STAKEHOLDERS ANALYSIS OF MANGROVE ECOSYSTEM MANAGEMENT IN SEGARA ANAKAN LAGOON, CILACAP

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STAKEHOLDERS ANALYSIS OF MANGROVE ECOSYSTEM MANAGEMENT IN SEGARA ANAKAN LAGOON, CILACAP. The mangrove ecosystems are one type of coastal ecosystem found along coastlines and river estuaries that are influenced by tides and inundation. Segara Anakan Lagoon, Cilacap as one type of coastal ecosystem has a protection function, coastal area buffer, and cultivation area function that must be supported from the aspects of policy and institutions, communication, and coordination. This study aims to identify the role of stakeholders and the relationship between stakeholders in mangrove ecosystem management in Segara Anakan Lagoon, Cilacap. The research method used was a survey and interview method analyzed with MACTOR software. The results showed that there were 18 stakeholders who involved in mangrove ecosystem management in Segara Anakan Lagoon, Cilacap. The stakeholders are classified into main stakeholders, key stakeholders, and supporting stakeholders using the objective of mangrove management as key activities such as silvofishery, mangrove conservation, fishing activity, industry activity, etc. The level of convergence between stakeholders was 96.1% and the level of divergence was 3.9%. These results indicate a relatively low potential for conflict between stakeholders. The research can be used as a model relation between stakeholders to support the management activity of Segara Anakan Lagoon.

Keywords: Mangrove ecosystem, management, Segara Anakan Lagoon Cilacap, MACTOR software, stakeholders

ANALISIS PELAKU PENGELOLAAN MANGROVE DI LAGUNA SEGARA ANAKAN, CILACAP. Ekosistem mangrove merupakan salah satu tipe ekosistem pesisir yang terdapat di sepanjang garis pantai dan muara sungai yang dipengaruhi oleh pasang surut air laut dan genangan. Laguna Segara Anakan, Cilacap sebagai salah satu tipe ekosistem pesisir memiliki fungsi perlindungan, penyangga wilayah pesisir dan fungsi kawasan budidaya yang harus didukung dari aspek kebijakan dan kelembagaan, komunikasi dan koordinasi. Penelitian ini bertujuan untuk mengidentifikasi peran pemangku kepentingan dan hubungan antar pemangku kepentingan dalam pengelolaan ekosistem mangrove di Laguna Segara Anakan, Cilacap. Metode penelitian yang digunakan adalah metode survei dan wawancara yang dianalisis dengan perangkat lunak MACTOR. Hasil penelitian menunjukkan bahwa teridentifikasi 18 pemangku kepentingan yang berperan dalam pengelolaan ekosistem mangrove di Laguna Segara Anakan, Cilacap. Peran pemangku kepentingan dikelompokkan menjadi pemangku kepentingan utama, pemangku kepentingan kunci, dan pemangku kepentingan pendukung. Yang menggunakan obyek aktivitas pengelolaan mangrove sebagai aktivitas kunci seperti tambak, konservasi mangrove, penangkapan ikan, industri dan lain-lain. Tingkat konvergensi antar pelaku kepentingan sebesar 96,1% dan tingkat divergensi sebesar 3,9%. Hasil ini menunjukkan potensi konflik yang relatif rendah antar pemangku kepentingan. Riset ini dapat digunakan sebagai model hubungan antar pemangku kepentingan dalam pengelolaan Laguna Segara Anakan.

Kata kunci: Ekosistem mangrove, pengelolaan, Laguna Segara Anakan Cilacap, perangkat lunak MACTOR, pemangku kepentinganr

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I. INTRODUCTION

The mangrove ecosystems are forest areas along the coastline and are influenced by tides, water inundation, soil texture, water salinity, water pH, and oceanographic factors (Azman et al., 2021; Hilmi, Sari, Cahyo, Mahdiana, & Samudra, 2021; Rastogi, Phulwaria, & Gupta, 2021). Mangrove ecosystems are unique natural ecosystems and have high ecological and economic values (Anneboina & Kavi Kumar, 2017; Dijk, Broersma, & Mehnen, 2016; Hu et al., 2020; Soares, Assunção, Fernandes, & Marinho-Soriano, 2018). The function of mangrove ecosystems includes protecting the coast from wind, currents, and waves from the sea, as well as being a habitat (place to live), feeding ground, and spawning ground for aquatic biota (Leo, Gillies, Fitzsimons, Hale, & Beck, 2019; Marlianingrum, Kusumastanto, Adrianto, & Fahrudin, 2021; Sihombing, Gunawan, & Sawitri, 2017). Mangrove forests also can produce firewood, construction wood, charcoal, dyes, syrup, and others. Mangrove also has an important function in supporting the activity of carbon dioxide sequestration to reduce the impact of global warming (Azman et al., 2021; Ely, Tuhumena, Sopaheluwakan, & Pattinaja, 2021; Hartoko, Chayaningrum, Febrianti, Ariyanto, & Suryanti, 2015; Hilmi et al., 2017; Thoral et al., 2021).

Segara Anakan Lagoon located in Cilacap Regency is the largest mangrove ecosystem in Java with an area of 21.500 ha (before 1990). The Segara Anakan Lagoon also has the Center for Indonesia Mangrove Conservation Studies including Lempong Pucung Hamlet, Ujung Alang Village, Kampung Laut District, and Cilacap. The Regional Regulation of Cilacap Regency 17/2001 concerning Mangrove Forest Management in Segara Anakan develops strategic and protective benefits and potential values, and conservation of ± 56 species of mangroves (Hilmi, Sari, Amron, Cahyo, & Siregar, 2021; Hilmi, Sari, Cahyo, Amron, & Siregar, 2021; Koswara, Ardli, & Yani, 2017; Nugroho, Piranti, & Husein Sastranegara, 2020; Rachman, Hilmi, Anwar, & Penelitian, 2020; Sari, Adrianto, Soewardi, Atmadipoera, & Hilmi, 2016). However, the mangrove ecosystem in Segara Anakan Lagoon, Cilacap is currently degraded due to natural and human factors (Fatimah et al., 2022). Therefore, integrated efforts are needed to reduce ecosystem degradation. Reducing the degradation required efforts to identify and synergize the roles of stakeholders in sustainable ecosystem management and conservation efforts.

The management and conservation activity require the policy and institutional aspects to reduce the degradation trend which is caused by natural phenomena such as tidal flooding, intrusion, abrasion, water inundation, human intervention, and the limited role of the community (Gijón Mancheño et al., 2021; Hariyadi, 2018; Khan, Abdullah, Salam, Mandal, & Hossain, 2021). In addition, the government also develops policies and takes on roles and responsibilities as the mangrove forest management authority. However, these activities still have constraints and management issues, namely: overlapping authority, poor communication, lack of coordination among related stakeholders, and lack of understanding of conservation and sustainable management, and knowledge of the impacts of ecosystem damage (Fatimah, Sudharto, & Kismartini, 2022; Pace, Saritas, & Deidun, 2023; Sari, 2016; Tandio, Kusmana, Fauzi, & Hilmi, 2023)

Stakeholders in mangrove forest management are classified into government agencies, community, academic people (teachers, lecturers, and mangrove experts), mass media, and private sector (business) (Fauzi, 2019; Kalsum, Purwanto, WF, & Sumardi, 2022; Tandio et al., 2023; Triyanti & Susilowati, 2019; Wardono, Muhartono, Hikmayani, Apriliani, & Hikmah, 2019). Stakeholder analysis requires a methodology to gain an understanding of a system, assess the impact of change on a system, and identify and assess the interests of all stakeholders. Therefore, stakeholders as groups and individuals must have a certain role

in achieving the conservation and management objectives of the mangrove ecosystem. The first is the government which must have good influence to develop good policies and outcomes to support mangrove conservation and management. The other stakeholders are the community, academia, private sector, and mass media which also have an important role in achieving the success of a program (Ahmad, Abdullah, & Jaafar, 2016; Ely et al., 2021; Fauzi, 2019; Glass, Kruse, & Miller, 2015; Muawanah, Kurniasari, Soejarwo, & Yuliaty, 2020; Tandio et al., 2023) Analyzing the role of the stakeholders can be done by developing stakeholders role model to support the objective of mangrove conservation and management. These activities can use MACTOR software. MACTOR as a software tool is used to measure the balance of power between stakeholders and study the convergence and divergence of stakeholders in addressing the interrelated interests and goals. MACTOR can assist in decision-making from the various interests of stakeholders to implement policies and reduce conflicts (Thompson, 2018; Triyanti & Susilowati, 2019; Wardono et al., 2019). The research aims to identify and develop the stakeholder role in managing and conserving mangrove ecosystems based on the relationship among stakeholders in Segara Anakan Lagoon, Cilacap using MACTOR software.

II. MATERIALS AND METHODS

A. Research Area

The research was conducted in February-March 2023 in Villages in Segara Anakan Lagoon (SAL), Cilacap, especially in Kotawaru, Kampung Laut, and Tritih, Central Cilacap District, Cilacap Regency. The subjects of this research were stakeholders around the Segara Anakan mangrove ecosystem. The ecosystem mangrove in Segara Anakan has specific characteristics because it is like the semi-closed lagoon and has two seawater gates that are Pelawangan Barat and Pelawangan Timur (Hilmi, Sari, Cahyo, Amron, et al., 2021; Hilmi, Sari, Cahyo, Mahdiana, et al., 2021).

