RESEARCH ARTICLE OPEN ACCESS

Reliability of Batujai Reservoir Care Community Analysis for Sustainable Reservoir Management

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ABSTRACT
Batujai Dam is one of the large dam, has a great benefitsfor field irrigation and raw water in West Nusa Tenggara. Based on that, it needed the sustainable reservoir management. One of the important aspect in a sustainable reservoir care is the organizational of reliable Reservoir Care Community (Kelompok Peduli Waduk/KPW). The establishment of Batujai KPW is absolutely needed as a way to preservation and utilization Batujai reservoir area. The Decision Support System for the compilation of pattern realiability of Reservoir Care Community related to social-organizational aspects, economic, and environment to guarantee to continue reservoir function. Analytic Hierarchy Process (AHP) represent one of the peripheral DSS Multi Criteria Decision Making (MCDM) used for the election of most conducive alternative. Decision Hierarchy show objectively target (goal) to reach, criterion, subcriterion to later then to form an alternative. Result of study reliability of Batujai Reservoir Care Community that economic criterion has the highest weight that is 0.5105 later then followed by social-organizational criterion with weight 0.3613 and environment criterion with weight 0.1282. Pattern alternative of Batujai Reservoir care Community Reliability (KPW) consis of The establishment of KPW with percentage value 12.0 %, The organizatiobal stabilization of KPW with percentage value 27.1 % and the autonomy ofKPW with percentage value 60.9 %.
Kata Kunci: Batujai Reservoir, Reservoir Care Community /KelompokPeduliWaduk (KPW), Analytical Hierarchy Process (AHP), Reliability.

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I. INTRODUCTION

Dam is buildings in the form of soil, rock and concrete which is built to hold water so that it can be useful, for human life such as field irrigation, raw water, electricity generation, flood control and even tourism.Dam is a vital asset, besides has a great benefits, it also has a large potential hazard/risk. Dam failure could cause the economic losses and even the loss of life (victims) at the downstream area of dam. The recovery process to return to normal condition requires an extensive time and a huge cost.

Dam failure can occur due to various causes including overtopping, structural failure and internal erosion that almost occur in all types of dams (concrete, rock fill and earth fill). Dams must be monitored for the safety of residents who live at the downstream of the dam and prevent environmental damage.Therefore the dam must be protected the sustainability of the dam, especially the management of reservoir areas, borders and greenbelt of the reservoir. However, to achieve sustainable reservoir management, the community around the reservoir must also be involved in dam management, particularly around reservoir areas. Not olnyfor the safety of the dam and the sustainability of the reservoir's function , but also to improve the economic level of the community around the reservoir.

Batujai Dam is one of the large dams and the oldest dam in West Nusa Tenggara. Therefore, managers need to be established in this case the establishment of a reliable Batujai Reservoir Care Group (KPW) especially in the Batujai Reservoir area in order to achieve sustainable reservoir management.

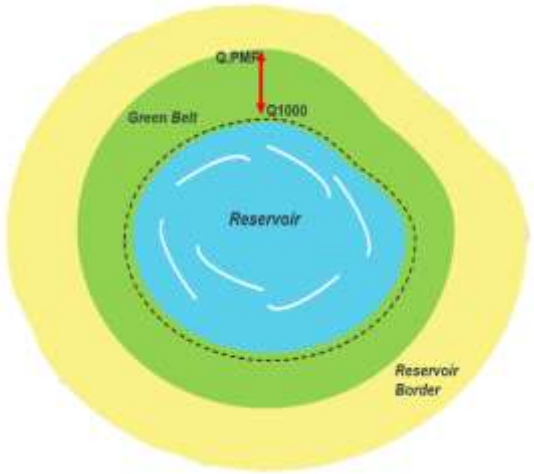
The problem is how to measure the reliability of a community that has been born in the community and what factors indicate that the KPW is reliable or not. So this research is aimed at determining the determinants of the reliability of the KPW with the Analytical Hierarchy Process (AHP) method.

