Level of Community Participation in the Preservation of Pager Wunung Darupono Nature Reserve at the Planning Stage

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Abstract. Pager Wunung Darupono Nature Reserve is a conservation area dedicated to biodiversity protection and life-support functions, with use restricted to research, science, education, and cultivation support. Its management requires community participation alongside government action. This study assesses community participation in reserve preservation at the planning stage. A descriptive mixed-method design combined questionnaires, interviews, observation, and literature review. Participation was measured using Arnstein's eight-rung ladder, based on membership in conservation institutions or groups and attendance at group meetings. The analysis produced an average score of 182, placing participation at the Informing rung and within the tokenism category. Most residents of Darupono Village were neither aware of nor involved in conservation groups; only a small proportion joined the Fire Care Community and Forest Farmer Group. Meeting participants mainly received information and remained dependent on Central Java BKSDA officers, while final decisions remained under government control.

Keywords: community participation, conservation, nature reserve, Arnstein ladder, planning

1 Introduction

Indonesia has abundant natural resources in the form of forests that can support national development efforts for the benefit of current and future generations. Forest resources have a function as a buffer system for human life, can provide benefits and fulfil the needs of human life both from wood and non-wood products. For this reason, the existence of forests needs to be protected from problems that can damage and threaten forest sustainability. Arif [1] stated that Indonesia is listed as a country that experiences the highest rate of destruction in the world due to human behaviour that wants to take advantage of the material results of excessive forest exploitation. Law No. 41 of 1999 [2] states that forests in Indonesia tend to decline in condition, therefore their existence must be maintained optimally, maintained its carrying capacity sustainably.

Various efforts have been made by the government to maintain the sustainability of forest areas in Indonesia, through the Ministry of Environment and Forestry has designated several areas as protected conservation forest areas in order to maintain the existence of forest areas.

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Conservation area is one of the functions of the area intended for the protection of potential biodiversity and ecosystems and as a life support. The existence of conservation forest areas is regulated in Law No. 5 of 1990 concerning the Conservation of Biological Natural Resources and Ecosystems [3] which explicitly regulates the function of conservation areas as nature reserve areas (KSA) consisting of nature reserves, wildlife reserves and nature conservation areas (KPA) consisting of national parks, botanical forest parks and tourist parks.

Nature reserves are one of the nature reserve areas that have the function of preserving biodiversity and supporting life support systems. Yunus [4] explained that the status of nature reserves cannot provide direct benefits for the socio-economy of the community, because there are restrictions on access to the area. The access restriction is related to the socio-economic benefits that are often considered by managers as consumptive use that is prohibited in the nature reserve area because it can result in changes to the integrity of the area [4]. Meanwhile, according to Law No. 5 of 1990 [3], utilisation activities in nature reserves are allowed only for the purposes of research and development, science, education, and cultivation support activities.

Restrictions on access and utilisation cause pressure on the management of nature reserves that have the potential to cause problems in the area, one of which is the Pager Wunung Darupono Nature Reserve [5]. The Pager Wunung Darupono Nature Reserve area was designated as a nature reserve based on the Besluit of the Governor General of the Dutch East Indies Number 19 Stbl Number 37 dated 21 January 1933 with an area of 30 hectares, with the aim of protecting its natural teak which has hundreds of years of age. Subsequently, this area was designated by the Minister of Forestry as a Permanent Forest Area with a nature reserve function through Decree No. 115/Menhut-II/2004 dated 19 April 2004 concerning the Designation of the Pager Wunung Darupono Forest Area covering an area of 33.2 hectares in the Kaliwungu Forest Section, Kendal Forest Management Unit in Kendal Regency, Central Java Province as a Permanent Forest Area with a Nature Reserve Forest Function.

Pager Wunung Darupono Nature Reserve is under the management of the Central Java Natural Resources Conservation Centre (BKSDA) under the Ministry of Environment and Forestry. Based on government administration, Pager Wunung Darupono Nature Reserve is included in Darupono Village, South Kaliwungu Sub-district, Kendal Regency. Its location is close to the population and has very high accessibility because the area is passed by the Kaliwungu-Boja highway which divides the area, so that it can threaten the security of the area and is prone to direct use by residents around the area without seeing the rules of conservation or regulations that have been set according to its function. Based on data from the Central Java BKSDA in the Pager Wunung Darupono Nature Reserve Long-Term Management Plan for 2024-2033 [5], there are problems that become strategic issues of the Pager Wunung Darupono Nature Reserve, namely prone to timber theft, the number of fallen trees, the disposal of household waste and prone to fire.