B. Sampling Techniques

This research used two-stage cluster sampling technique (using village as the first parameter and stakeholders as the second parameter) to collect a sample of stakeholders from villages in East Segara Anakan Lagoon, Cilacap (Kutawaru, Tritih and Kampung Laut). The determination of the number of respondents was based on Slovin's Formula for Sampling Technique (Slovin, 1960) as follows (Saptutyningsih, Diswandi, & Jaung, 2020; Syafiq, Sirojuzilam, Badaruddin, & Purwoko, 2022)).

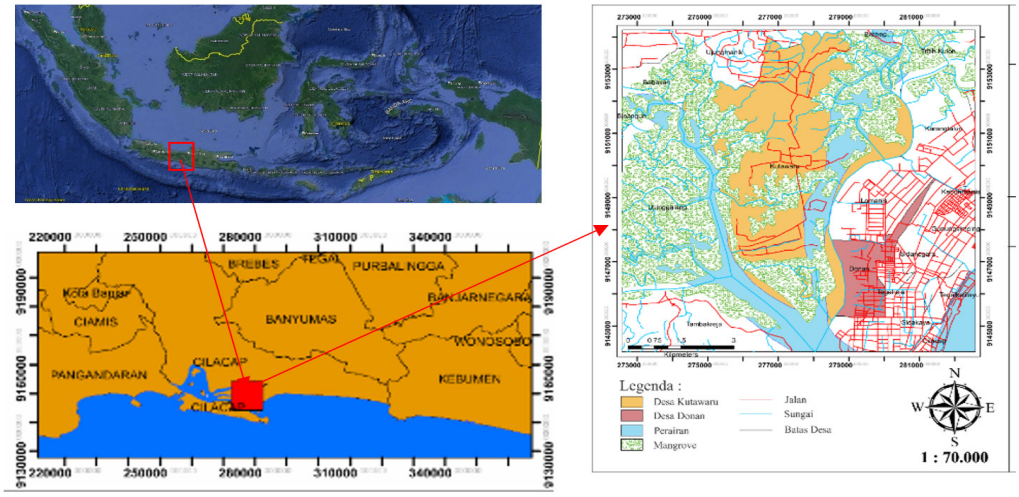


Figure 1. Map of Research Location

$$n = \frac{N}{1 + Ne^2} \quad \text{.....(1)}$$

Notes:
n: Number of samples
N: Total population
e: Fault tolerance limit (in this study was 25%)

Focus Group Discussion was developed following the Slovin index. Based on the Slovin Index the total number of respondents in this study was> 30 respondents. Respondents in this study consisted of the government (Central Java Province Environment and Forestry Office, Cilacap Regency Environment Office, Cilacap Regency Maritime Affairs and Fisheries Office, Donan Village Government of Cilacap Regency, Kutawaru Village Government of Cilacap Regency), academic persons (Jenderal Soedirman University), private sector/ industry (PT. Pertamina (Persero) RU IV Cilacap and PT. Solusi Bangun Indonesia Tbk. Cilacap), ecotourism managers, community (community leaders, fishermen, mangrove craft processors and craftsmen, farmers, silvofishery communities, boat transportation services, the general public, collectors, NGOs, and direct mangrove user communities).

C. Research ProcedureT

The research procedure consists of 4 stages, that were (Fauzi 2019; Tandio et al. 2022, 2023):

1. The initial stage of the research was carried out by surveying the research location with field observations and literature studies.
2. The data collection stage by conducting interviews directly with respondents using a questionnaire to analysis relation between stakeholders.
3. The data analysis stage is done by tabulating the data in Microsoft Excel to get mode data from the results of the questionnaire assessment followed by analyzing the data using MACTOR software.
4. The data classification stage is by grouping data based on the influence and dependence between stakeholders presented in the form of matrices and maps.
5. MACTOR analysis was conducted to determine the involvement of actors concerning the activity object. A table listing important actors along with their roles, strategic issues, and objectives of interest was created. From the first analysis, Actor Objectives were obtained in the 1MAO matrix. Subsequently, the following were generated: 1a) Convergence and divergence matrix 1 (1MAA), 2a) Convergence and divergence matrix 2 (2MAA), 3a) Convergence and divergence matrix 3 (3MAA), 1b) Value matrix (2MAO), 2b) Position matrix values and weighting, 3b) Strategic recommendations.
6. Actors are affected by direct and indirect power matrices and power coefficients. The steps of identifying and analyzing the interests of actors were done with MACTOR software. MACTOR works by filling in the position matrix or 1MAO (Actor-Objective Matrix) matrix and 2MAO matrix. After that, the next matrix to be completed is the MID matrix (Direct Influence Matrix) which describes the influencing variables. After filling in the MID and 1MAO matrices, MACTOR will calculate the 2MAO matrix through a computer program. Through the 3MAO matrix, various features can be generated, including mobilization coefficients, which show the various actors involved in a situation.
7. In addition to using a prospective analysis approach, this study also formulated the results of FGDs with stakeholders directly related to the development of mangrove areas Segara Anakan Lagoon, Cilacap in mapping the opinions of main stakeholders, key stakeholders, and supporting stakeholders involved in the FGD.

D. Data Analysis

Data analysis used quantitative descriptive analysis methods and stakeholders' analysis using MACTOR software. This analysis using MACTOR software employed many

stakeholder groups which is shown in Table 1.

The analysis of stakeholder impact on mangrove management was analyzed using the relationship among stakeholders with objective mangrove management activities. The objective of mangrove management is shown in Table 2.

III. RESULTS AND DISCUSSION

A. The Role of Stakeholders in Mangrove Ecosystem Management in Segara Anakan Lagoon, Cilacap

The data in Table 3 shows that there are various activities of stakeholders to conserve, protect, manage, and other activities in the mangrove ecosystem in Segara Anakan.

Table 1. Stakeholders of mangrove management

No.	Long Label	Short Label
1.	Environment and Forestry Service of Central Java Province	DLHK Prov
2.	Cilacap District Environment Agency	Dinas LH
3.	Cilacap Regency Marine and Fisheries Agency	Dinas KP
4.	Donan and Kutawaru Village Governments	Village's
5.	Jenderal Soedirman University	Academics
6.	PT. Pertamina (Persero) RU IV Cilacap	Pertamina
7.	PT. Solusi Bangun Indonesia Tbk Cilacap	PT SBI
8.	Ecotourisme management	Ecotourism
9.	Community leaders	Com. leader
10.	Fishermen	Fishermen
11.	Fishpond farmers	Fishpond's
12.	Local community	Community
13.	Ship Crossing Transportation Services	Ships Boat
14.	Mangrove Crafts and Processed Products Maker	Craftsmen
15.	Silvofishery society	Silvofishr
16.	Agent of Fish and mangrove collectors	Fish_agent
17.	Non-government organizations	NGO
18.	Direct Mangrove Utilizers	Utilizers

Table 2. Objectives of mangrove management

No	Long label	Short label
1.	Management of mangrove forest areas	Forest
2.	Conservation of the mangrove ecosystem	Conserve
3.	Fishing ground management	Fish ground
4.	Habitat management for biota or wildlife	Habitat
5.	Mangrove rehabilitation	Rehabilitate
6.	Control of heavy metal, petroleum, and domestic water pollution	Pollution
7.	Improved clean water supply	Freshwater
8.	Mangrove ecosystem preservation efforts	Preserve
9.	Ecotourism development in mangrove ecosystems	Ecotourism
10.	Increased crab catches	Crabs
11.	Improved economy with fishpond business	Fishpond
12.	Increased shellfish catch	Shellfish
13.	Increased ship and boat transportation income	Boats ship
14.	Innovation of mangrove crafts or preparations	Craft innovate
15.	Management of silvofishery system	Silvofishery
16.	Continuity of fish catch supply	Fish catch
17.	Controlling mangrove land conversion	Conversion
18.	Prohibition of mangrove logging	Logging

Table 3. Identification of the role of each stakeholder

No.	Stakeholders	The role
1.	Environment and Forestry Service of Central Java Province	Formulate policies and evaluate the implementation of policies of Segara Anakan Lagoon, Cilacap mangrove area at the provincial level.
2.	Environmental Service of Cilacap Regency	Conducting guidance and supervision of the implementation of mangrove ecosystem management in Segara Anakan Lagoon, Cilacap.
3.	Marine and Fisheries Service of Cilacap Regency	Formulating policies, managing, and evaluating in the field of capture fisheries, aquaculture, and fisheries business of the mangrove ecosystem in Segara Anakan Lagon, Cilacap.
4.	Donan and Kutawaru Village Government	Establish development policies and management licenses carried out in the village area around the mangrove ecosystem in Segara Anakan Lagoon, Cilacap.
5.	Academics (Jenderal Soedirman University)	Contributing ideas and thoughts in the management of the mangrove ecosystem through research activities carried out in Segara Anakan Lagoon, Cilacap.
6.	PT. Pertamina (Persero) RU IV Cilacap	Conduct corporate social responsibility CSR activities to support environmental conservation in the form of mangrove planting and contribute to the development of facilities and infrastructure contained in ecotourism.
7.	PT. Solusi Bangun Indonesia Tbk Cilacap	CSR activities that contribute to the development of ecotourism facilities and infrastructure, facilitate mangrove batik business groups and conduct mangrove planting programs.
8.	Ecotourism Managers	Conducting ecotourism management and developing ecotourism areas by beautifying the location.
9.	Community Leaders	Contribute thoughts and ideas for the development of villages around mangrove ecosystems.
10.	Fisherman	Utilizing mangrove ecosystem resources by catching fish, shellfish, crabs, etc.
11.	Fish Farmers	Developing fisheries businesses with aquaculture activities in ponds.
12.	Local Communities	Participate in preserving the mangrove ecosystem.
13.	Boat Crossing Transportation Services	Providing ferry services for the community around the mangrove ecosystem.
14.	Mangrove Handicraft and Processed Makers	Utilizing mangrove ecosystem resources by innovating such as making flour and food from mangroves fruits, and handicrafts in the form of mangrove batik.
15.	Silvofishery Communities	Conducting aquaculture business by combining fisheries with mangrove planting.
16.	Fish Collectors	Parties that buy fisheries products from fishermen.
17.	Non-Governmental Organizations (NGOs)	Contribute to community empowerment.
18.	Direct Mangrove Users	Utilizing mangrove ecosystem resources directly such as mangrove wood utilization.