II. LITERATURE

According to ministerial regulation of PekerjaanUmum dan PerumahanRakyat (PUPR) No. 27/PRT/M/2015:

1) Dam is building in the form of earth, rock and concrete, which are built in addition to holding and storing water, can also be built to hold and accommodate mine waste, or hold mud to form reservoirs.
2) Reservoiris an artificial container formed as a result of the construction of a dam, it can be used as a place for tourism activities, sports activities and aquaculture activities(fishery cultivation).
3) Greenbelt is the area around or along the edge of the reservoir with a certain width, it's between flood water level (Q1000) and the extraordinary flood water level (QPMF) which is technically the difference in elevation is equivalent to the free board of dam.
4) Reservoir Border isreservoir border is an area around or along the edge of the greenbelt with a certain width can be used as a place of research and farming activities.

Figure 1. reservoir, greenbelt, and reservoir border boundary schemes



Dam is any artificial barrier, a type of urugan or other type, which holds water or can hold water naturally and artificially, including foundations, cliffs and supporting structures and their equipment (BalaiKeamananbendungan, 2003).

III. METHODOLOGY

1) Location

Administratively ofBatujai Dam is located in Batujai Village, West Praya, Central Lombok Regency, West Nusa Tenggara. Built in 1977-1982. The inundation area is 890 ha, irrigates 3500 ha of rice fields but now it is 2815 ha.

Figure2. Map of locations of the BatujaiDam

2) Batujai Reservoir Care Community (KelompokPeduliWaduk/KPW)

The community was established on October, 14th 2017. The purpose of the formation of this community is to preserve reservoir functions by preserving reservoirs, preserving water, establishing and managing reservoir protected areas and civil engineering through social-organizational criterion, economic and environmental approaches. Activities undertaken to improve the economic level of communitysuch as aquaculture, utilization of reservoir areas for agriculture and tourism development.

3) Analytical Hierarchy Process (AHP) Method

AHP is a method of solving problems in unstructured problems into component parts. Determine this part or variable to form a hierarchical arrangement, then provide numerical values for subjective judgments of the relative importance of each variable and synthesize valuations for which variable has the highest priority which will improve the results of cases (Pranoto, YosepAgus, 2013).

In solving problems using the AHP method, there are some basic principles that must be considered, including the following:

- Arrange the hierarchy

The preparation of the hierarchy is done by determining the objectives that are at the top level. The next level consists of criteria for assessing alternatives. Each criterion has sub-criteria.

- Criteria and alternative assessment

It has done by using pairwise comparisons, a rating scale of 1 to 9 is used which is the best scale for expressing opinions.

- Synthesis of priority

The relative comparison value of alternative and criteria have to be adjusted to the judgement (respondent), it determined to produce the wight of value and priority. It calculated by matrix or completion of mathematical equations.

- Logical Consistency

The meaning of Consistency is the similar object can be grouped according to uniformity and relevance.

Table 1. Quantity Scale AHP method

Intensity Of Interest	Definition	Explanation
1	Both elements are equally important	Both elements have same impact about the purpose (goals)
3	One elements is slightly more important than the other	Experience and assessment slightly support one elements compared to the other
5	One element is important than the other	Experience and assessment is extremely strong in supporting one element compared to the other element
7	One element is clearly more absolutely important than the other	One element that is strongly supported and dominant is seen practice
9	One element is absolutely important than the other	The evidence supporting one element towards another has the highest level of affirmation that might be corroborating

