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Original research article

Mapping Resource Conflicts Based on Land Use and Land Cover Data in Kaledupa Island Marine Conservation Area of Wakatobi National Park

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ABSTRACT

Impact conflict social in a conservation area is generally more significant in the islands minor because competition limits space and resources. Objective study This is a complete stakeholder analysis of the interests (stakeholders) involved in the utilization of land and resources in nature. Data used in studies mapping conflict social This consists of two types, namely qualitative data related to the existence of the stakeholder's interests and spatial data. Qualitative data obtained from studies literature results in research, observation field, and interviews deep with the critical actor (*key actor*). At the same time, spatial data is an Island LULC Kaledupa 2016 (result in classification guided Landsat 8 imagery OLI), and derived MSP from map topography island (result in SRTM data analysis). Utilization stakeholder resource nature and management area on the Island Kaledupa shared into five categories: authority manager area conservation, Institution Central Government (Ministry of Maritime Affairs and Fisheries), government area Wakatobi, social economy local, and nongovernmental organizations. Mapping conflict utilization resource nature and management area on the Island Kaledupa is beneficial in formulating input consensus policy among all stakeholders.

Introduction

Management area conservation is frequently confronted with various interests from stakeholders (good in a manner individual or group) in utilizing resource nature, raising social conflict

(Bragagnolo *et al.*, 2016; Vucetich *et al.*, 2018). Yasmi *et al.* (2006) and Bragagnolo *et al.* (2016) said that appearance conflict in development conservation because of stakeholders with different interests, values, influence, perceptions and goals. Temporary that

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according to De Pourcq *et al.* (2017), conflicts that generally occur between manager conservation and other related stakeholders with lots of factors, including transfer forced other interests (Schmidt-Soltau 2009), ignoring aspect social (Vedeld *et al.*, 2012); process participle underprivileged community (Lele *et al.*, 2010; Brondo & Bown, 2011); denial ancestral territorial rights (Brondo & Bown, 2011); restrictions priority use resources (Torri, 2011); impact negatively from conservation to public local (Brockington & Schmidt-slot, 2004); impoverishment from various aspects (Brockington *et al.*, 2006). The conflict that needs to be handled with Good can and does for a long time cause conservation which is not effective (Madden & McQuinn, 2014).

Conservation or protected area (PA) is something from priority management protection diversity biological or prevent happening scarcity resource nature. Globally, conservation is an essential instrument for protecting biodiversity and conservation of landscape culture (Lockwood *et al.*, 2006; Jepson *et al.*, 2011; Watson *et al.*, 2014; Bragagnolo *et al.*, 2016). Function conservation moment This has experienced an expansion concept, from protecting intact resources to a multi-purpose for maintaining a functioning ecosystem and supporting the local economy (Watson *et al.*, 2014). Draft This applies to terrestrial habitat conservation and protection of the sea (Torn *et al.*, 2007; Liu *et al.*, 2014; Masud *et al.*, 2017). With this, dimensions man no can be separated in management conservation (Bennet *et al.*, 2017). Sowman and Sunde (2018) said that the dimensions of man in the natural protection resource are essential for supporting conservation success.

The impact of conflict social in a conservation area is generally more significant in small islands because competition limits space and resources

(Novy-Hildesley, 2001; Aretano *et al.*, 2013; Bragagnolo *et al.*, 2016; Calado *et al.*, 2016). Pressure use of land, poor spatial planning and various use room limitations have often been shown to trigger conflict locally on the island small (Eadens *et al.*, 2009; Lagabrielle *et al.*, 2009; Brown & Raymond, 2014; Bragagnolo *et al.*, 2016). Island Kaledupa, as Wakatobi National Park (WNP), is a vulnerable area happening potential conflict social in the use of land and use resource nature and area. Besides that, there is a level of constraints taker policy; remember there are two authorities strong who have authority in the arranged area, namely the Wakatobi National Park Agency and the Government Regency Wakatobi (Adimu *et al.*, 2017; Adimu *et al.*, 2018).