The results showed that there are about 18 stakeholder groups that play a role in mangrove ecosystem management in Segara Anakan Lagoon, Cilacap, which are grouped into the government, the private sector, academics, and the community. These stakeholders have direct and indirect influence on mangrove ecosystem management. Based on the roles played, the stakeholders can be classified into three groups, namely main stakeholders, key stakeholders, and supporting stakeholders (Fauzi, 2019; Muawanah et al., 2020; Tandio et al., 2023).

The main stakeholders in mangrove ecosystem management in Segara Anakan Lagoon, Cilacap consist of ecotourism managers, community leaders, fishermen, fish farmers, local communities, boat crossing transportation services, mangrove processed craftsmen, silvofishery communities, fish collectors, non-governmental organizations, and mangrove users directly. The groups of main stakeholders are those that can be directly impacted both positively and negatively by mangrove ecosystem management (Azman et al., 2021; Hilmi et al., 2017; Kantharajan et al., 2018; Shah & Ramesh, 2022). This shows that these parties are highly dependent on the existence of mangrove ecosystems in Segara Anakan Lagoon, Cilacap as their main livelihood (Fauzi, 2019; Muawanah et al., 2020; Tandio et al., 2023). Tandio et al. (2022, 2023) write that the management of the mangrove ecosystem in North Jakarta is influenced by eleven stakeholders.

Meanwhile, key stakeholders in the management of mangrove ecosystems in Segara Anakan Lagoon, Cilacap are the Central Java Provincial Environment and Forestry Office, the Cilacap Regency Environment Office, the Cilacap Regency Marine and Fisheries Office, and the Donan Village and Kutawaru Village Governments. Key stakeholders are stakeholders who have official authority in decision-making (Fauzi, 2019; Muawanah et al., 2020; Tandio et al., 2023), including in mangrove ecosystem management at the provincial, district, and village levels. In Segara Anakan Lagoon, the authority to manage mangrove areas no longer belongs to the local government but has shifted to the provincial authority, namely the Central Java Provincial Environment and Forestry Service and Perum Perhutani Central Java Regional Division (Fatimah et al., 2022; Fauzi, 2019; Junaidi, Hilmi, Madusari, & Williansyah, 2022; Muawanah et al., 2020; Tandio et al., 2023).

Supporting stakeholders in the management of mangrove ecosystems in Segara Anakan Lagoon, Cilacap consists of academics (universities, schools, and pesantren), PT. Pertamina (Persero) RU IV Cilacap, and PT. Solusi Bangun Indonesia Tbk Cilacap. These parties are those who have great concern and have contributed indirectly to the management of mangrove ecosystems in Segara Anakan Lagoon, Cilacap. The data also explained that the academics have a role to support mangrove conservation in Segara Anakan Lagoon, Cilacap with the activity of research, and collaboration with the private sector to do socialization of mangrove rehabilitation and conservation and mangrove ecotourism. The private sector (PT. Pertamina (Persero) RU IV Cilacap and PT. Solusi Bangun Indonesia Tbk Cilacap) also has activities to support mangrove conservation through Corporate Social Responsibility (CSR) programs. Some examples of stakeholder activities are ecotourism activities in Kutawaru Village, namely SIMANJA (Jagapati Mangrove Conservation) tourism fostered by PT Pertamina Patra Niaga Integrated Terminal Cilacap and Kampung Kecrabing Tourism Village fostered by PT Pertamina (Persero) RU IV Cilacap. Meanwhile, PT Solusi Bangun Indonesia Tbk Cilacap fosters the Batik Mangrove Joint Business Group (KUB). These supporting stakeholders can act as facilitators of ongoing programs and can influence decision-making (Hariyadi, 2018; Hilmi, Sari, Cahyo, Amron, et al., 2021; Rachman, 2020; Wardoyo, 2019). Research from (Tandio et al., 2023) reported that DPRD DKI Jakarta, the Ministry of Environment and Forestry of the Republic of Indonesia, the Bureau of Development and Environment of DKI Jakarta Province the Mayor of North Jakarta City, and the Government of DKI Jakarta Province have high influenced to support the sustainable of mangrove management in North of Jakarta.

B. Relationship Between Stakeholders in Supporting Mangrove Ecosystem Management in Segara Anakan Lagoon, Cilacap

Figure 2 shows that the Central Java Provincial Environment and Forestry Service

MDII	DLHK Prov	DinasLH	DinasKP	Village's	Academics	Pertamina	PT SBI	Ecotoursim	Com.leader	Fishermen	Fishpond's	Community	Ships Boat	Craftsmen	Silvofishr	Fish_agent	NGO	Utilizers	Ii
DLHK Prov	22	26	25	26	20	18	21	38	33	33	28	46	29	32	33	29	34	39	510
DinasLH	21	24	22	24	19	17	19	30	30	28	23	37	26	29	27	26	29	32	439
DinasKP	19	21	24	23	18	14	16	31	30	32	24	39	25	25	27	30	30	34	438
Village's	17	18	19	22	16	15	16	25	27	27	26	33	26	24	26	23	23	28	389
Academics	19	21	21	23	18	15	16	27	25	28	24	31	25	26	26	24	27	30	408
Pertamina	16	17	20	18	15	16	18	30	27	28	24	34	28	28	26	25	23	30	407
PT SBI	14	14	19	16	14	16	17	27	24	25	22	31	26	26	22	22	20	27	365
Ecotoursim	18	19	19	26	19	18	21	34	30	30	27	43	26	29	30	31	30	34	450
Com.leader	15	17	18	22	17	16	17	29	30	28	25	34	26	24	26	26	25	31	396
Fishermen	13	14	19	15	11	10	10	18	19	26	20	24	21	19	20	20	19	22	294
Fishpond's	8	8	14	10	9	8	8	16	18	21	16	21	19	15	16	18	14	20	243
Community	19	20	23	21	14	15	18	36	31	31	26	46	29	30	29	33	29	33	437
Ships Boat	10	12	17	14	9	9	9	23	24	23	20	30	21	19	21	20	17	23	300
Craftsmen	9	9	7	10	8	10	13	19	16	17	14	20	16	19	16	16	14	16	230
Silvofishr	6	6	8	9	7	8	8	14	15	17	14	17	16	14	14	13	13	16	201
Fish_agent	4	5	10	12	8	6	6	14	16	19	15	20	13	10	15	17	17	16	206
NGO	16	17	22	21	16	17	17	27	26	27	24	35	25	24	25	24	26	31	394
Utilizers	6	6	8	9	7	7	8	17	12	13	11	16	13	13	11	12	13	14	182
Di	230	250	291	299	227	219	241	421	403	427	367	511	389	387	396	392	377	462	6289

Figure 2. Matrix of influence and dependence between stakeholders

(DLHK Prov. Central Java) has the highest influence on other stakeholders with an influence value of (li=510), while those with the greatest dependence on other stakeholders are local communities (Masyarakat) with a dependence value of (Di=511). This shows that the Department of Environment and Forestry of Central Java Province (DLHK Prov. Central Java) has the highest authority in the management of mangrove ecosystems in Segara Anakan Lagoon, Cilacap, including in terms of licensing and policy making. Meanwhile, local communities are the affected parties of mangrove area management policies that are highly dependent on the existence of mangrove ecosystems as their main livelihood. The results also showed that local communities are the main stakeholders who are the main objects of government policy (Fauzi, 2019; Tandio et al., 2023; Triyanti & Susilowati, 2019).

The stakeholders' influence and dependency map is a graph of the position, dependency, and influence between one actor and another (direct influence and indirect influence) analyzed with MACTOR software. The strength of influence and the level of dependence of stakeholders in MDII are described according to their location in the quadrant, with the concept that the higher position of the actor, the stronger the influence, while the more to the right the actor has a high dependence (Fauzi, 2019; Kalsum et al., 2022; Mahardika, Yulianda, Adrianto, & Sulistiono, 2022; Tandio et al., 2023; Triyanti & Susilowati, 2019). The map of influence and dependency between stakeholders in mangrove ecosystem management in Segara Anakan Lagoon, Cilacap can be seen in Figure 3.

Figure 3 shows that the Central Java Provincial Environment and Forestry Service (DLHK Prov. Central Java), Cilacap Regency Marine and Fisheries Service (Dinas KP), Cilacap Regency Environmental Service (Dinas LH), Donan Village and Kutawaru Village Governments (Village Governments), Jenderal Soedirman University (Academics), PT. Pertamina (Persero) RU IV Cilacap (Pertamina), and PT. Solusi Bangun Indonesia Tbk Cilacap (PT. SBI) are dominant key stakeholders because they have the highest influence and can influence other stakeholders with a low level of dependence (quadrant I/top left). Stakeholders in this position are very important as policy designers, directing the implementation and evaluation of policies applied in mangrove ecosystem management in Segara Anakan Lagoon, Cilacap. All stakeholders in Quadrant I have a strong influence and low dependence on the mangrove ecosystem management scenario in Segara Anakan Lagoon, Cilacap.