The management of Pager Wunung Darupono Nature Reserve with an area of 33.2 ha cannot be done alone by the government without involving the participation of the community around the forest in the area management planning. Community participation is essential in conservation-area management because it supports area preservation and accommodates the interests of surrounding communities [6]. Planning activities are the first stage and a precondition in the implementation/management of conservation areas. This is in accordance

with the mandate of Law No. 41 of 1999 [2], which states that the initial stage in forest management is the need for careful planning of activities. Meanwhile, according to Anwar et al. [7], the level of community participation in forest conservation can be measured through stages including: Planning Stage, Implementation Stage, Monitoring and Evaluation Stage.

At the planning stage in the Pager Wunung Darupono Nature Reserve, the Central Java BKSDA has carried out several activities involving the community around the reserve, namely Darupono Village, including the formation of a Fire Care Community (MPA) group [5], the formation of a Forest Farmer Group (KTH) [5] and the holding of FGDs and public consultations in the context of preparing a long-term management plan for the Pager Wunung Darupono Nature Reserve [5]. Participation activities that have been carried out so far are still considered ineffective because several problems are still found. For this reason, it is necessary to know the extent of community participation in the conservation of the Pager Wunung Darupono Nature Reserve at the planning stage.

2 Methods

This research was conducted in January - March 2025 in Darupono Village which is a buffer village of Pager Wunung Darupono Nature Reserve conservation area. Pager Wunung Darupono Nature Reserve is administratively included in Darupono Village, South Kaliwungu Sub-district, Kendal Regency.

This research was conducted using quantitative and qualitative design with descriptive method. The descriptive method serves to describe or give an overview of the object under study through data or samples that have been collected as is [8]. The data used is divided into two types, namely primary data and secondary data. Primary data comes from filling out questionnaires and interviews with respondents. Secondary data comes from various books, journals, theses from related institutions or agencies, and other sources related to the research. The population in this assessment is the community bordering the Pager Wunung Darupono Nature Reserve area, namely Darupono Village with a total of 785 households [9]. The sample size was determined using the Slovin formula as presented by Sugiyono [10, p. 137], with a 90% confidence level and an allowable error of e = 10%, as follows:

$$n = N / [1 + N(e)^2] \quad (1)$$

where n is the sample size or number of respondents,

N is the population size, and

e is the tolerable error rate or sampling-error tolerance (e = 0.1).

From the formula above, it can be calculated and it is known that the number of samples is 88.7 or rounded up to 89, meaning that the number of respondents sampled in this study is 89 families.

To determine the level of participation in the planning stage, it is necessary to determine the variables and indicators. Research variables are elements of a group of research objects or something that is of interest in a study that will be studied. The indicators used in this research

consist of 2, namely membership involvement in institutions/forums/groups and frequency of attendance at group meetings. The research variables and indicators are presented in Table 1.

Table 1. Research variables and indicators.

Variable	Sub-variable	Indicators
Participation level	Level of participation at the planning stage	1. Membership in institutions/forums/groups 2. Frequency of attendance at forum/group meetings

The method of analysis in this research uses Arnstein's ladder of participation analysis [11]. Arnstein's ladder of participation consists of eight levels of participation: Manipulation, Therapy, Informing, Consultation, Placation, Partnership, Delegated Power and Citizen Control. Arnstein's eight rungs of participation are reclassified into three groups of participation levels, namely:

1) High level of participation (citizen power), including the ladder of community control, delegated power, and partnership;

2) Moderate level of participation (tokenism), including placation, consultation, and informing; and

3) Low levels of participation, (non-participation) include therapy and manipulation.

Scoring and weighting analyses were conducted to measure the level of community participation. The level of community participation in each indicator was determined in the form of a score from the answers given for each indicator.

To determine the level of community participation in the planning stage/sub-variable, the average score on the indicator was obtained. Meanwhile, the indicator score is calculated from the number of respondents' answers to each question multiplied by the weight of Arnstein's participation ladder. After that, the interval calculation is carried out to get the class division using the following formula:

$$I = (Smax - Smin) / k \quad (2)$$

where I is the interval, Smax is the maximum score, Smin is the minimum score, and k is the number of classifications.

The sequence of scores is based on Arnstein's eight ladders of participation and adds one response from respondents who are not present or not involved with a score of 0. From each individual, the minimum score is 0, which is 1 x 0 and the maximum score is 8, which is 1 x 8. If the number of respondents is 89 people, then the minimum score for the level of community participation (89 x 0) is 0 and the maximum score of the level of community participation (89 x 8) is 712. Then the interval distance (712-0)/8 is 89. The categories for the level of community participation can be seen in Table 2.

