung Regencies have higher daily labor wages than Bondowoso Regencies, as shown in the table below:

Table 23. Wage Comparison

Name of District	Wages outside the harvest season (Rp)		Wages during the harvest period (Rp)		Notes
	Man	Woman	Man	Woman	
Wonosobo	50.000	25.000	50.000	50.000	man: spur, preparing the planting plot; women: weed (matun), give pesticides (ngobat). At harvest, farm workers also receive a share of the harvest. notes: * For Temanggung and Kendal Regencies it is not known whether the wages are during the harvest or outside the harvest season.
Temanggung	70.000*	50.000*	N/A	N/A	
Kendal	• 80.000* • 50.000* (without meal); 40.000* (with meal)	• 75.000* • 40.000* (without meal); 30.000* (with meal)	N/A	N/A	

From the table above, it can be seen that there is a very significant difference in daily labor wages in Wonosobo Regency, namely Igirmranak Village, which is 50%. Meanwhile in Temanggung Regency the difference is up to 30% and in Kendal the difference in wages for male and female workers is not up to 10%. The difference in wages between women and men occurs because women's work is considered lighter and requires less labor than that of men. Though the role of plant care is as important as other roles in the agricultural cycle. The role of caring for and weeding plants is given to women because women are considered to have qualities/expertise in this matter, namely accuracy and diligence, although these qualities are not something men cannot possess. On the other hand, actually women also work in hoeing the land, such as in Igirmranak Village and Cemoro Village.

In the plantation area that is in the Perhutani area, there is an LMDH group where most of the registered members are men, although women also work in this area. For example, in Cemoro Village, 10 women were registered as LMDH members, out of a total of 400 registered LMDH members, although it was known that women also co-managed land with their husbands. This situation was also found in Wonosari Village, where women were involved in managing land which was a Perhutani area, but only wrote the names of their men/husbands in the LMDH group.

In the public domain, women are involved and actively manage several activities through savings and loan groups, women farmer groups (KWT), joint venture groups (KUB), PKK and PAMSIMAS. Some of the activities or groups managed by women are generally activities related to activities attached to the role of women related to family health, namely PKK, or fulfilling family food such as yard farming activities through KWT. In addition, women are also given space in the role of fund management such as in savings and loan groups and PAMSIMAS fund management. Various other activities that are followed by women and men, also for the younger generation are recitations which are held with a frequency of more than 2 times a week.

However, the involvement and role of women in various domestic and public domains does not necessarily mean that women are involved/invited in various village planning processes, for example in the preparation of the RPJMDes, or in village planning efforts. Women attend village meetings, but often their role is only limited to providing meeting consumption. In other situations, for example in Nglarangan Village, for example, women were involved in deliberations, and given space to propose programs. Unfortunately, this space has not been utilized by women due to their low level of ability and self-confidence, which makes them attend meetings without the courage to provide input in the forum. From the FGDs, it was found that there was only one village where women were actively involved, including in village planning. This situation was conveyed as a result of a training called ABCD (Asse-based Community Development).[5]

On the other hand, the situation of youth involvement in the seven villages along the Bodri watershed varies. In several villages, such as Igirmranak Village and Singorojo Village, it was found that there were not many people working on farms anymore. This is due to the lack of land that they can work on. However, this situation is inversely proportional to the situation of the younger generation in Cemoro Village, where almost all of them are still involved in natural resource management activities such as farming and farming with their parents. It was stated that only about 5% of the youth in Singgorojo Village worked as laborers outside the village. Meanwhile, in Sidodadi Village, some young men still work as farmers, but women are usually not involved. Meanwhile, in Pidodo Kulon Village, since the age of 12, young boys have been taken by their parents (fathers) to go fishing. There is a belief that if young people no longer go to sea, then they are disobedient.

In general, young people have several sources of livelihood, for example driving motorcycle taxis and becoming tour guides, or farming and opening stalls. Another role of the younger generation related to agriculture is generally as collectors, or helping the distribution of agricultural products as drivers for transporting vegetables or as sellers to the market. These roles are generally performed by young men. Women are also involved in ecotourism development activities, although they are not dominant.

Several groups that provide space for the younger generation to actualize themselves are tour groups and youth groups. In some areas, young women and men work together in one organization. This is not commonly found in adult women's and men's organizations. Men generally join in their own groups, for example Joint Business Groups, or farmer groups. Meanwhile, women are joined in separate groups which are generally related to family affairs such as PKK, or KWT which develop yard farming. However, LMDH is known to have female members with a small percentage.