Ecotourism managers (PEkowisata), community leaders (TokohMsy), local communities (Masyarakat), and non-governmental organizations (NGOs) are relay stakeholders (quadrant II/top right)

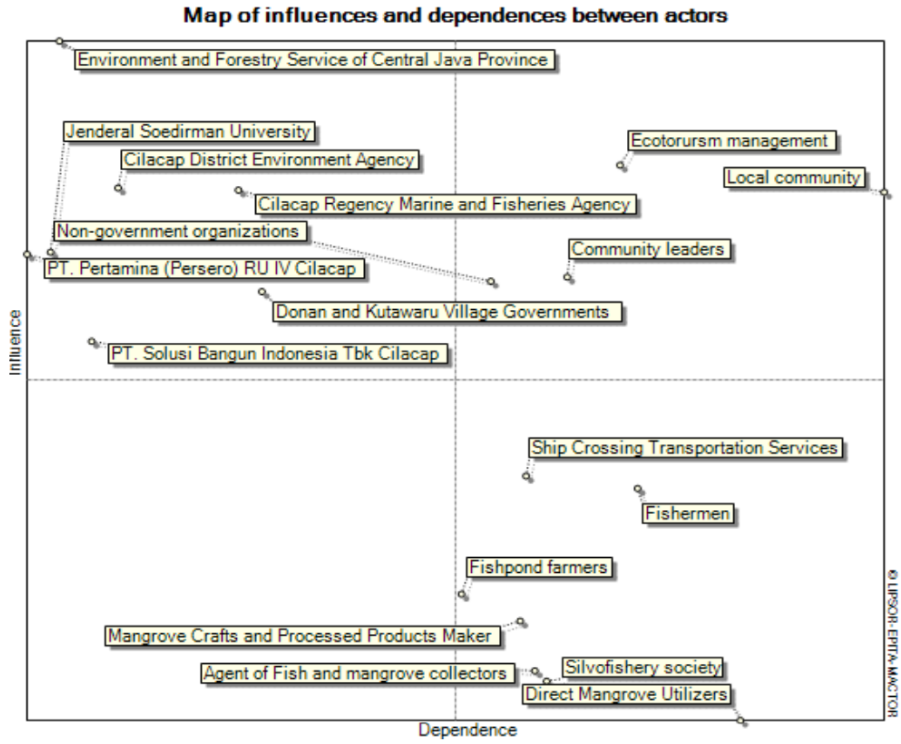


Figure 3. Map of influence and dependence between stakeholders

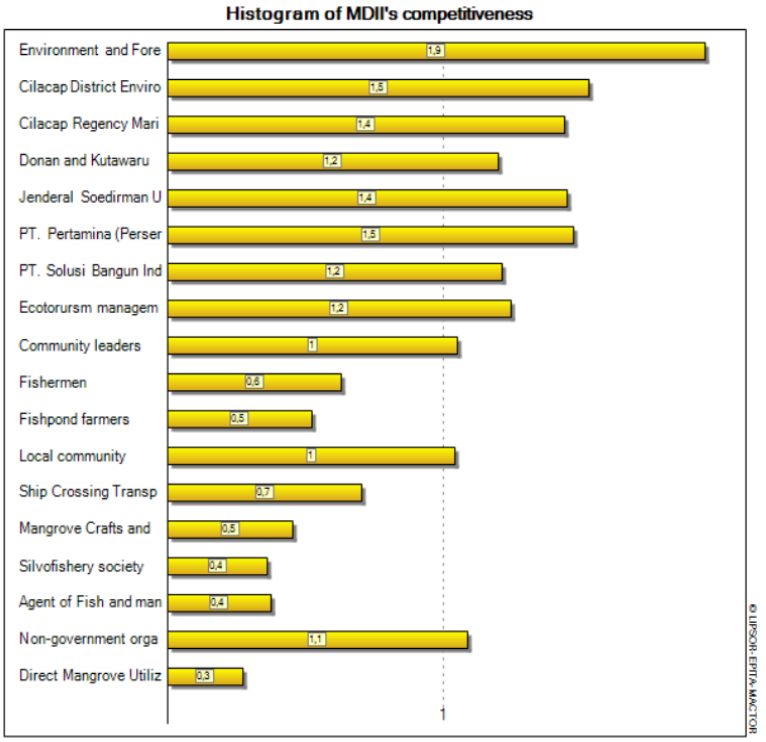
because the power of influence is high but the dependence is also high. Stakeholders who are in this position will spearhead and determine the success of the implementation of mangrove ecosystem management activities in Segara Anakan Lagoon, Cilacap tailored to their respective capacities and roles. Stakeholders in this position are also referred to as relay stakeholders. Stakeholder relay depends on stakeholders who are encouraged in Quadrant I, but have a significant influence on Quadrant III through the influence of Quadrant I stakeholders on Quadrant II stakeholders (Fauzi, 2019; Mahardika et al., 2022; Tandio et al., 2023; Wardono et al., 2019).

The ship and boats transportation service (TransKapal), fishermen (Fishermen), fish farmers (Cultivators), fish collectors (Collectors), mangrove handicraft makers and preparations (Craftsmen), silvofishery communities (MsySilvofi) and direct mangrove users (Beneficiaries) are stakeholders who are the object of mangrove management activities (quadrant III/bottom right). This indicates that these stakeholders are highly influenced and dependent on other stakeholders. Stakeholders who are in this position have a low level of power but have a high level of dependence on other stakeholders (Fauzi, 2019; Mahardika et al., 2022; Tandio et al., 2023; Wardono et al., 2019). The more upward actor has a high influence, while the more to the right actor has a high dependence (Mahardika et al., 2022; Tandio et al., 2023; Wardono et al., 2019).

C. Competitiveness between Stakeholders in Segara Anakan Lagoon

The diagram of the competitiveness of stakeholders in mangrove ecosystem management in Segara Anakan Lagoon, Cilacap is shown in Figure 4. The competitiveness between stakeholders explains the role of stakeholders in supporting mangrove conservation in SAL (Tandio et al., 2022). The number of MDII (matrix direct influence) competitiveness also shows the direct influence of stakeholders to support the mangrove conservation in SAL.

Figure 4 shows that the stakeholders that play an important role both directly and indirectly



	Ri
DLHK Prov	1,95
DinasLH	1,53
DinasKP	1,44
Village's	1,20
Academics	1,45
Pertamina	1,47
PT SBI	1,21
Ecotoursim	1,24
Com.leader	1,05
Fishermen	0,63
Fishpond's	0,52
Community	1,04
Ships Boat	0,70
Craftsmen	0,46
Silvofishr	0,36
Fish_agent	0,38
NGO	1,09
Utilizers	0,27

Figure 4. Histogram of competitiveness between stakeholders

are the Central Java Provincial Environment and Forestry Service (DLHK Prov. Central Java) (1.95), the Cilacap Regency Environment Service (DinasLH) (1.53), the Cilacap Regency Marine and Fisheries Service (DinasKP) (1.44), Donan Village Government and Kutawaru Village Government (Village Government) (1.20), Jenderal Soedirman University (Academician) (1.45), PT. Pertamina (Persero) RU IV Cilacap (Pertamina) (1.47), PT. Solusi Bangun Indonesia Tbk. Cilacap (PT. SBI) (1.21), ecotourism managers (Ecotourism Managers) (1.24), community leaders (Community Leaders) (1.05), community (Community) (1.04), and non-governmental organizations (NGOs) (1.09). Meanwhile, stakeholders who have weak competitiveness are fishermen (Fishermen) (0.63), fish farmers (Cultivators) (0.52), ship crossing transportation services (TransKapal) (0.70), mangrove craftsmen and preparations (Craftsmen) (0.46), silvofishery communities (MsySilvofi) (0.36), fish collectors (Collectors) (0.38), and direct mangrove users (Beneficiaries) (0.27). This is by the reference which states that stakeholders who have a value of more than 1 (100%) have high competitiveness and conversely stakeholders who have a value of less than 100% have low competitiveness dependence (Mahardika et al., 2022; Tandio et al., 2023; Wardono et al., 2019). Different from these results, Tandio et al. (2023) and (Tandio et al., 2022) reported that the Regional Peoples Representative Council, Ministery of Environment and Forestry, Jakarta Environment Department Burau, and local government of Jakarta have a high role in supporting the conservation and management of the mangrove ecosystem in North Jakarta.