Table 2. Interval scores for the participation levels.

No.	Participation level	Total score
8	Citizen Control	630–719
7	Delegated Power	540–629
6	Partnership	450–539
5	Placation	360–449
4	Consultation	270–359
3	Informing	180–269
2	Therapy	90–179
1	Manipulation	0–89

3 Results and Discussion

3.1 Study Area and Conservation Context

Pager Wunung Darupono Nature Reserve is one of the conservation areas characterised by a natural ecosystem dominated by teak (Tectona grandis) that is hundreds of years old. In accordance with its designation as a nature reserve area, the management mandate of the Pager Wunung Darupono Nature Reserve area is to protect the potential of its natural teak forest. The condition of the teak stands, which are an important value of the area, is currently old, prone to uprooting and its regeneration is hampered. The desired condition of the Pager Wunung Darupono Nature Reserve area is to preserve its natural teak and become a medium for improving science, education and research for the surrounding community [5].

The research was conducted in the Pager Wunung Darupono Nature Reserve area which is administratively included in the Darupono Village area, South Kaliwungu Sub-district, Kendal Regency. Darupono Village is a buffer village of Pager Wunung Darupono Nature Reserve area. Based on the Darupono Village Monograph 2024 [9], Darupono Village has an area of 2,038 ha with a total of 785 households and is the closest village to the Pager Wunung Darupono Nature Reserve area.

In preserving the Pager Wunung Darupono Nature Reserve, the government, in this case the Central Java BKSDA, has carried out comprehensive management of the area by involving the community in the form of Fire Care Community (MPA) groups and Forest Farmers Groups (KTH) in Darupono Village. Law No. 5 of 1990 [3] states that the management of forest resources is aimed at realising the preservation of biological resources and the balance of the ecosystem, so that it can better support efforts to improve community welfare and the quality of human life. Furthermore, the regulation mandates that area management is carried out in accordance with the main function of the area, namely as a protection area for life support systems, as an area for preserving the diversity of plant and / or animal species and their ecosystems and for the sustainable use of biological natural resources and their ecosystems.

Nature Reserve Area Management is a systematic effort made to manage the area through planning, protection, preservation, utilisation, supervision and control activities [12]. Planning activities are the first stage and a precondition in the implementation/management of conservation areas. This is in accordance with the mandate of Law No. 41 of 1999 [2], which states that the initial stage in forest management is the need for careful planning of activities. Planning activities in the context of nature reserve area management include inventorying the potential of the area, structuring the area, and preparing a management plan. In the implementation of planning activities, especially the preparation of area management plans, it is necessary to involve the community to participate in order to build a bottom-up planning process based on the needs of the site level. In addition, community involvement can also foster a sense of ownership of the management plan that will be prepared and management activities as the implementation of the management plan. For this reason, it is necessary to know the extent of community participation at the planning stage in supporting the preservation of the Pager Wunung Darupono Nature Reserve.

At the planning stage, the level of community participation in forest conservation of Pager Wunung Darupono Nature Reserve uses 2 indicators in its assessment, namely Membership in Institutions/Forums/Groups and Frequency of Attendance at Meetings. From the results of questionnaires and interviews in the field, the results are shown in the following table:

3.2 Participation in Institutions, Forums, and Groups

Table 3. Respondents' participation in institutions, forums, and groups.

Rating scale/answer option	N	%	Weight	N × W
Not a member of an institution	56	62.9	0	0
Member only because of an invitation	0	0.0	1	0
Member only to obtain information	0	0.0	2	0
Member to obtain information without expressing an opinion	0	0.0	3	0
Member with an opportunity to express opinions, but opinions are not considered	0	0.0	4	0
Active member whose opinions result in a small number of decisions	17	19.1	5	85
Member with a share of responsibility	16	18.0	6	96
Member with authority to make decisions	0	0.0	7	0
Member able to control all activities and decisions	0	0.0	8	0
Total	89	100		181

In the indicator of respondents' level of participation in membership of institutions/forums/groups, it can be seen to what extent the community is involved as a member of the Focus Group Discussion (FGD) forum, public consultation, cooperation forum, conservation agreement and MPA/KTH membership. Based on the results of the analysis of Arnstein's participation ladder [11] in Table 3, a score of 181 was generated, meaning that the typology of community participation is classified at the informing participation level, meaning

that communication is often carried out and information has been provided to the community but the community is not given the opportunity to provide feedback.