[5] https://www.youtube.com/watch?v=kz8W7xPDRvw&feature=youtu.be

As a note, it is interesting to note that the age at which women marry is generally younger than men. In Igirmranak, for example, women today are still married at the age of under 20, while in the past women were even married at the age of 13. In another example, a woman who is currently 23 years old married at 19 years old, while her husband was 26 years old at the time of their marriage. In Nglarangan, for example, a woman who is currently 37 years old married at the age of 17, while her husband was 9 years older than her. However, in Wonosari, for example, a woman married at an older age of 33 because she previously worked as a migrant worker abroad. The age difference at marriage between women and men means that women have a shorter span of time to prepare themselves or increase their capacity to open up better livelihood opportunities, compared to men.

2. The capacity of women and the younger generation

Various natural resource management skills are carried out by women using hereditary methods that they are familiar with from their parents. Women who do not have tertiary education do farming without increasing knowledge due to the lack of capacity building programs for women, except for yard farming activities. Meanwhile, as in Cemoro Village, women who are educated in tertiary institutions choose to return to being farmers and managing their gardens with novelties such as using organic fertilizers, using notes in the form of a planting calendar, and even bringing their own agricultural produce to the market. Furthermore, women in several villages have the ability to manage finances well. In relation to the savings and loan group, the women stated that the sustainability of the group was due to their commitment to repay the loan, accompanied by social control because of the great shame towards other members if they did not pay the loan.

Several other women showed abilities beyond the roles considered women's roles, such as being involved in SAR (Search and Rescue). However, this involvement still cannot make their opinions heard for various programs that contribute to these activities.

Apart from that, the dream of making changes to their village is still imagined as limited to increasing the ability to provide better food for ecotourism activities, or other short-term skills such as the desire to be able to make batik with various motives. There has been no longer any thought of market recognition, or other innovative entrepreneurial capabilities. It has not yet emerged among them the dream of being able to be involved in influencing village policies to be able to provide programs that touch the root causes of the situation they are facing, including in terms of sustainable natural resource management and long-term economic improvement.

Even though women in the seven study villages participated in many activities or groups, there was very limited learning space to improve analytical skills or understanding of their rights. For example, the ABCD training held in Igirmranak Village has motivated women to be actively involved in everyday life in the public sphere and in village planning. However, this capacity still needs to be strengthened because various groups that women are involved in attend without intensive assistance, including various self-capacity building trainings such as leadership training. Due to the lack of assistance for women who have a limited capacity building timeframe, before they settle down, not a few groups that were formed ended or were not active after their formation, such as KWT and KUB.

Meanwhile, the youth also received skills training. The training provided includes training on the permaculture system, including making organic fertilizer, and training related to tourism management for the younger generation. Young people in the seven study locations basically have not utilized information technology which is currently the backbone of the creative economy, from the local to the global level. The marketing activities of agricultural products

carried out by the younger generation are still just continuing old habits or ways, even though young people are the most reliable/reliable party to make innovations in various things, including in the management of natural resources.

The ability to think strategically and self-leadership among the younger generation needs to be improved so that they can think holistically and think for long-term (change). The ability to recognize local ecosystems and natural resources, as well as various lifestyles and sustainable management of natural resources will be the key so that they have principles for improving the situation of the environment and natural resources.

3. The basis and relevance of the involvement of women and youth in the governance of natural resource management

Gender mainstreaming in development has been instructed by the President in Presidential Decree No. 9 of 2000 concerning Gender Mainstreaming in Development. This means that planned development must be responsive to the often different needs of men and women. Because of this, the Presidential Instruction instructs all government agencies to conduct a gender analysis before planning activities. Gender analysis is carried out so that the reality of the situation of women and men can emerge, and then programs can be prepared in a participatory manner, which is in line with the situation found from the gender analysis.

Furthermore Presidential Decree No. 18/2020 concerning the National RPJM 2020-2024 also specifically pays attention to gender equality and social inclusion, especially towards the younger generation, where it states that "...reducing the gap between men and women in accessing and controlling resources, participating in all processes development and decision-making, and benefit from development". This means that women, like men, need to be involved in the process of drafting village development plans, program implementation and monitoring and evaluation.

In particular, the 2020-2024 National RPJM emphasizes the importance of providing space for participation for women and the younger generation as a way to achieve Indonesia's 2020-2024 medium-term development goals.