D. The convergence and correlation between key stakeholders in Segara Anakan Lagoon

Figure 5 shows that 17 stakeholders support the 18 objectives that have been formulated indicated by the number (+1) and there is 1 stakeholder who does not support 5 of the 18 formulated objectives indicated by the number (-1). This shows that direct users of mangroves are more concerned with achieving economic goals than sustainability goals. This should

1MAO	Forest	Conservs	Fish_groun	Habitat	Rehabilita	Pollution	Freshwater	Preserve	Ecotoursm	Crabs	Fishpond	Shellfish	Boats ship	Craft inov	Silvofishe	fish catch	Conversion	logging	Absolute sum
DLHK Prov	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
DinasLH	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
DinasKP	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
Village's	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
Academics	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
Pertamina	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
PT SBI	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
Ecotoursim	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
Com.leader	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
Fishermen	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
Fishpond's	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
Community	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
Ships Boat	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
Craftsmen	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
Silvofishr	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
Fish_agent	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
NGO	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
Utilizers	-1	-1	1	-1	1	1	1	-1	1	1	1	1	1	1	1	1	1	-1	18
Number of agreements	17	17	18	17	18	18	18	17	18	18	18	18	18	18	18	18	18	17	
Number of disagreements	-1	-1	0	-1	0	0	0	-1	0	0	0	0	0	0	0	0	0	-1	
Number of positions	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	

Figure 5. Valence level matrix of stakeholders to goals

2CAA	DLHK Prov	DinasLH	DinasKP	Village's	Academics	Pertamina	PT SBI	Ecotoursim	Com.leader	Fishermen	Fishpond's	Community	Ships Boat	Craftsmen	Silvofishr	Fish_agent	NGO	Utilizers
DLHK Prov	0,0	55,0	55,0	53,0	52,0	49,5	49,5	55,0	46,5	50,5	46,5	54,0	44,5	44,0	46,0	46,5	50,5	32,5
DinasLH	55,0	0,0	55,0	53,0	52,0	49,5	49,5	55,0	46,5	50,5	46,5	54,0	44,5	44,0	46,0	46,5	50,5	32,5
DinasKP	55,0	55,0	0,0	53,0	52,0	49,5	49,5	55,0	46,5	50,5	46,5	54,0	44,5	44,0	46,0	46,5	50,5	33,5
Village's	53,0	53,0	53,0	0,0	50,0	47,5	47,5	53,0	44,5	48,5	44,5	52,0	42,5	42,0	44,0	44,5	48,5	32,5
Academics	52,0	52,0	52,0	50,0	0,0	46,5	46,5	52,0	43,5	47,5	43,5	51,0	41,5	41,0	43,0	43,5	47,5	31,0
Pertamina	49,5	49,5	49,5	47,5	46,5	0,0	44,0	49,5	41,0	45,0	41,0	48,5	39,0	38,5	40,5	41,0	45,0	30,0
PT SBI	49,5	49,5	49,5	47,5	46,5	44,0	0,0	49,5	41,0	45,0	41,0	48,5	39,0	38,5	40,5	41,0	45,0	30,0
Ecotoursim	55,0	55,0	55,0	53,0	52,0	49,5	49,5	0,0	46,5	50,5	46,5	54,0	44,5	44,0	46,0	46,5	50,5	34,5
Com.leader	46,5	46,5	46,5	44,5	43,5	41,0	41,0	46,5	0,0	42,0	38,0	45,5	36,0	35,5	37,5	38,0	42,0	27,5
Fishermen	50,5	50,5	50,5	48,5	47,5	45,0	45,0	50,5	42,0	0,0	42,0	49,5	40,0	39,5	41,5	42,0	46,0	30,0
Fishpond's	46,5	46,5	46,5	44,5	43,5	41,0	41,0	46,5	38,0	42,0	0,0	45,5	36,0	35,5	37,5	38,0	42,0	29,0
Community	54,0	54,0	54,0	52,0	51,0	48,5	48,5	54,0	45,5	49,5	45,5	0,0	43,5	43,0	45,0	45,5	49,5	34,5
Ships Boat	44,5	44,5	44,5	42,5	41,5	39,0	39,0	44,5	36,0	40,0	36,0	43,5	0,0	33,5	35,5	36,0	40,0	27,0
Craftsmen	44,0	44,0	44,0	42,0	41,0	38,5	38,5	44,0	35,5	39,5	35,5	43,0	33,5	0,0	35,0	35,5	39,5	26,5
Silvofishr	46,0	46,0	46,0	44,0	43,0	40,5	40,5	46,0	37,5	41,5	37,5	45,0	35,5	35,0	0,0	37,5	41,5	27,5
Fish_agent	46,5	46,5	46,5	44,5	43,5	41,0	41,0	46,5	38,0	42,0	38,0	45,5	36,0	35,5	37,5	0,0	42,0	26,5
NGO	50,5	50,5	50,5	48,5	47,5	45,0	45,0	50,5	42,0	46,0	42,0	49,5	40,0	39,5	41,5	42,0	0,0	30,0
Utilizers	32,5	32,5	33,5	32,5	31,0	30,0	30,0	34,5	27,5	30,0	29,0	34,5	27,0	26,5	27,5	26,5	30,0	0,0
Number of convergences	830,5	830,5	831,5	800,5	784,0	745,5	745,5	832,5	698,0	760,5	699,5	817,5	667,5	659,5	690,5	697,0	760,5	515,0
Degree of convergence (%)	96,1																	

Figure 6. Convergence matrix between stakeholders

get attention from the government so that the achievement of economic goals is balanced with sustainability goals. Disagreement with sustainability goals by direct mangrove users (Beneficiaries), indicates the need for intensive socialization and efforts to increase awareness of the importance of mangrove ecosystem conservation in Segara Anakan Lagoon, Cilacap to realize sustainable mangrove.

The next analysis is the Actor and Actor Convergence Matrix (2CAA). This matrix calculates the average intensity of convergence between two stakeholders when they have the same level (pro or contra to the goal). The following convergence matrix between stakeholders (2CAA) in mangrove ecosystem management in Segara Anakan Lagoon, Cilacap is presented in Figure 6

Figure 6 also shows that the Central Java Provincial Environment and Forestry Service (DLHK Prov. Central Java), the Cilacap Regency Environmental Service (DinasLH), and the Cilacap Regency Marine and Fisheries Service (DinasKP) with ecotourism managers (PEkowisata) have the same interest with an intensity coefficient of 55.0. This shows that the

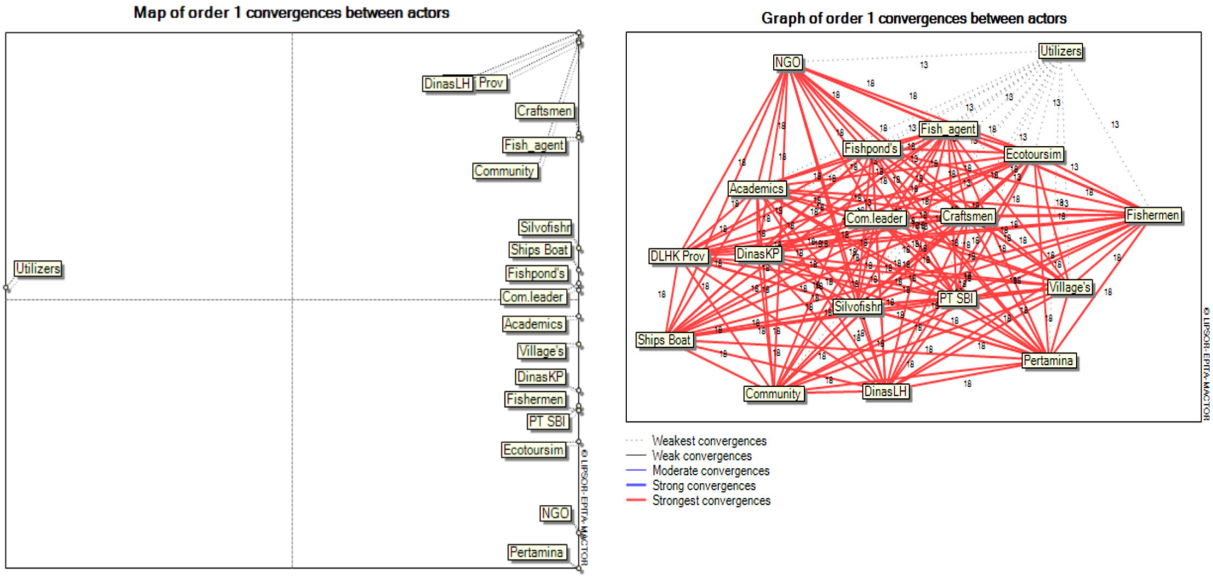


Figure 7a. Graph of convergence between stakeholders (Order 1)

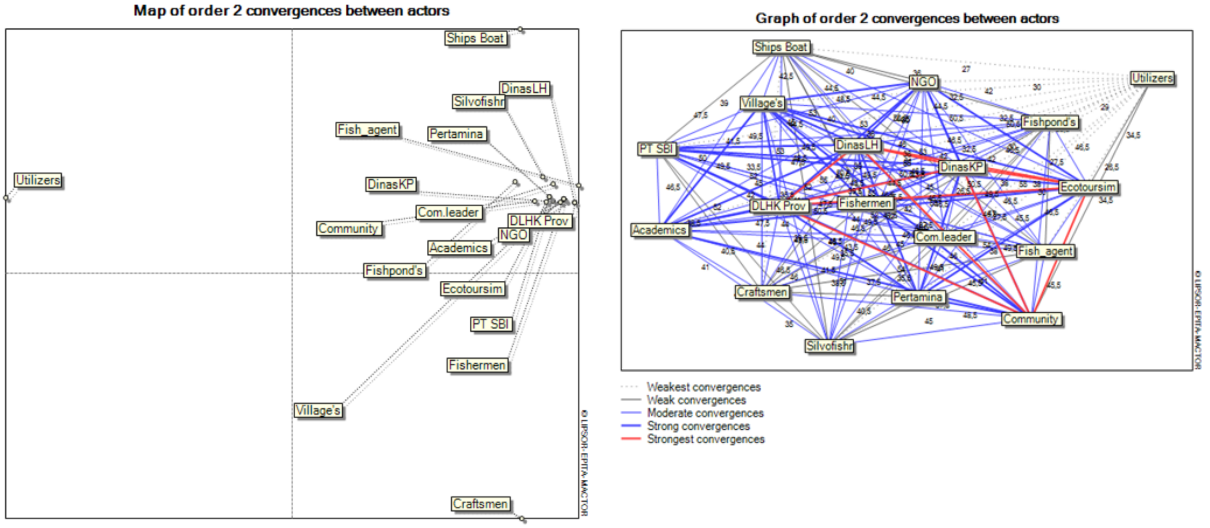


Figure 7b. Graph of convergence between stakeholders (Order 2)

level of stakeholder interest and cooperation is very strong. The stakeholder pair that has the highest value indicates the high intensity of the pair's relationship toward achieving goal dependence (Mahardika et al., 2022; Tandio et al., 2023; Wardono et al., 2019). The degree of convergence in SAL was 96.1% and the degree of convergence above 79% indicates that the possibility of conflict is relatively low (Fauzi, 2019; Mahardika et al., 2022; Tandio et al., 2023).)