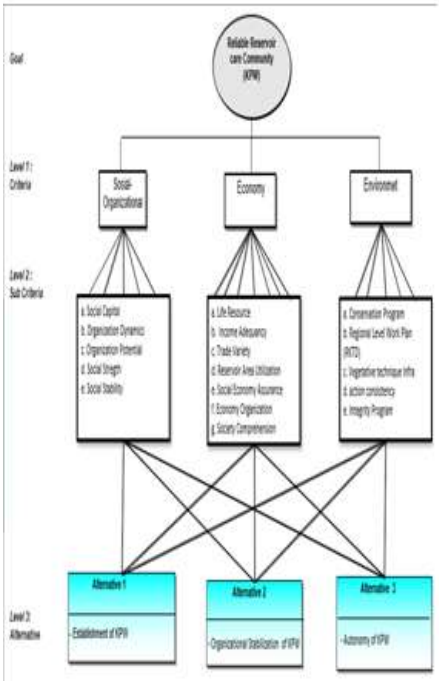


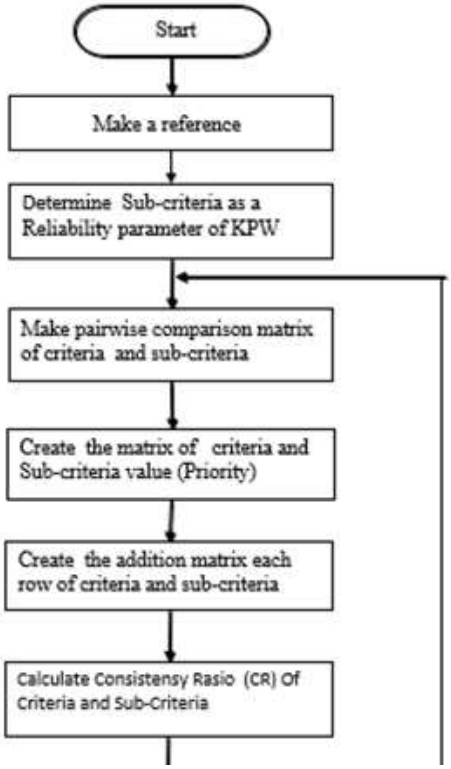
Figure 3. Hierarchy of Criteria Structure

4) Respondent

Data collection uses a questionnaire containing opinions about the reliability factor for the Batujai reservoir care community. Using Expert Choice Method to decide the respondent.There are 12 respondents who filled out the questionnaire, among themselves:

- Head of Dam Management Unit, River Basin Department Nusa Tenggara I
- Vice head of Dam Management Unit, River Basin Department Nusa Tenggara I
- Head of Sub Dam Management Unit River Territory Lombok
- Technical Implementer of Lombok dam
- Officer Coordinator Of batujai Dam
- Operating Officer Of Batujai Dam
- Maintenance Officer Of Batujai Dam
- Monitoring Officer Of Batujai Dam
- Chairman Of Batujai Reservoir Care Community (KPW)
- 3 (Three) Members Of Batujai Reservoir Care Community (KPW)

5) Flowchart Metode AHP



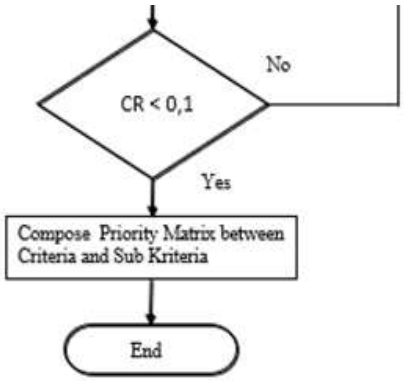


Figure 4. Flowchart of research steps using the AHP method

IV. ANALYSIS AND RESULT

This research is a descriptive study, data collection was carried out by the expert choice method which involved 12 respondents. The criteria examined include the social-organizational criteria, economic criteria and environmental criteria. Social-organizationalcriteria are divided into 5 (five) sub-criteria, those are (i) social capital, (ii) Dynamics organization, (iii) organizational potential, (iv) social strength, (v) social stability. Economic criteria are divided into 7 (seven)sub-criteria, those are (i) life resource, (ii) income adequancy, (iii) trade variety, (iv) reservoir area utilization, (v) social economy assurance, (vi) economy organization, (vii) society comprehension.

Environmental criteria are divided into 5 (five) (lima) sub-criteria, those are (i) conservation program, (ii) Regional Level Work Plan, (iii) Vegetative technique infra, (iv) action consistency, (v) Integrity program.

1) Social-organizational criteria

In terms of social capital, KPW is assessed by the maturity of the community as seen from the community experience. The older of age community organization. Based on researchsocial capital has a weight value (0.0565)

In terms of Organization dynamics, reliability is assessed from the dynamics of a community as evidenced by the ownership of statutes and household budget, management, work programs and sources of funds. This is considered the most influential on the reliability of KPW. Organization dynamics has a weight value (0.4536)

Potential Organization has a weight (0.1486). What is meant by potential organizational sub-criteria is the intensity of social interaction with the value of mutual cooperation and community as seen from the intensity of routine group meetings, frequency of mutual cooperation, the existence and role of leaders in environmental preservation.

Weight of social strength is (0.2792). Based on the social strength sub-criteria in general, the reliability of KPW based on the activeness and ability to carry out standard group activities that have been tested for integrity, increased potential, solidarity, internal relations, and the resolution of the field problems encountered.