> *"Indonesia's development 2020-2024 is aimed at forming quality and competitive human resources, namely human resources who are healthy and intelligent, adaptive, innovative, skilled and with character. To achieve this goal, human development policies are directed at population control and strengthening population governance, fulfillment of basic services and social protection, improving the quality of children, women and youth, poverty alleviation, and increasing labor force productivity and competitiveness" (BAPPENAS, 2019, page IV-2"*

That the younger generation is a special group for national medium-term development is also stated with a youth development index target of 57.67. On a national scale, it is known that only 6.7 percent of youth have ever provided suggestions/opinions in meeting activities and only 6.4 percent are actively involved in organizational activities, as explained by BAPPENAS (2019). Even though Law No. 40 of 2009 concerning Youth states that the goals of youth development are empowerment, leadership development, entrepreneurship and youth pioneering. This means that the youth development space along the Bodri watershed will be able to contribute to the 2020-2024 National RPJM target.

Meanwhile, the Labor Force Participation Rate (TPAK) for women was recorded at only 51.89% compared to men which reached 83.13%. In fact, if seen at the site level, for example in all study locations along the Bodri watershed, the number of women working as gardeners, farmers, cultivators, breeders and fishermen is more or less the same. It's just that, in the official records, women are not listed as gardeners, cultivators, farmers, etc., in line with the condition of how only husbands are registered as LMDH members, even though the wife also works on the area together. As a result, on KTP, women from farming families are labeled as 'housewives', while their husbands are referred to as 'farmers', 'planters', 'breeders' or 'fishermen'. This situation will result in the absence of special program allocations for female farmers, planters, ranchers and fishers because they are considered non-existent. On the other hand, the failure to record the names of these women in official documents means that women's TPAK is still considered low, when in reality their value can far exceed the current TPAK.

It should be remembered that the entities of men, women and the younger generation are not homogeneous entities. There are parties who are usually 'invisible' or 'unheard' because they rarely speak out, let alone ask or propose something in the public sphere. Usually these 'invisible' or 'unheard' groups are those who are most dependent on natural resources because they do not have access and networks to other jobs. It is these parties that need to be involved, empowered and consulted so that the village development program truly answers the problems of the people who need it most.

Figure 32. a group of young farmers in Nglarangan Village.
They group to make innovations in the field of animal husbandry and agriculture.

D. Policies related to Environmental Governance, Natural Resources and Climate Change

1. National Context

Since the Government of Indonesia co-signed the 2016 Paris agreement, national climate change conservation and mitigation policies have continued to be encouraged. With the "Indonesia's Forestry and Land Use (FOLU) Net Sink 2030" program, the Government of Indonesia through the Ministry of Environment and Forestry intends to halt the increase in the earth's temperature rate below 1.5 degrees Celsius. In addition, Folu Net Sink 2030 is Indonesia's guide in carrying out climate change mitigation and adaptation actions. The operational form of FOLU Net Sink 2030 is by reducing the rate of deforestation, reducing the rate of forest degradation, regulating the development of plantation forests, sustainable forest management, social forestry, rehabilitation, management of peat restoration, improvement of peat water systems, repair and conservation of mangroves, conservation of diversity biodiversity and its ecosystem, as stated by the Minister of Environment and Forestry when inaugurating the Forest and Other Land Uses Operation and Collaboration Center (FOLU COLL) Office on 22 December 2022.

Regulations and policies related to climate change at the national level already exist, starting from laws and implementing regulations at the practical level. A list of regulations and policies related to climate change can be seen at the following link Kebijakan – Direktorat Jenderal Pengendalian Perubahan Iklim (menlhk.go.id).

2. Regional Context

Local governments (provinces/regencies/cities) have the same obligations as the central government in mitigating and adapting to climate change. Based on Presidential Regulation Number 98 of 2021, Governors/Regents/Mayors are given the task of making climate change mitigation and adaptation policies. In Central Java, the Provincial Government has established a Regional Action Plan (RAD) for Central Java Province GHG Emission Reduction which has been ratified in Governor Regulation No. 43 of 2012. It is continued in the Central Java RPJMD policy (Central Java RPJMD Regional Regulation Number 5 of 2017 concerning Development Plans Central Java Province Medium Term 2018-2023), the issue of environmental management is important in ensuring the continuity and sustainability of development. Problems such as: a) Decreasing quality of the environment (water, air, sea and land); b) Handling and management of waste that is not yet optimal is the main concern of the provincial government.