Figures 7a and 7b show the strongest convergence between stakeholders in mangrove ecosystem management in Segara Anakan Lagoon, Cilacap, indicated by the red line. Starting from the Central Java Provincial Environment and Forestry Service (DLHK Prov), the Cilacap Regency Environment Service (DinasLH), the Cilacap Regency Maritime and Fisheries Service (DinasKP) to ecotourism managers (PEkowisata), and the local community (Masyarakat) indicated

3MAO	Forest	Conservs	Fish_groun	Habitat	Rehabilita	Pollution	Freshwater	Preserve	Ecotoursm	Crabs	Fishpond	Shellfish	Boats ship	Craft inov	Silvofishe	fish catch	Conversion	logging	Mobilisation
DLHK Prov	7,8	7,8	5,8	7,8	7,8	5,8	7,8	7,8	3,9	3,9	3,9	3,9	3,9	3,9	7,8	3,9	5,8	7,8	107,0
DinasLH	6,1	6,1	4,6	6,1	6,1	4,6	6,1	6,1	3,1	3,1	3,1	3,1	3,1	3,1	6,1	3,1	4,6	6,1	84,1
DinasKP	4,3	4,3	5,8	5,8	5,8	2,9	4,3	5,8	2,9	5,8	2,9	4,3	2,9	2,9	5,8	4,3	2,9	5,8	79,1
Village's	3,6	2,4	2,4	3,6	4,8	2,4	3,6	4,8	3,6	2,4	2,4	2,4	3,6	3,6	4,8	2,4	3,6	4,8	61,2
Academics	4,3	4,3	2,9	4,3	5,8	4,3	5,8	5,8	2,9	2,9	1,4	2,9	2,9	2,9	4,3	2,9	4,3	5,8	71,0
Pertamina	4,4	2,9	2,9	4,4	5,9	4,4	4,4	4,4	5,9	2,9	1,5	2,9	1,5	4,4	4,4	1,5	1,5	4,4	64,7
PT SBI	3,6	2,4	2,4	3,6	4,9	3,6	3,6	3,6	4,9	2,4	1,2	2,4	1,2	3,6	3,6	1,2	1,2	3,6	53,4
Ecotoursim	5,0	2,5	3,7	3,7	5,0	3,7	3,7	3,7	5,0	3,7	1,2	3,7	5,0	5,0	5,0	1,2	2,5	5,0	68,4
Com.leader	3,1	2,1	2,1	2,1	3,1	2,1	2,1	3,1	2,1	2,1	2,1	2,1	1,0	2,1	3,1	1,0	1,0	3,1	39,9
Fishermen	1,9	1,3	2,5	2,5	1,9	1,9	1,9	1,9	1,3	1,9	0,6	1,9	0,6	0,6	0,6	2,5	0,6	2,5	29,1
Fishpond's	1,0	1,0	1,0	1,0	1,6	1,0	1,6	1,0	1,0	1,6	2,1	1,6	0,5	0,5	0,5	0,5	1,0	1,0	19,9
Community	3,1	2,1	3,1	3,1	3,1	3,1	3,1	3,1	3,1	3,1	3,1	3,1	4,2	3,1	3,1	3,1	2,1	3,1	55,3
Ships Boat	1,4	1,4	1,4	1,4	2,1	1,4	1,4	1,4	2,8	0,7	0,7	0,7	2,8	0,7	0,7	0,7	0,7	1,4	23,9
Craftsmen	0,9	0,9	0,9	0,9	1,4	0,9	1,4	0,9	0,9	0,5	0,5	0,5	0,5	1,8	0,5	0,5	0,5	0,9	15,0
Silvofishr	0,7	0,7	0,7	1,1	1,1	1,1	1,1	0,7	0,7	0,7	0,4	0,4	0,4	0,4	1,5	0,4	0,4	1,1	13,5
Fish_agent	0,8	1,1	1,5	1,5	0,8	0,8	0,8	0,8	0,4	0,8	0,4	0,4	0,4	0,4	0,4	1,5	0,4	1,5	14,3
NGO	3,3	3,3	2,2	4,4	4,4	3,3	4,4	3,3	3,3	2,2	2,2	2,2	2,2	2,2	2,2	1,1	1,1	3,3	50,0
Utilizers	-0,8	-1,1	0,5	-0,5	0,8	1,1	0,8	-1,1	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	-1,1	12,9
Number of agreements	55,5	46,8	46,7	57,5	66,2	48,5	57,9	58,3	48,2	41,2	30,2	39,0	37,1	41,7	55,0	32,4	34,8	61,3	
Number of disagreements	-0,8	-1,1	0,0	-0,5	0,0	0,0	0,0	-1,1	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	-1,1	
Degree of mobilisation	56,3	47,9	46,7	58,0	66,2	48,5	57,9	59,4	48,2	41,2	30,2	39,0	37,1	41,7	55,0	32,4	34,8	62,4	

Figure 8. Matrix of Weighted Values of Stakeholders' Position against Objectives

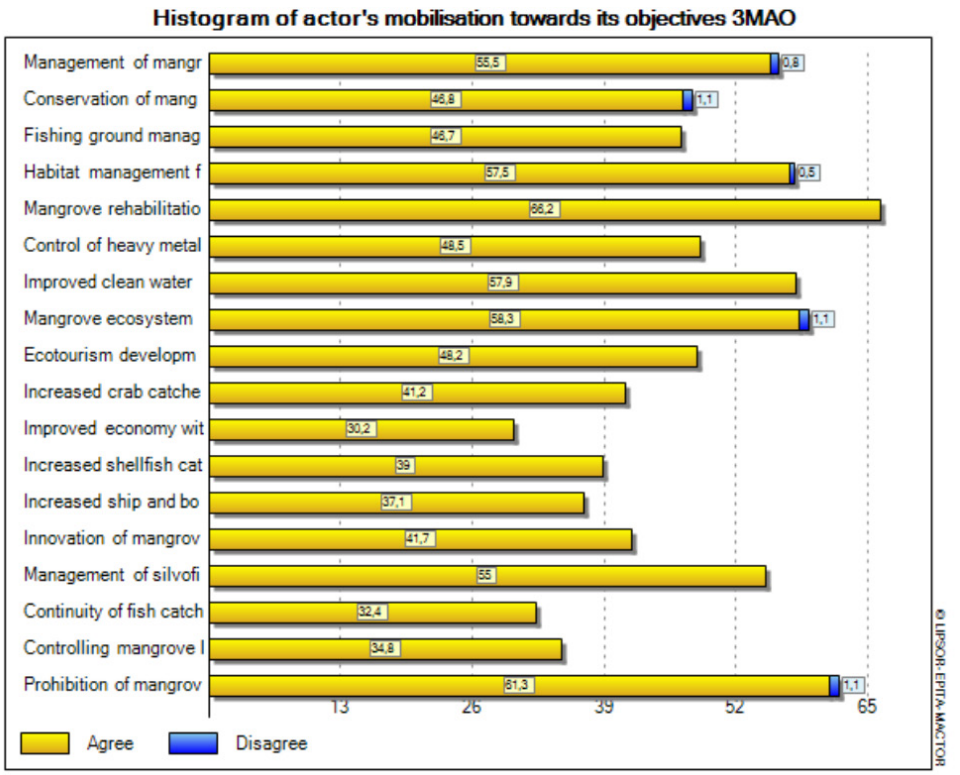


Figure 9. Histogram of Stakeholders' Mobility to Objectives

by thick red arrows with convergence values of 55.0 and 54.0 respectively. The role and participation of the community are very important in the formulation of policies by the government in management, starting from planning, implementation, and evaluation to realize sustainable management (Mahardika et al., 2022; Pace et al., 2023; Saptutyningsih et al., 2020). The role of the central and local governments is needed, especially for ecosystem user communities through extension activities, socialization, and dialogue to get input on ideas and common perceptions related to mangrove ecosystem management (Mahardika et al., 2022; Tandio et al., 2023; Triyanti & Susilowati, 2019; Wardono et al., 2019) (Figure 8).