Clifton and Majors (2012) explain that minimizing conflict local in the conservation program at WNP is necessary to emphasize approach participatory and collaborative to management source power. Clifton (2013) confirms management area. This considers lens culture public customs and ethnicity minorities like the Bajo community must always be involved. Understanding the position of social and mapping distribution spatial Island Kaledupa with different potential conflicts can give information important for planning conservation, facilitating communication and collaboration between taker decisions and stakeholder's interests (Kwaku Kyem, 2004). With spatial representation, conflict zone development conservation can be identified and visualized spatially with more ok.

The objective study does a stakeholder analysis of the interests (stakeholders) involved in the utilization of land and resources. Nature on the Island Kaledupa analyzes form coalition and identification conflict between stakeholder's interests and map conflict social based on land use land cover

(LULC) and simple models island (MSP).

Methods

Data and collection

Data used in studies mapping social conflict consists of two types, namely qualitative data related to the existence of the stakeholder's interests and spatial data. Qualitative data obtained from studies literature results in research, observation field, and interviews deep with the key actor (*key actor*) while spatial data is an island LULC Kaledupa 2016 (result classification guided Landsat 8 imagery OLI), and derived MSP from map topography island (result in SRTM data analysis).

Stakeholder analysis

Stakeholder analysis in the study This adopts the method of Bragagnolo *et al.* (2016). The analysis is divided into three stages. Stage first, identification actor key refers to the organization, private or the public, can influence or be influenced by related decisions with determination and management of WNP.

All organizations, government or non-government private sector, and selected associations must own office representatives or touch directly with utilization island resources and territories Kaledupa. Stage second classification divided actors into five groups: Balai WNP (*Park authority*), agencies centre, agency government area (*Local authorities*), sector economy, and nongovernmental organizations. Stage third is to conduct a semi-structured interview to actor keys from stakeholders.

Identification of cooperation and conflict

Cooperation and conflict between stakeholders are carried out with identification form linkages and relationships between one stakeholder with others in utilization (LULC) and natural management conservation resource in a manner discursive, practical, and material manner. Search This generated what and how to form cooperation and what and where conflict between stakeholders. Identification this done with the help of device ArcMap 10 software.