Weight of social stability is (0.0621). Based on the reliability social stability criterion as seen from the potential seeds of vertical and horizontal social conflict.

Then, Sub Criteria that the most important in influencing Social- Organizational Citeria based the highest weight value and priority is Organization Dynamics, Social Strenght, Organization Potential, Social Stability, and Social Capital

2) Economic Criteria

Life resource sub-criteria has weight 0.0354. The types of sources of life that can be utilized in the reservoir area.

Income adequancysub-criteria has weight 0.2299. in terms of the adequacy of group income from reservoir use.

In terms of trade variety (0.0353), it can be seen from land use efforts such as planting various types of plants and utilizing reservoir inundation areas as a place for fish farming, besides other tourism businesses that are carried out.

Reservoir area utilization has weight 0.3732. TheActivities carried out in reservoir areas such as tourism, sports and fishery cultivation activities.

Social economy assurance has weight 0.1012. Provision of plant seeds, provision of fish culture seeds, provision of fertilizers and pest control

Economic organization has weight 0.1483. Shows the existence and support of existing institutions towards increasing income, being able to explore group needs, condition maps and group potential.

Society comprehension has weight 0.07767.Understanding of the aspects of productivity, achievement, and investment in terms of productivity as seen from the results of the management of the green belt which is an achievement of conservation of water resources, land resources which are investments for future generations

Then, Sub Criteria that the most important in influencing Economy Citeria based the highest weight value and priority is Reservoir Area Utilization

3) Environmental Criteria

Conservation program has weight 0.4926. The ability to formulate a conservation program

supported by coaching by the government with assistance from the facilitator.

Regional Level Work Planhas weight 0.0575.The preparation of the Regional Level Work Plan becomes a unity with the stages in the planning and development, deliberations related to the conservation program

Vegetative technique infra has weight 0.1486. The ability of the Group to explore activities related to the utilization of existing vegetative civil infrastructure, such as the utilization of plants in the green belt area, Limitation with parking areas or tidal areas

action consistency has weight 0.0691.Implements activities in the Regional Level Work Plan and activeness in implementing.

Integrity program has weight 0.2437.Active in identifying and negotiating with stakeholders as well as caring for downstream water use and upstream water conservation.

Then, Sub Criteria that the most important in influencing Environmental Citeria based the highest weight value and priority is Conservation Program

The result of analysis about respondent opinions for the criteria weight value of Reliabiliy Reservoir care community for the sustainable reservoir management has the highest weight value on economic criteria (0.5105), The second priority is Social- Organizational (0.3613), and The Third priority is Environmental Criteria (0.1282).

4) The action alternative

The first priority of action alternative for reliability Of Batujai Reservoir Care Community for the sustainable reservoir management is Autonomy KPW (60.9%), the meaning is, to be autonomous on economic, be autonomous on social-organization and on maintain andprotect the environment from the damage. The organizatiobal stabilization of KPW with percentage value (27.1 %). And the scond alternative is establishment of KPW with percentage value(12.0%).

V. CONCLUSION

The conclusion of reliability of Batujai Reservoir Care Community (KPW) that economic criterion has the highest weight that is 0.5105 later then followed by social-organizational criterion with weight 0.3613 and environment criterion with weight 0.1282. Pattern alternative of Batujai Reservoir care Community Reliability (KPW) consis of The establishment of KPW with percentage value 12.0 %, The organizatiobal stabilization of KPW with percentage value 27.1 % and the autonomy of KPW with percentage value 60.9 %.

Social-organizational criteria consist of Social capital has a weight value (0.0565), . Organization dynamics has a weight value (0.4536),potential organization has a weight (0.1486), weight of social strength is (0.2792), weight of social stability is (0.0621).

Economic criteria consist of Life resource sub-criteria has weight (0.0354),income adequancy sub-criteria has weight (0.2299),trade variety (0.0353,)reservoir area utilization has weight (0.3732),social economy assurance has weight (0.1012), conomic organization has weight (0.1483), society comprehension has weight (0.07767).

Envinronmental criteria consist of conservation program has weight (0.4926),regional Level Work Plan has weight (0.0575), vegetative technique infra has weight (0.1486), action consistency has weight (0.0691), Integrity program has weight (0.2437).

VI. GENERAL ARTICLES

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