2DAA	DLHK Prov	DinasLH	DinasKP	Village's	Academics	Pertamina	PT SBI	Ecotoursim	Com.leader	Fishermen	Fishpond's	Community	Ships Boat	Craftsmen	Silvofishr	Fish_agent	NGO	Utilizers
DLHK Prov	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	18,5
DinasLH	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	18,5
DinasKP	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	17,5
Village's	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	16,5
Academics	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	17,0
Pertamina	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	15,5
PT SBI	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	15,5
Ecotoursim	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	16,5
Com.leader	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	15,0
Fishermen	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	16,5
Fishpond's	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	13,5
Community	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	15,5
Ships Boat	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	13,5
Craftsmen	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	13,5
Silvofishr	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	14,5
Fish_agent	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	16,0
NGO	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	16,5
Utilizers	18,5	18,5	17,5	16,5	17,0	15,5	15,5	16,5	15,0	16,5	13,5	15,5	13,5	13,5	14,5	16,0	16,5	0,0
Number of divergences	18,5	18,5	17,5	16,5	17,0	15,5	15,5	16,5	15,0	16,5	13,5	15,5	13,5	13,5	14,5	16,0	16,5	270,0
Degree of divergence (%)	3,9																	

Figure 10. Weighted Divergence Value Matrix Between Stakeholders

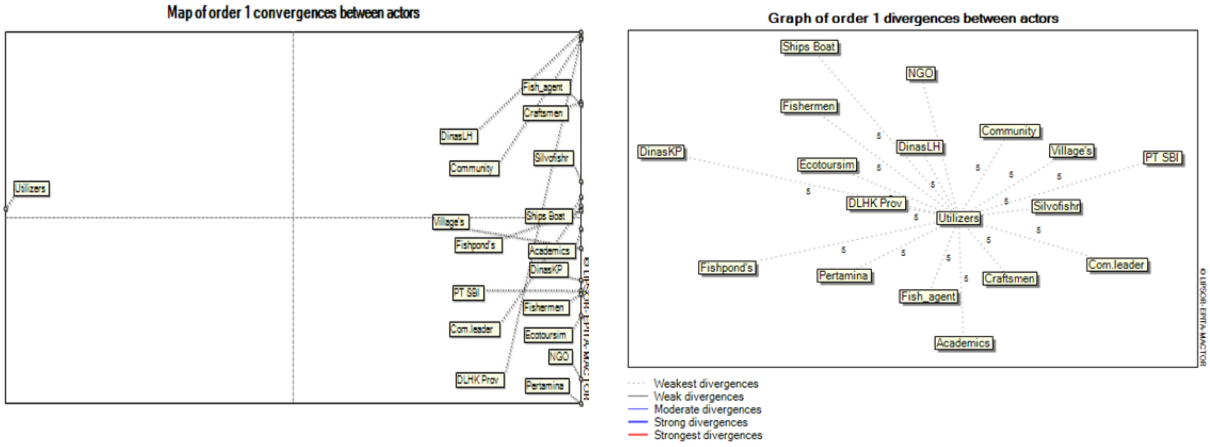


Figure 11a. Graph divergence between stakeholders (Order 1)

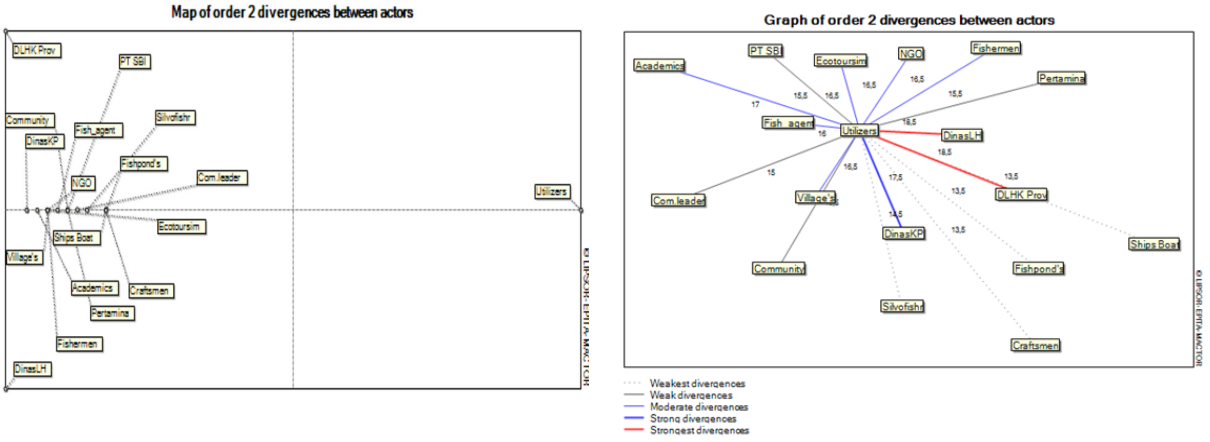
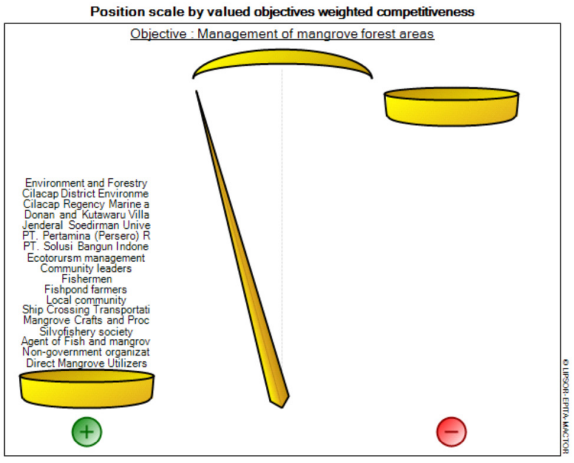


Figure 11b. Graph divergence between stakeholders (Order 2)

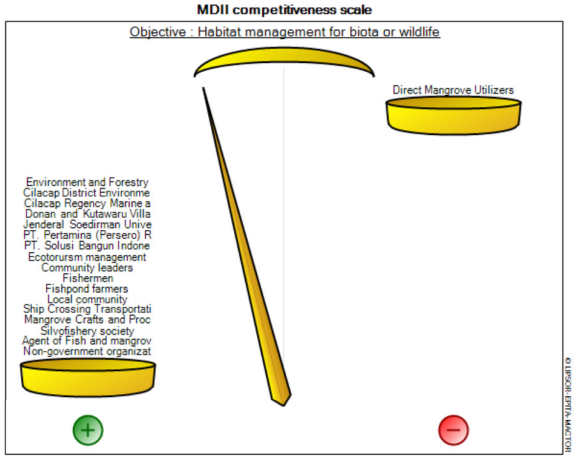
The 3MAO matrix also shows that the most active stakeholders in this activity are the Central Java Provincial Environment and Forestry Service (DLHK Prov. Central Java) and the Cilacap Regency Environmental Service (DinasLH) with mobility values of 107.0 and 84.1, respectively. The mobilization level of 66.2 (bottom row) shows that rehabilitation of the degraded mangrove ecosystem is the goal that gets the most attention from the stakeholders. This can be seen in Figure 9, where the mobilization level of 66.2 is fully supported by the agreement of the stakeholders. This is because the stakeholders feel the importance of degraded mangrove ecosystem rehabilitation (Rhblitasi). All stakeholders provide support for mangrove ecosystem rehabilitation activities in Segara Anakan Lagoon, Cilacap.

The analysis of the level of divergence between stakeholders in Figure 10 shows the level of divergence between stakeholders presented in the form of a Valued Divergence Matrix (2DAA). The highest divergence value is owned by direct mangrove users (Beneficiaries) with a value of 270.0. This indicates that direct mangrove users (Beneficiaries) have the greatest potential for conflict with other stakeholders. However, the overall degree of divergence is shown at 3.9% which indicates that there is no potential conflict from the activities of the stakeholders because the value of the degree of divergence is still lower than 20% (Fauzi, 2019; Mahardika et al., 2022; Tandio et al., 2023).

Figures 11a and 11b also show a visualization of the divergence between stakeholders. The strongest divergence occurs between the Central Java Provincial Environment and Forestry Service (DLHK Prov. Central Java) and the Cilacap Regency Environmental Service (DinasLH) with direct mangrove users (Beneficiaries) which are marked with a thick red line and the divergence value found in direct mangrove users (Mangrove users) is 18.5.



Objectives: Management of Fishing Areas; Rehabilitation of Damage to Mangrove Ecosystems; Control of Water Pollution Due to Heavy Metals, Petroleum and Domestic; Improvement of Clean Water Supply; Development of Mangrove Ecotourism; Improvement of Crab Catches; Improvement of the Pond Economy; Improvement of Shellfish Catches; Increased Revenue for Transportation and Ferry Services; Innovation in Crafts or Processing of Fishery Products; Management of Fishery Lands using Silvofishery Systems; Continuity of Catch Supply; Controlling of Mangrove Land Use Change



Objectives: Mangrove forest management, Mangrove Ecosystem Conservation, Biota or Animal Habitat Management, Mangrove Ecosystem Preservation Efforts, Mangrove Logging Prohibition

Figure 12. The influent scale of key stakeholders with objectives

E. The influent scale of key stakeholders with the objective

This analysis of MACTORs uses "scales" for each objective. The following are the "scales" for each objective presented in Figure 12. Figure 12 shows that of the 18 objectives that have been formulated, there are pros and cons among stakeholders. Thirteen objectives were fully supported by stakeholders, namely the management of fishing grounds (Catch), rehabilitation of the damaged mangrove ecosystem (Rehabilitation), control of water pollution due to heavy metals, petroleum, and domestic (Pollution), increased availability of clean water (Water Supply), development of ecotourism in mangrove ecosystems (Ecotourism), increased crab catch (Crab), economic improvement with ponds (Ponds), increased catches of shellfish (Shellfish), increased income of boat crossing transportation services (Ships), innovation of mangrove crafts or processing (Crafts), management of fishery land with silvofishery system (Silvofishery), sustainability of catch supply (Supply), and control of mangrove land conversion (Land). However, there 5 objectives that are not fully supported by stakeholders which are the management of mangrove forest areas (Forest), preservation of mangrove ecosystems (Conservation), management of biota or animal habitats (Habitat), efforts to preserve mangrove ecosystems (Sustainable), and prohibition of mangrove forest logging (Logging) (Hariyadi, 2018; Sari, 2016).