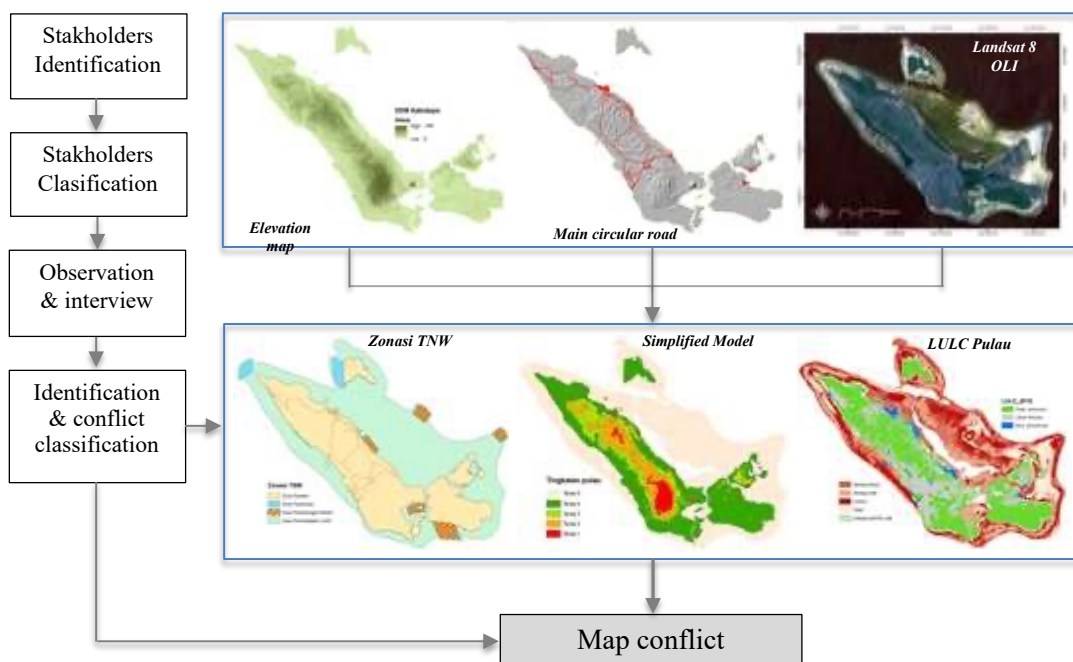


Figure 1. Mapping flow conflict utilization resource natural Island Kaledupa

Mapping conflict

Mapping conflict social events in the WNP area, especially on the island of Kaledupa, with the method converting qualitative data results from observation and interview actor key into spatial data. This way, adopt the method used by Bragagnolo *et al.* (2016). Analysis results qualitative mainly used to (1) identify space that has overlapping the most utilization; (2) coverage type and level conflict; (3) conflict mapped with analysis overlay the use device ArcMap 10 software, with LULC input, island boundaries, and linked with MSP, as a formed island because appointment reef coral (*uplifted coral*).

Results and Discussion

Island stakeholder identification results Kaledupa there are 13 that consists of WNP Center (S1), *Coral Reef Rehabilitation and Management Program* (CORE MAP) (S2), Local Government Wakatobi (S3), Navy (S4), *Hoga Resort* (S5), *Pulo* and Bajo Communities (S6), Fishermen (S7), Farmers Grass Laut (S8), *World Wide Fund for Nature* (WWF) (S9), *The Nature Conservancy* (TNC) (S10), PT. Mitra Wallacea Indonesia (S11), Kahedupa Forum Toudani (Forkani) (S12), and Sara Customary Institution (S13). Stakeholder classification can be seen in Table 1.

Form cooperation between stakeholders

Management involving various stakeholders will intertwine something connection good cooperation, with the condition that they own objective or the same vision, as well as trust and effective communication between them (Cvitanovic *et al.*, 2018). Based on the pattern overlay analysis room by the duties and functions of each stakeholder, the utilization room is the most found in core 5 (SWMH).

All stakeholders have an interest utilization or management of resource

nature at sea. Utilizing much space in the sea brings up stakeholder collaboration discursive, practical, and material (Middelveld, 2012). Schleicher (2018) said strategic suitable conservation needs involve non-government stakeholders through concession conservation. Form existing collaboration between stakeholders as follows:

- First, fishermen fueled and bubu with WNP and local government. Organization conservation acknowledges and agrees that activity fishermen have no dangerous practice, so they are permitted in reef areas, particularly in the local utilization zone (ZPL). In other words, the parties are authorized to accept fishermen and equipment used.
- Second, unscrupulous local government and fishermen bomb. Middelveld (2012) said fishermen bomb only capable of creating and using bombs If they Can get fertilizer cages, axes and matches fire to Wakatobi. Since Wakatobi became a district, inspection and supervision to material bombs the more increased, so needed good relationship between the official government and fishermen bomb for import material bombs can success.
- Third, TNC and WWF. Connection's second organization is mighty since the conservation program started in a manner together. *Kindly discursive*, TNC collects scientific data and conducts patrol corals, while WWF presents this data to resident local, organization conservation others and the government in advice and education forms (Middelveld, 2012). TNC and WWF use the exact words for the protection of reef corals and resources coast others, as well as activities related to maintenance meetings, workshops and Education together. Their names have become one in form TNC-WWF, and they

Table 1. Classification of stakeholders

Group	Influence and interests
WNP Hall (S1)	Actors who have great power in taking decision management, good planning, implementation, and WNP supervision. WNP Hall is an agency under the Ministry of Environment Life and Forestry.
Ministry of Maritime Affairs and Fisheries (S2)	Actors who have the strength significant for carrying out protection, rehabilitation, and management programs for reef corals and ecosystems related in a manner sustainable, as well as increase the well-being of the public coast. This institution is COREMAP, an extension hand from the Ministry of Maritime Affairs and Fisheries (KKP). This institution does not give influence direct to taking decisions by WNP management. System management applied is a Protected Area Sea (DPL).
Government area (S3-S4)	Actors with strength in progress, responsible answers on spatial planning implementation supervision, management fisheries and maritime affairs, and developing tourism. The government area's authority is essential in permitting the private sector to enter and set up businesses on the island. In the study, This government area shared became the Office of Public Works and Spatial Planning, the Office of Maritime Affairs and Fisheries, and the Office of Tourism Wakatobi.
Local Socio-Economy (S5-S8)	Actors who do not own influence direct take WNP's decision. However, existence in the utilization of resources, nature and landscapes is an actual result of park management. The actor comprises sectors engaged in tourism, aquaculture grass the sea, the fishermen, and the development of residential areas (esp public <i>pulo</i> and Bajo communities) that use land on mainland islands or waters.
Associations and nongovernmental organizations (S9-S13)	Actor, The institution's international and local roles are essential in helping WNP management. Although No own influence directly takes WNP's decision, the actor's actor always gives input from the study's academic condition resource nature. The actor is also a mediator between WNP managers and with public local, in particular, giving awareness to pubic-related importance effort conservation.