At the district/city level, the obligation to have climate change mitigation and adaptation policies is also a statutory order. In Kendal Regency there is already Regional Regulation 7 of 2021 regarding the 2021-2026 RPJMD which has a priority agenda related to resilience and sustainable development, including the RAD API (Regional Action Plan for Climate Change Adaptation) agenda. In Temanggung Regency, in the RPJMD document for the 2018-2023 changes, special environmental issues in the Bodri and Progo watersheds and their vulnerability have become a major concern. Other regional regulations related to environmental protection and management have been issued in districts/cities. In Kendal there is already a Regional Regulation 11/2012 concerning Environmental Protection and Management, in Temanggung Regency there is a Regional Regulation 9/2020 concerning Environmental Protection and Management, in Wonosobo Regency there is a Regional Regulation 4/2012 concerning Environmental Protection and Management.

However, there is still no visible integration of policies upstream and downstream of the BODRI watershed which cover 3 districts (Wonosobo, Temanggung and Kendal) so that the regional regulations in the 3 districts seem to stand on their own. In addition, the integration of the regional medium-term program plan (RPJMD) and district RKP in the BODRI watershed needs to include activity initiatives that involve the upstream and downstream of the BODRI watershed.

3. Factual Conditions of Rules and Policies in the Village

Many aspects can be arranged according to the needs in the village which can support efforts to protect and manage the environment in a sustainable manner. Problems that arise in villages such as waste management, use of chemical fertilizers, utilization of water/springs, sustainable agricultural land management, environmental protection are everyday problems in villages that need to be regulated. Arrangements at the village/village level do not all have to be made in the form of Village Regulations, but can also be in the form of customary rules or group rules. Matters that are general in nature and apply to all villagers may need to be regulated by Village/Kampung Regulations. Meanwhile, rules that are specific in nature, for example in farmer groups, can be by mutual agreement which can be written or unwritten.

4. Patterns of village policies/regulations

Based on the results of the GEF-SGP investigation, Village Regulations always have village regulations regarding the Village RPJM and Village RKP, because these are conditions for disbursing village funds. In addition, there are village regulations regarding the formation of BUMDES. All surveyed villages have all the village regulations. However, it is very difficult to obtain information that there are village regulations governing environmental protection, waste and waste management, chemical fertilizer control, sustainable natural resource management, sustainable agriculture, agricultural control on mountain slopes, water management and water sources. Even though at the same time, this is a daily problem faced by the community and the village government.

Table 24. Village regulations in the baseline survey

Name of Village	Village Regulations (RJPMDes, RKPDes, Village Authority, BUMDES)	Village Regulations (LH, Fertilizer, Agriculture, Garbage, Sustainable Natural Resources, Water/Springs)
Igirmranak	100%	0%
Cemoro	100%	0%
Nglarangan	100%	0%
Sidodadi	100%	0%
Singorojo	100%	0%
Wonosari	100%	0%
Pidodo Kulon	100%	0%

5. Village Orderly Practices from a Community Perspective

The legal culture in Indonesian society is heavily influenced by traditional values and local wisdom. Such as the value of gotong royong, the shame of doing wrong, tepo seliro. In addition, religious values also influence the behavior of society, such as sin when acting badly and harming others. Community order based on traditional, customary and religious values is actually social capital if the village government wants to make rules according to the conditions of the problems in the village. Customary values (or norms), habits, can be used as a source of law in making village regulations, apart from of course higher state regulations (Perda, Ministerial Regulations, Presidential Regulations, Government Regulations, Laws). Village regulations whose contents are more or less in direct contact with the good habits of the community will increase the effectiveness of implementing village regulations, compared to village regulations whose contents are not "known" or "understood" by the community. The rest are new things that are regulated in Village Regulations but are not yet understood by the community, must be given an introduction and explanation. For example, about environmental conservation, water conservation, the impact of climate change due to forest conversion, the long-term effects of chemical fertilizers, and so on.

6. Problems in Documenting Rules in the Village

In the process of collecting data on regulations during the survey, there were difficulties in obtaining information regarding existing regulations in the village because they were not well documented in the village. Administration of village regulations is still weak. Even though officially it has been regulated in regional regulations regarding the formation of village regulations. On the official website of the village government, there is not always complete information about the regulations that apply in the village. Village regulations are actually not only needed by local villagers, but also for outsiders who will enter or be in the village for a certain period of time. Including the village regulation document in a facility that can be accessed by the public will help anyone who wants to know the regulations that apply in the village. This can also help prevent people from taking actions that are prohibited/shouldn't be done in the village or attract the attention of people who want to come/work together (tourists, investors, local government, etc.) with the village because they see good order in the village.