Stakeholders that support the formulated goals/objectives are the Environmental and Forestry Service (DLHK Prov), the Cilacap Regency Environmental Service (DinasLH), the Marine and Fisheries Service (DinasKP), the Donan Village and Kutawaru Village Governments (PemDes), Jenderal Soedirman University (Academics), PT. Pertamina (Persero) RU IV Cilacap (Pertamina), PT. Solusi Bangun Indonesia Tbk Cilacap (PT. SBI), ecotourism managers (Ecotourism Managers), community leaders (Community Leaders), fishermen (Fishermen), fish farmers (Cultivators), local communities (Communities), ship crossing transportation services (TransKapal), craftsmen and mangrove preparations (Craftsmen), silvofishery communities (MsySilvofi), fish collectors (Collectors), and non-governmental organizations (NGOs). Meanwhile, stakeholders who disagree with the formulated objectives are direct mangrove users (Beneficiaries). Parties that are pro to the goal have an awareness of the importance of the sustainability of mangrove ecosystems in Segara Anakan Lagoon by paying attention to activities that support the sustainability of mangrove ecosystems, while the direct mangrove users prioritize goals that lead to profit or income so that it contradicts the goal of sustainability. Utilization of mangrove areas for rice fields, ponds, and illegal logging as part of human activities to gain benefits for their survival (Fatimah et al., 2022; Hariyadi, 2018; Yulianti & Ariastita, 2012).

Figure 13 illustrates the distance relationship between objectives in mangrove ecosystem management in SAL. It can be seen that the goal of rehabilitation of degraded mangrove ecosystem (Rehabilitation) with increased water supply (Water Supply) and the prohibition of mangrove logging (Logging) with mangrove ecosystem conservation efforts (Lestari) and management of biota or animal habitat (Habitat) has the strongest relationship, which is marked with a thick red line. This shows that the goal of rehabilitation of degraded mangrove ecosystems (Rehabilitation) can support the success of the goal of increasing the availability of clean water (Water Supply). The goal of mangrove ecosystem conservation efforts (Lestari) and management of biota or animal habitats (Habitat) will support the success of the goal of prohibiting mangrove logging (Logging) (Azman et al., 2021; Datta & Deb, 2017; Murniasih, Hendarto, & Hilm, 2022; Sidik, Lawrence, Wagey, Zamzani, & Lovelock, 2023).

Figure 14 provides an overview of the relationship between stakeholders in the management of mangrove ecosystems in

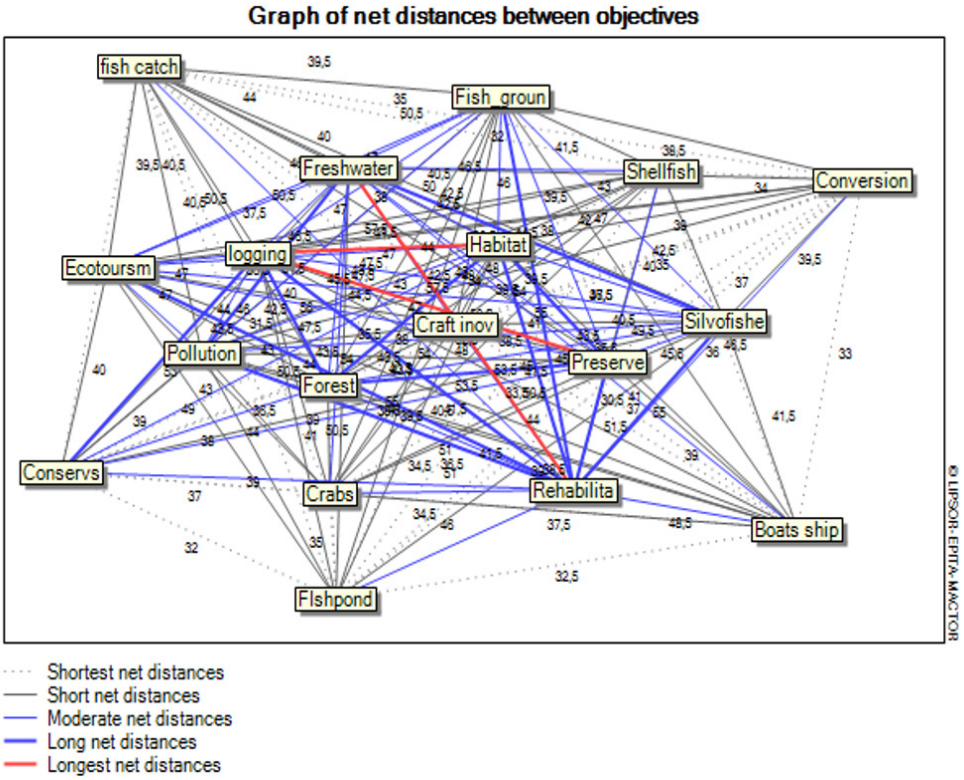


Figure 13. Graph of net distance between objectives

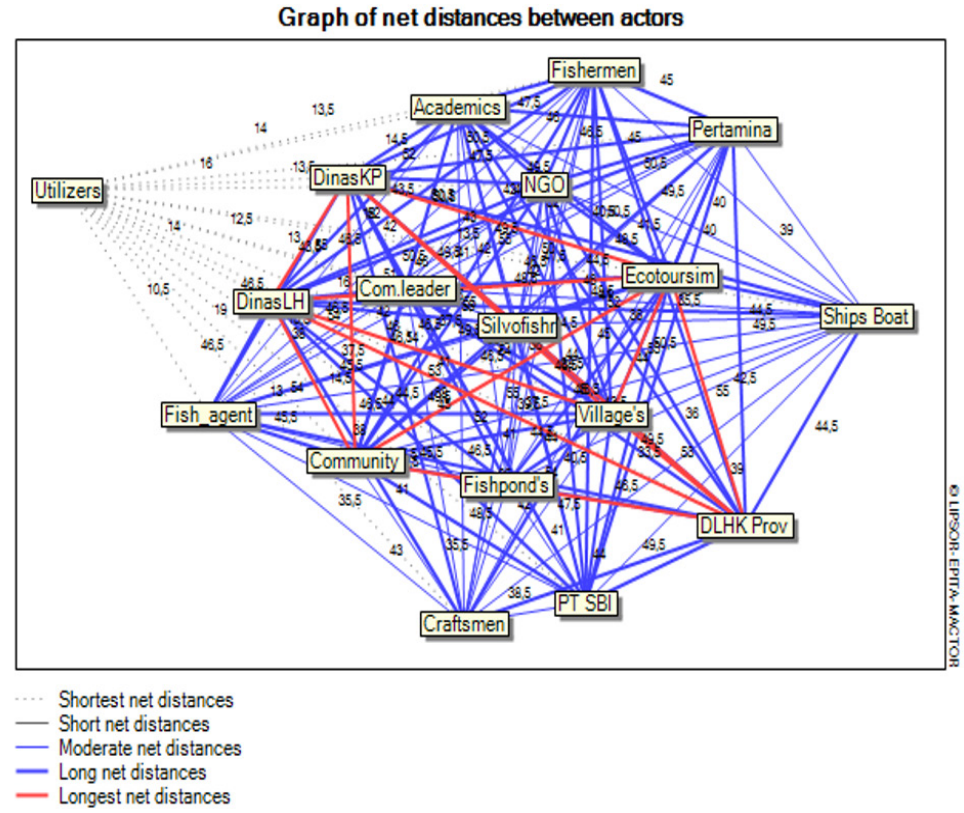


Figure 14. Graph of net distance between stakeholders

Segara Anakan Lagoon, which shows the existence of linkages between the Central Java Provincial Environment and Forestry Service (DLHK Prov. Central Java), the Cilacap Regency Environment Office (DinasLH), the Cilacap Regency Maritime and Fisheries Service (DinasKP), the Village Government (PemDes) Donan and Kutawaru, ecotourism managers (PEkowisata), local communities (Masyarakat), silvofishery communities (MsySilvofi), and the strongest are non-governmental organizations (NGOs). The relationship between stakeholders is shown with a thick red line. This shows that there is mutually beneficial cooperation between stakeholders in preserving the mangrove ecosystem in Segara Anakan Lagoon, Cilacap.

IV. CONCLUSION

Segara Anakan Lagoon, Cilacap has 18 stakeholders who have different roles in supporting the management activities of the mangrove ecosystem. The relationship between stakeholders in mangrove ecosystem management in Segara Anakan Lagoon, Cilacap is indicated by the value of the degree of convergence and divergence. The degree of convergence is 96.1% which indicates that the possibility of conflict between stakeholders is relatively small, while the degree of divergence is 3.9% which indicates the potential for conflict that can occur. The positive objectives to support mangrove conservation and management were the Management of Fishing Areas; Rehabilitation of Degraded Mangrove Ecosystems; Control of Water Pollution Due to Heavy Metals, Petroleum, and Domestic; Improvement of Clean Water Supply; Development of Mangrove Ecotourism; Improvement of Crab Catches; Improvement of the Pond Economy; Improvement of Shellfish Catches; Increased Revenue for Transportation and Ferry Services; Innovation in Crafts or Processing of Fishery Products; Management of Fishery Lands using Silvofishery Systems; Continuity of Catch Supply; Controlling of Mangrove Land Use Change.

Based on the role of stakeholders, the mangrove ecosystem management in Segara Anakan Lagoon, Cilacap requires the big role of the Central Java Provincial Environment and Forestry Office, the Cilacap Regency Environment Office, the Cilacap Regency Marine and Fisheries Office, and the Donan Village and Kutawaru Village Governments as the key stakeholders; meanwhile, Jenderal Soedirman University, PT. Pertamina RU IV Cilacap, and PT. Solusi Bangun Indonesia Tbk. Cilacap, as the supporting stakeholders to support mangrove conservation in Segara Anakan Lagoon, Cilacap, also plays big roles in the SAL mangrove ecosystem management.

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