share an office for strengthening Work The same them (Middelveld, 2012).

- Fourth, TNC-WWF and TNW. *Kindly discursive*, TNC-WWF supports WNP activities in the protection resource coast, for example, explaining and educating the local public about new related effort conservation policy. TNC-WWF is active in educating WNP about How to arrange patrol and handle various violation corals (Middelveld, 2012). *Materially*, the activities of TNC-WWF and TN share Lots of source power like ships and equipment dives. Things This forms a material relationship between the second organization. *Kindly practice* these stakeholders' Work in monitoring resource coastal and surveillance patrols region and publish their data together (Middelveld, 2012).

- Fifth, Sara and Forkani form strong cooperation with TNC-WWF and WNP. *Kindly discursive* stakeholders' interests. This same goal is for protecting reef corals and resources on the other coast; however, in a manner practice, they are different in their effort to protect the resource coast. Sara is very consistent with the perpetrator mining coral. If found perpetrator, then Sara will confiscate boat miners and equipment (Middelveld, 2012). TNC-WWF delivers warnings and Education only when they meet miners in the no-go zone take. FORKANI mainly deal with the bomb fishermen and delivers awareness to them, fishermen. This is about the negative impact of the bombing.
- Sixth, the Navy and TNC-WWF. *Kindly discursive*, TNC-WWF

provides Education to force the sea about methods to handle violation destruction of resource coast (Middelveld, 2012). *kindly practice*; stakeholders interested in this do patrol together. *Materially*, they share boats and resources power other during patrol.

- Seventh, TNC-WWF and COREMAP. The connection between these stakeholders needs to be stronger. COREMAP primarily Work Alone to protect reef coral. *Kindly discursive*, WNP, TNC-WWF, COREMAP, and the government own that purpose reef coral needs protection based on scientific results (Middelveld, 2012). *kindly practices and materials*; they agreed about using the reef as a friendly coral environment, objects that can be used, and which location can be utilized. *Kindly practical* Work The same they Still shallow Enough, including when concerns distribution of information and work the same in issues similar, as well as method work on monitoring and patrolling. COREMAP relies on the local people they know to educate, while TNC-WWF and TN did monitoring and patrolling alone (Middelveld, 2012).
- Eighth, the international organization only own tight connection with government area. *Secara practical and material*, the government receives funds from international organizations to increase society's eye livelihood and protect the ecosystem coast (Middelveld, 2012). *Kindly discursive*, the government usually takes an organization's idea internationally to maintain connection and helpful finances with them (Middelveld, 2012).

Identification of conflict between stakeholders

Based on the results of identification and analysis of designation overlap space and resources, Nature on

the Island Kaledupa found that conflict between many stakeholders occurs in coastal areas, particularly utilization of ecosystem reef coral and coastal habitats. The conflict between stakeholders occurs in a manner discursive, practical, and material (Middelveld, 2012), as follows:

- First, tour operators and bubu fishermen. *Kindly discursive*; these stakeholders own different views about tool bubu tang (Middelveld, 2012). Fishermen think that their bubu use No damage reef reefs, while tour operators evaluate traps placed in the area reef coral cause coral break and generally material to cover the bubu-used coral that causes reef coral break.
- Second, fishermen bomb tour operators and organizations conservation (TNW, TNC-WWF, COREMAP). *Kindly discursive*, organizational conservation and carrier states that fishing with bombs causes damage reef very severe corals (Middelveld, 2012). At the same time, fisherman bomb thinks that activity like That can fish fast with excellent results. *Kindly practical*, conflict This is related to utilization space. Fishermen bomb fish bomb in the area reef remote, which tourists do not use; however, in practice no, there is a distribution room between locations between fisherman bomb tourists. WNP is always with TNC-WWF do patrol to fishermen do fish bombing routine or in a manner incidental based on a report from the public local or tour operator kindly matter, bomb fish, not by tool friendly catch environment (Middelveld, 2012).
- Third, fishermen bomb to fisherman others (Middelveld, 2012). *Kindly discursive*, fishermen other evaluate the use of the bomb as a method of fishing that destroys coral habitats or ecosystem others. Meanwhile, fisherman bombs do not realize that