Based on the results of interviews with respondents, in the indicator of respondents' participation in membership of institutions/forums/groups, it was stated that the community was involved in a public consultation meeting in the context of preparing the area block arrangement and long-term management plan for the Pager Wunung Darupono Nature Reserve. In this meeting, the community is only a participant and is not involved in planning / compiling materials to be discussed, all materials have been compiled and prepared by the management or government. In this meeting, only representatives of village officials/community leaders who attended the meeting were involved. The community has the opportunity to ask questions and provide input as well as give opinions and suggestions, but there is no negotiating power or guarantee that what is conveyed can influence decisions that have been planned previously. The public consultation activity is shown in Fig. 1.



Fig. 1. Community involvement in the public consultation forum for preparation of the Pager Wunung Darupono Nature Reserve management plan.

Community participation in the conservation of Pager Wunung Darupono Nature Reserve is also seen in the involvement of the community as members of the Fire Care Community (MPA) group. The MPA group of Pager Wunung Darupono Nature Reserve is a Fire Care Community group that was formed in 2004 facilitated by the Central Java BKSDA. The main purpose of this organisation is to accommodate and facilitate the community to be more concerned about forest fire prevention and control. In addition, this group was also formed in order to assist, protect and secure the Pager Wunung Darupono Nature Reserve area. There are 15 representatives from Darupono village who are members of MPA. As members of the MPA, the community is given duties and responsibilities in preventing and controlling fires and helping to maintain the security of the area together with officers from the Central Java BKSDA. Community involvement through the MPA is shown in Fig. 2.



Fig. 2. Community involvement as members of the Fire Care Community (MPA) at Pager Wunung Darupono Nature Reserve.

In addition to the MPA group, the community is also a member of the KTH formed by the Central Java BKSDA as a fostered group in the context of community empowerment efforts around the Pager Wunung Darupono Nature Reserve area. The purpose of forming KTH is as a target group for awareness and business development in the forestry sector that can increase the income and welfare of the community so as to increase public awareness to play an active role in protecting and preserving the Pager Wunung Darupono Nature Reserve area. From the results of interviews with members of KTH, the number of members who are members of KTH is only 15 people from the total number of households in Darupono Village of 785 households [9]. In running the KTH organisation, group meetings are only held when there are activities or problems within the group.

From the interview results, most respondents were not involved in membership/institutions in the field of nature reserve forest conservation, either MPA community groups, KTH or conservation-conscious community groups such as conservation cadres, nature lovers groups or other environmentally conscious community groups. Table 3 shows that the level of respondents' participation in membership of forums/institutions/groups is 37.1% or only 33 households out of 89 households. While as many as 56 families (62.9%) stated that they did not know or were not involved in membership in institutions/forums/groups in the preservation of the Pager Wunung Darupono Nature Reserve. This means that most of the people of Darupono Village are not involved in membership in the forum/group for the preservation of the Pager Wunung Darupono Nature Reserve forest and only a small number of people participate in group membership, namely those who are members of the MPA and KTH groups as partner groups of the Central Java BKSDA.

This is because in addition to the community not knowing and the lack of information from the manager, there are also limited programmes from the government related to the Pager

Wunung Darupono Nature Reserve forest conservation group/forum involving the community around the Darupono Village area. Given the status of the area as a nature reserve, it has the highest conservation value and there are rules in limiting the use of the area so that the community has limited access in the Pager Wunung Darupono Nature Reserve area. Community involvement is only limited as members of MPA and KTH with a limited number of members of only 15 people in each group, so that the involvement of the Darupono Village community is very minimal in the membership of the group/forum. In addition to the MPA and KTH, there are no community groups in Darupono Village that are engaged in the conservation of the Pager Wunung Darupono Nature Reserve forest, such as conservation cadres, nature lovers groups and other environmentally conscious groups whose members are students. Most of the members who are members of MPA and KTH belong to the elderly, very few of them are teenagers or young people.

3.3 Participation through Meeting Attendance

As for the second indicator, namely the level of participation of respondents in the frequency of attendance at meetings, from the results of questionnaires and interviews in the field, the results are shown in the following table:

Table 4. Respondents' participation based on frequency of meeting attendance.