7. Village Regulation Effectiveness

Village regulations are often constrained by the effectiveness of their implementation. Community perceptions of the effectiveness of this regulation were frequently raised, including in the phase-7 GEF-SGP survey. The effectiveness of a regulation is very dependent on the process of forming the regulation. If the top-down process, the contents of the regulations are not relevant to the factual conditions in society, the effectiveness will be low. In addition, the legal culture of society also determines the effectiveness or failure of regulations and policies. Therefore, to increase the effectiveness of regulations, it is necessary to increase public and government understanding in the process of forming effective regulations using the ROCCIPI method and the Formation of Regulations with a Strategic Approach.

Figure 33. Nglarangan Village office area.

8. Village Regulation Formation Capacity

The lack of Village Regulations is strongly influenced by the capacity of the village government (Village Government and BPD). The task of increasing capacity in formulating regulations rests with district governments through Bimtek activities, but financial constraints and the large number of areas that must be accommodated have resulted in a slow process of village capacity building. In addition, methods for capacity building that are monotonous (less innovative) do not encourage motivation to learn from the village government and BPD. The formation of village regulations is not just compiling article sentences. The main and most important thing is to understand the problem and the root of the problem in the village, so that the rules made respond to the problem you want to solve. In addition, it is very important to explore the social, economic, cultural, institutional, natural and human resource modalities in the village as a basis for formulating village capacity-based solutions. Finally, village regulations must have measurable goals. For what and how long will this village regulation achieve the goals set by all components of the village community. If the three raw materials for forming regulations have been identified, compiling village regulation articles is the last step which is easier to do because there is already a standard format prepared by the government. Support for developing the capacity to formulate village regulations is a necessity in order to support the GEF-SGP program in the management of BODRI watershed buffer areas. This capacity building can be collaborated with extension workers and drafters of regional regulations at the Provincial Legal and Human Rights Regional Office as well as the legal department at the district regional secretariat.

9. The Use of Rules in the Village to Support the SGP Program

Environmental conservation initiatives and innovations, agricultural businesses and the community's economy will be stronger if supported by regulations at the village level such as regulations regarding environmental protection, waste and waste management, control of chemical fertilizers, sustainable management of natural resources, management of water and water sources, etc. With the existence of rules in the village through village regulations, the village government can participate in developing these innovations by including them in the RPJMDes and RKP Desa so that there is a supporting budget that can be used from DD and ADD funds. In addition, for GEF-SGP policy support at the village level will help this program during implementation and forcibly implementing the program. The support for the continuity of the GEF-SGP program can be continued by the village government. With the existence of related village regulations, the village government can continue the program with the support of village funds.

III. Issues and Strategic Planning in The Bodri Watershed Area

A. Strategic Issues

From the results of observations and analyses that have been carried out, several strategic issues that need attention in the Bodri watershed area are as follows:

1. **Interdependence between regions in providing access to clean water and the need for the protection of springs.**

   Almost all villages in the upstream region have water sources that come from outside their own village area. Efforts to protect springs are still limited to safety buildings (tubs). There has been no effort to protect the springs' borders either vegetatively or legally by issuing village regulations for the protection of the area around the springs.

2. **Erosion in the upper and middle areas of the Bodri watershed**

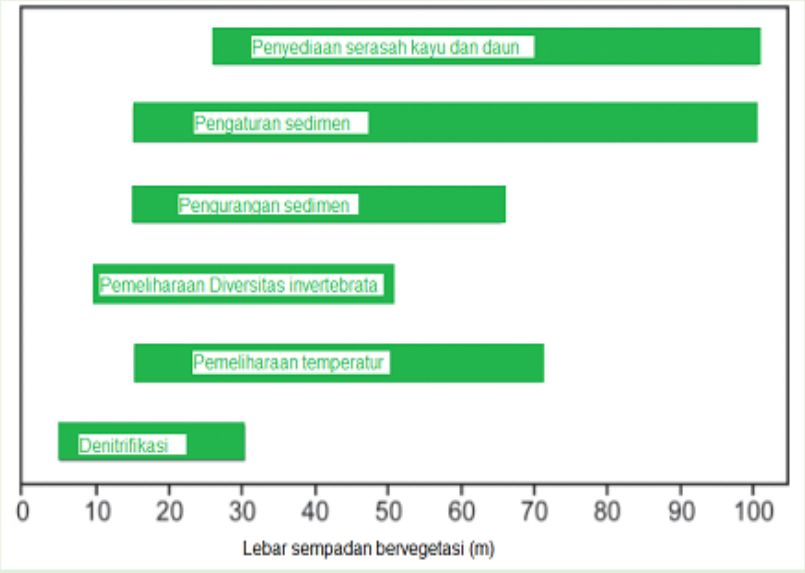
   The risk of erosion that occurs in the upstream and middle areas, especially those that occur on agricultural land, can endanger the continuity of the cultivation itself. In addition to reducing the surface soil layer, erosion also causes the loss of nutrients from the soil.