they harm fishermen other. Kindly practically the affected location bomb will damage severely and diminish room life for fish. Materially, fishermen use tools to catch those who do not damage the environment. Meanwhile, fishermen bomb to destroy fish habitats (Middelveld, 2012).

- Fourth, person government areas and miners coral to organization conservation (Middelveld, 2012). kindly discursive, local government and organizations conservation choose perception The same that mining coral is destructive activity reef coral so that must be terminated. However, in a manner practically, the local government did not adopt interview conservation, where they became buyers of coral biggest from miners (Middelveld, 2012). Organization conservation pushes the government to stop the purchase of coral mines by reducing requests will coral, reducing mining and developing solutions for miners. Conflict This is about coral mining and the practice of mining coral (Middelveld, 2012).
- Fifth, WNP and TNC-WWF towards COREMAP and DKP (Middelveld, 2012). TNC-WWF and TNW entered an MOU with COREMAP and DKP to share information with hurry up and open budget to see who can arrange type protection for the park. However, division information strolls (from COREMAP to TN and TNC-WWF) and must go through procedure bureaucracy before being given to TNW or TNC-WWF (Middelveld, 2012).
- Sixth, COREMAP with local government and TNW. Based on GIS analysis, DPLs overlap (DPL Lambeau highway to the west of the island Hoga) with *dive spots* (tours of nautical diving). Kindly discursive, DPL and tours nautical own different purposes. In practice, DPL is a protection zone full of resource coast, so no activity besides research is permitted.
- Seventh, COREMAP with public local (esp farmer grass sea) and local government. There are two overlapping DPLs overlapping with location cultivation grass worked sea society. DPL focused on protecting reef corals and resources coast important other. Temporarily the same room as Sombano and Tanjung DPL Langge fits perfectly for be used For cultivation of grass sea, so public locals do cultivation in the same location.
- Eighth, the Bajo community with TNW, TNC-WWF, and COREMAP. Lynch (2017) said the Bajo community actively reject WNP policy and organization conservation other. They claim that policy conservation limits access to resource natural as a need to live life and value culture. The livelihoods of the Bajo community are often not considered in planning and implementing conservation programs (Lynch, 2017), so the Bajo people will keep going and occupy a role peripheral in water conservation, weakening protection policies and programs resource nature (Clifton & Majors, 2012).
- Ninth, society local (*pulo* and bajo) with TNW, TNC-WWF. Cragg and Hendy (2010) said the public locally cut down mangrove tree species *Bruguiera gymnorhiza* for use as wood burn, large tree diameter *Rhizophora apiculata* cut For board House community, fish fence (tool catch traditional) made with cut puppies mangrove trees (especially *buggier*), and the manufacture of roofs made of raw mangrove species palm. Activity public like this is contrary to effort conservation,

especially again utilization of deep mangrove trees scale extensively.

Mapping conflict utilization resource nature and management area

Conflict utilization resource nature on the island Kaledupa is mapped based on three primary data sources: (1) island LULC Kaledupa which is the results classification guided 2016 OLI Landsat 8 imagery; (2) simple models lowered islands (MSP). From map topography, composed of 4 terraces of land area and one terrace of water area, which SWMH limits; (3) maps WNP and COREMAP zoning that differentiate protection zones and utilization zones other. Conflict is categorized as being three levels that are high, medium, and low.