Rating scale/answer option	N	%	Weight	N × W
Absent	50	56.2	0	0
Rarely attends or attends under compulsion	1	1.1	1	1
Attends only to fulfil an invitation	4	4.5	2	8
Attends to obtain information without expressing an opinion	3	3.4	3	9
Attends, obtains information, and expresses opinions that are not considered	9	10.1	4	36
Attends and offers opinions, with a small number incorporated into decisions	6	6.7	5	30
Attends and shares responsibility	14	15.7	6	84
Attends and has authority to make decisions	2	2.2	7	14
Attends and has full authority to plan, implement, and supervise plans	0	0.0	8	0
Total	89	100		182

In the indicator of respondents' participation level in the frequency of attendance at meetings, it can be seen to what extent the frequency of attendance at FGD meetings, public consultations, cooperation forums, conservation agreements and MPA/KTH meetings. Based on the results of the analysis of Arnstein's participation ladder [11] in Table 4, a score of 182 was generated, meaning that the typology of community participation is classified at the Informing participation level.

For respondents' participation in the frequency/level of attendance at meetings, communities who are members of MPA groups conduct regular meetings once a month but the frequency of attendance of each member varies, some are active in attending every meeting and some are less active or sometimes attend meetings. In every meeting, of the 15 MPA members, not all of them are actively present, some are rarely present due to work and busyness. However, if there is a schedule for patrolling and guarding the area, members attend according to the predetermined schedule. Members already have duties and responsibilities as MPA. The schedule of meetings and area guarding has been prepared by the area management officer, the group implements and follows according to the predetermined schedule.

Whereas in KTH, the level of attendance of members in group meetings also varies, not all members actively attend meetings, some are present only to fulfil invitations or rarely attend and some are present to obtain information, express opinions and provide input discussions. Based on the results of interviews with Darupono Alam Lestari KTH, KTH meetings are held only when there are activities or group problems and have not been carried out on a monthly basis. At group meetings, only the management and some members attend, with no more than 10 people in attendance. The level of attendance of members in meetings still depends on the assistants/instructors from the Central Java BKSDA in providing guidance on group activities and businesses. Extension officers can provide motivation and innovation to members in every meeting, provide assistance in group activities such as drafting bylaws, providing group administration (guest book, cash book, inventory book, documentation book, business results book and others). An example of a KTH meeting with Central Java BKSDA extension officers is shown in Fig. 3.



Fig. 3. Meeting of the Darupono Alam Lestari Forest Farmer Group with Central Java BKSDA extension officers.

From the results of the analysis of table 4, it shows that the frequency/level of respondents' attendance in group meetings was 43.8% and those who did not know or were absent were 56.2%. This means that the Darupono Village community who are members of the MPA and

KTH groups are less active in attending group meetings and only a few members are active or present when there is a meeting. The presence of the group in the meeting still depends on waiting for an invitation from the accompanying officer. Group members who attend this meeting listen and receive information and get the opportunity to discuss but are not used as decisions. From the results of this analysis, the activeness of members in attending meetings is still low so that it can affect the running of the group organization. Regular or periodic meetings are therefore needed to improve member attendance and strengthen group planning and implementation.

3.4 Overall Participation Level at the Planning Stage

From the two indicators, the average score of the participation level at the planning stage in the preservation of the Pager Wunung Darupono Nature Reserve is 182. It can be concluded that participation at the planning stage is at the third level of participation ladder, namely informing. Based on the level of power distribution of the Arnstein ladder theory, the level of participation is at the moderate level of participation or tokenism, meaning just justification, communication tends to be one-way even though there is little feedback. Most of the Darupono Village do not know or are not involved in group membership in the preservation of the Pager Wunung Darupono Nature Reserve, only a small part of the community is part of the MPA and KTH, namely each group consists of 15 people or families from the total number of families in Darupono Village of 785 families. In meeting activities, the community members who are members of the MPA and KTH are mostly just listeners and only a small part express their opinions. In meetings, they still depend on the accompanying officers/extensions of the Central Java BKSDA, starting from invitations, meeting activity plans and agreed results following government directions and decisions.

4 Conclusion

Community participation in Darupono Village in preserving the Pager Wunung Darupono Nature Reserve at the planning stage produced an average score of 182. This score corresponds to the third rung of Arnstein's ladder, Informing, and falls within the moderate-participation or tokenism category, in which communication is predominantly one-way. Most residents were unaware of or not involved in conservation-group membership, while only a small proportion joined the Fire Care Community (MPA) and Forest Farmer Group (KTH). During group meetings, community members primarily acted as listeners and continued to depend on Central Java BKSDA officers for information and guidance. Consequently, decision-making remained largely under government control.

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