SEMPADAN SUNGAI

Sempadan sungai menurut P38 Pasal 5 ayat 5 merupakan ruang penyangga antara ekosistem sungai dan daratan, agar fungsi sungai dan kegiatan manusia tidak saling terganggu. Selanjutnya pada Pasal 8 terdapat pembagian garis sempadan atau batas sempadan sungai berdasarkan tanggul sungai, lokasi sungai (perkotaan atau diluar perkotaan), pengaruh pasang surut, paparan banjir dan mata air. Dalam hal sungai tidak bertanggul di luar kawasan perkotaan, batas semadan untuk sungai kecil sekurangnya adalah 50m dan untuk sungai besar sekurangnya adalah 100 m (pasal 10).

Sempadan sungai bervegetasi penting untuk kualitas air, karena semakin lama limpasan ditahan di penyangga, semakin sedikit polutan yang masuk ke sungai. Secara fisik, tanaman bertindak sebagai penghalang, memperlambat aliran air, memberikan waktu bagi sedimen dan kontaminan lainnya untuk keluar dari limpasan, dan memungkinkan lebih banyak air bergerak ke dalam tanah. Akar tanaman menjebak sedimen dan kontaminan lainnya di air tanah dangkal, menyerap nutrisi, menahan tepian di tempatnya, dan mencegah erosi. Limpasan yang merembes ke air tanah dangkal meningkatkan pengisian ulang air tanah dan menyimpan sementara air hujan dan secara perlahan melepaskannya dalam jangka waktu yang lebih lama (Ellis, 2008).

Lebar semadan bervegetasi dapat diatur sesuai fungsi ekologi pokok yang hendak dituju. Contoh lebar sempadan bervegetasi menurut Broadmeadow and Nisbet (2014).



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3. **Excessive use of chemical inputs for agricultural cultivation**

   For all seasonal production crops which are a source of income for farmers along the Bodri watershed, chemical inputs have become a problem both ecologically and economically. With restrictions and rising prices of chemical inputs, agricultural production costs are high. In addition, the quality of agricultural land is very unhealthy and unproductive.

4. **Management of agricultural production residues/wastes**

   The management of agricultural residues or waste, especially in the central region, has not been carried out properly. Waste or production residue from corn plants, by most residents, is simply thrown into the river.

5. **Environmentally friendly innovations for both agricultural practices and energy use on a household scale are urgently needed due to the high dependence of society on nature**

   The existing agricultural practice innovations still involve superior seeds (not local seeds) which require chemical inputs and the number continues to increase. Meanwhile, at the household level, especially in the upstream areas, many people still use wood-fired stoves that cannot be continuously available.

6. **Mangrove management is still not integrated with village planning**

   Mangroves are a very important part of the life of Pidodo Kulon village, because apart from breaking waves, preventing abrasion, filtering rubbish that enters the sea, they are also a place to find fish or oysters. Until now, mangrove management has not been included in the Pidodo Kulon RPMDES. Planting is carried out sporadically by various parties but there has never been a management plan for a certain period of time.

7. **The involvement of women in decision-making is generally still limited to the micro/domestic domain and there is a tendency for women to be minimally involved in matters of natural resource management.**

   Women and men play an equal role in managing natural resources (managing fields, managing clean water, etc.), and in various other sectors, but decision-making that involves women generally only occurs at the household/domestic level, for example in determining prices. selling agricultural products, or in determining the use of family household budgets.

   The quality that women have in processes at the domestic level does not necessarily make women involved in various deliberation/decision-making processes in the public domain, for example becoming part of LMDH, even though in fact many women are involved in managing the land/fields. In some areas, although women are involved in managing the Perhutani area, only the husband's name is listed as a member of the LMDH so that women will not get a large portion, even if consulted, in various programs related to LMDH. Likewise at the village level, there is only one village where there are women who are part of the village management structure. The situation of involving women in the data collection process for the baseline is quite challenging. Sometimes the women who attended were women who were not involved in natural resource management activities at all, or came from an elite group that did not depend on land conditions,

or even no women were invited to attend as resource persons. If not handled properly, this can obscure opportunities for equality, effectiveness and distribution of benefits from the presence of the GEF SGP project in the Bodri watershed due to an incomplete socio-economic picture obtained as a basis for intervention.