Based on the results search various result research in WNP, observation field, and interviews with actors, the key obtained is that lots of conflicts happen in the waters area (terrace 5). All stakeholders are interested in utilizing

and managing resources in coastal areas and exceptionally shallow aquatic habitats. On terrace five, there is also a settlement of the Bajo community (same bahari, mantigola, and logos). Conflict in this area is categorized as high. On terrace 4, there is a conflict utilization of mangrove forests between society and organization conservation. Conflict in the area This is classified at a medium level. Temporarily, on terraces 1-3, its utilization is already clearly arranged in the regency RTRW Wakatobi. The conflict between stakeholders in the area has yet to be found. WNP, COREMAP and organization other conservations do not set and set mainland island as a protection zone. Core conflicts 1-3 are categorized as low. Mapping conflict did after the determination of category conflict in accordance with space. Mapping conflict is done with the help of the device ArcMap 10.3 software. Mapping results in conflict utilization resource nature and management area Island Kaledupa presented in Figure 2.

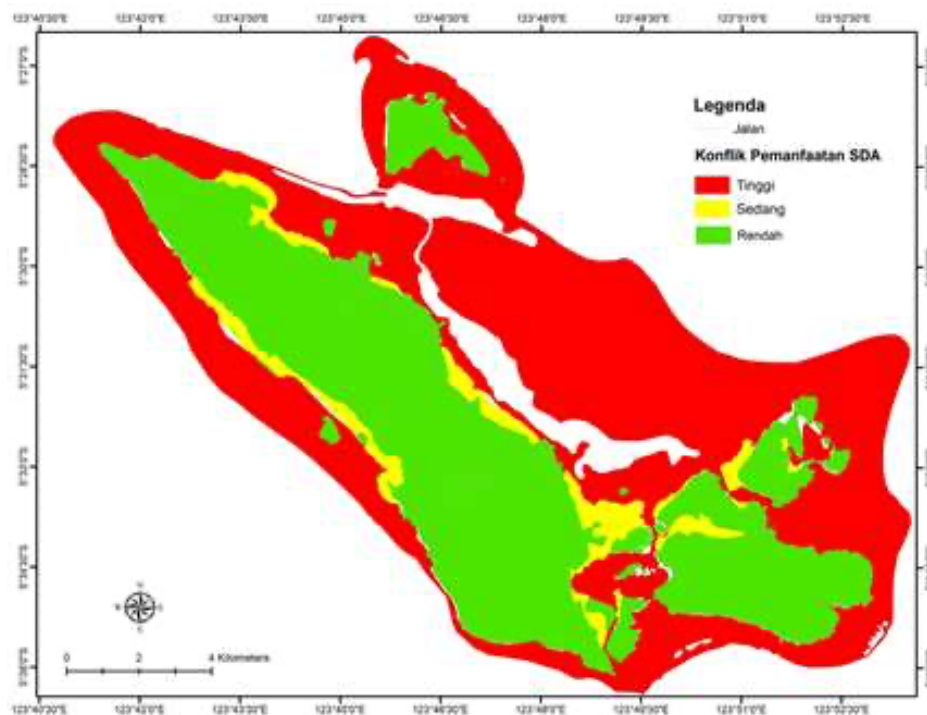


Figure 2. Conflict map utilization resource nature and management area on the island Kaledupa

Conclusion

Utilization stakeholder resource nature and management area on the Island Kaledupa shared into five categories that are authority manager area conservation, Institution Central Government (Ministry of Maritime Affairs and Fisheries), government area Wakatobi, social economy local, and nongovernmental organizations. Kindly detail stakeholder consists of 1, namely the WNP Office (*park authority*), the *Coral Reef Rehabilitation and Management Program* (COREMAP), the Regional Government Wakatobi, Navy, Hoga Resort (tour operator), Pulo and Bajo Communities, Fishermen, Farmers Grass Laut, *World Wide Fund for Nature* (WWF), *The Nature Conservancy* (TNC), PT. Wallacea Indonesia Partners, Kahedupa Forum Toudani (Forkani), and the Sara Customary Institution. Every stakeholder has interests and influences that are the same as well as different, so that form cooperation and emergence conflict between them.

Use LULC map, simple model island (appropriate morphogenesis island), protection zone area, perfect for map conflict. Conflict map This can be done with the help device ArcMap 10.3 software or other GIS software. Mapping conflict utilization resource nature and management area on the Island Kaledupa is very useful as formulation input consensus policy between all stakeholders.

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