8. **Tradition owes to farmers and fishermen along the Bodri watershed**

Communities along the Bodri watershed consisting of farmers and fishermen have a tradition of indebtedness to collectors or banks (in this case BRI) at quite alarming levels, namely around 70% -90% of the entire community. The reason could be because the production rate is decreasing, or the consumption level is increasing.

9. **Empowerment programs for women generally only include practical activities**

Various empowerment activities received by women are generally related to improving skills, such as batik, agricultural activities, or cooking. This is important, interesting and relevant for women, but does not maximize their capacity to be able to think strategically and innovatively to continue/apply the various skills they already have from the training provided.

10. **The younger generation is not exposed to much knowledge and skills of environmentally friendly living (agriculture, fishing, conservation, waste management)**

The tendency of the younger generation to avoid the work done by their parents because usually in their teens, school is preferred. In addition, the difficulty level of the profession of farmers and fishermen is considered quite high. The impact is not only having little local knowledge, but also being distant from nature. On the other hand, there are not many programs available for young people to be able to increase their knowledge and capacity in general to enable them to manage natural resources in a sustainable, innovative and in accordance with the ecosystem in which they live.

11. **Village regulations and policies have not been effective in supporting environmental conservation initiatives, sustainable agriculture and improving the community and village economy.**

The capacity to draw up effective village regulations is inadequate, the substance of the regulations is not much that supports environmental conservation initiatives, sustainable agriculture and improves the community and village economy. Regulations at the district and cross-district levels in the BODRI watershed need to be encouraged to support upstream-downstream integrated management of the BODRI watershed and buffer zones.

12. **Limited raw water access in downstream areas.**

Fulfillment of raw water for downstream areas is something that is expensive. The use of shallow dug wells is no longer able to meet the needs because the water is brackish. Raw water, especially for drinking and cooking purposes, must be purchased. The use of drilled wells is considered expensive operationally and investment because they have to reach a depth of between 75 – 80 m.

B. Strategic Planning

1. Encouraging cooperation between villages in the management of springs and river bodies.

- Cooperation between villages can be realized institutionally or by issuing joint regulations aimed at protecting springs and river bodies.
- Carry out maintenance and or planting of annual stands/plants (timber or fruit trees or bamboo) on river banks and springs borders that meet the requirements of applicable regulations. The target for planting stands on the riverbank is 33 hectares

2. Improvement of agricultural systems or land management with a conservation pattern

In general, some farmers have implemented some of the principles of land management and farming systems with conservation patterns. Patterns of land management or conservation agricultural cultivation that have the opportunity to be implemented, among others:

- There is an application of alley system of agricultural cultivation, namely by planting perennials, legumes or fodder at a certain distance. Types of perennials or legumes are selected with light crowns so they don't block the sunlight needed by the main crops.
- There is a strip cropping pattern with strip cropping. Planting pattern by planting in the direction of the contour with the path system. Each path is interspersed with grass or legume vines which act as erosion control and can be harvested at certain times as fodder or mulch.
- There is use of organic mulch. The mulch that is widely used today is plastic mulch. Plastic mulch can reduce the potential for erosion but does not help restore soil nutrients. It is hoped that the use of organic mulch will not only reduce erosion, but also restore soil nutrients

3. Encourage cultivation practices using natural inputs

- Development and production of natural fertilizers, both solid and liquid
- Development and production of natural pesticides
- Development of goat or goat livestock for natural fertilizer
- Development and production of dry and fermented animal feed
- Making demonstration plots for organic farming using local seeds (eg white corn)
- Producing demonstration plots for organic farming using seasonal plant seeds of economic value
- Planting of trees for fodder and natural pesticides

4. Processing and utilization of agricultural residues/wastes

Waste or remnants of agricultural production, especially in the central region, which so far have only been thrown away, can be processed for various purposes. Several opportunities for processing or managing agricultural waste include:

- Utilization of waste as mulch material. Materials in the form of plant residues (stems and leaves) can be used as organic mulch material which does not always have to come out of the land. Mulch material can be applied in the field itself or in other places where it is needed.
- Utilization of waste as fuel. Some agricultural wastes such as corncobs can be used as fuel. Innovations can be made by using a more efficient and cleaner stove model or by processing waste into charcoal or charcoal briquettes.
- Utilization of waste as animal feed and organic fertilizer

5. **Encouraging local (village-based/inter-village-based) research to practice innovative agricultural technology and the use of renewable energy according to community needs.**

- Making demonstration plots for local food plants and spices to produce tough seeds (does not require chemical input or at least chemical input)
- Development of demonstration plots for economic commodity plant nurseries to produce tough seeds (does not require chemical input or at least chemical input)
- There is a transitional plant fertilization system/technology from chemical to natural materials.
- There are processed products based on local harvests using technology that uses renewable energy.
- There is a pilot use of energy-efficient stoves in 5 households in each program location village that still use wood-fired stoves.

6. **Making a mangrove management plan as part of the RPJMDes or planning with the community**

- There is a mapping process with the community for areas to be planted with mangroves
- There is a plan for the utilization of mangrove areas and their management

7. **Encouraging the holding of women's field schools or similar programs through existing learning spaces to increase women's critical awareness regarding the environmental, social and economic context**

In line with the various practical trainings given to women, such as training on batik, cooking and farming activities, discussion spaces and informal education are also needed to enable women to think critically about their environmental and social situations, which will be as beneficial as women's field schools. The ability and habits to be able to analyze social, economic and environmental situations will be related to women's ability to organize and have a long and sustainable vision and make innovations to realize or continue various practical programs as mentioned above. Some related interventions, eg:

- Women's capacity building programs related to women's rights, policies and management of natural resources/development refer to various existing policies and regulations
- Joint participatory action research with women, for example related to local knowledge about food, division of roles in the household related to natural resource management, biodiversity/local seeds/medicinal plants, clean water management or various sustainable management/utilization of natural resources which become part of the culture of society to

be published together. This participatory action research with local women can start from the preparation of the research concept, including methodology, data collection and dissemination (including direct dissemination by women to the government).

- Women's group organizing/assistance programs, starting from visioning, planning, and linking their practical activities such as savings and loan activities with family financial management and individual and group long-term goals.

8. **Encouraging reforms in the financial management of farming and fishing families and growing small-scale businesses at the village level**

   - Strengthening the capacity of families, especially wives in managing family finances
   - There is cooperation with related banks to be able to carry out program development that can transfer consumer debt/credit to production credit with increased capacity to make proper business planning
   - There are small business initiatives in the field of tourism/food/supplying the needs of farmers, fishermen and households both individually and coordinated by a group of women in the village or BumDes

9. **Increased understanding of village officials and other authorities related to inclusive development**

   In addition to strengthening parties who are generally not involved in various village programs, especially in program formulation, strengthening the understanding of village officials or other parties who have authority will be the key to successful participatory natural resource management/development, which includes being gender responsive and inclusive, especially towards young generation. Related intervention programs for example:

   - Training and assistance for village officials regarding gender responsive budget planning (gender budgeting)
   - Training on basic concepts and the importance of participatory and gender-responsive environmental/natural resource governance.

10. **Encourage collaboration with various communities, entities, institutions related to the younger generation and women, whether associated with religion (NU for example), educational institutions (Universities and Vocational Schools) or CSOs that can empower the younger generation, both women and men to manage resources nature.**

    - There is a capacity building program for young women and men related to their rights as citizens and in formulating policies at the village level, starting from program planning, implementation to monitoring and evaluation in the village regarding sustainable management of natural resources according to their potential and the challenge
    - There is an exchange program for learning between villages or to certain institutions according to the needs of the planned program
    - There is support from the village in the form of a special budget or facilities for gathering and learning places for youth

11. **Increasing the effectiveness of village/district regulations and policies in supporting environmental conservation initiatives, sustainable agriculture and improving the community and village economy.**

- Field school (on-site training) drafting village regulations with a strategic approach for village government, BPD, community leaders, youth leaders, religious leaders, and women's groups.
- Field school (on-site training) to design village regulations using a strategic approach for village government, BPD, community leaders, youth leaders, religious leaders, and women's groups.
- Training and TOT on drafting regulations for government officials (legal department) regional DPRD secretariats in 3 program location districts (Kendal, Temanggung and Wonosobo).
- Assistance in drafting village regulations and their integration into RJMPDesa or RKP Desa.
- Review of regulations/policies at the district level where the program is located (Wonosobo, Temanggung, Kendal) and recommendations for synchronizing regulations/ policies in the upstream-downstream BODRI watershed areas that support environmental conservation, sustainable agriculture and community economic improvement.
- National policy studies and recommendations based on good practices in environmental conservation and sustainable agriculture in the 4 priority locations of the GEF-SGP program (DAS BODRI, DAS Balantieng, SM Nantu and Pulau Sabu).

12. **Strive to increase access to raw water which is limited in the downstream area.**

- Collaborating with PAMSIMAS or PDAM to be able to distribute water to areas that do not yet have adequate sources of clean water in downstream areas

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