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Spatial conflict and priority for small-scale fisheries in near-shore seascapes of the Central Coast Vietnam

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In near-shores of Vietnam, there are increasing spatial conflicts among different fishing gear operators as a result of declining and overfishing of small-scale fisheries recently. A challenge facing both small fishers and local governments is identifying more appropriate marine resource governance and public policies to deal with conflicts in the interests of short-term economic feasibility as well as long-term sustainability. This study presents perceived spatial conflicts and priorities in the near-shore seascape of Hoai Nhon district (Binh Dinh, Vietnam). Participatory GIS and questionnaires for local fishers were used to collect data on fishery resources, spatial seascape, spatial conflicts and priorities. Likert scale's weighted mean (wMean), and consensus measure (CnS) were applied to rank spatial conflicts and priorities. The results show that, conflicts among fishing gear operators were ranked at the high level, and no conflict was really serious. The highest conflicts were between trawl operator and others, particularly with baby lobster trap in rocky-reefs. Trawl operations were ranked the lowest priority because of its serious negative impact on fishery resources and other fishing gears. Sustainable fishery management for study area requires the comparative analyses about spatial conflicts before making implementation. A marine spatial planning (MSP) or an integrated spatial planning (ISP) at local scale is considered essential for the study area by focusing on the result of ranking priority of fishing gear operators over each small spatial marine area.

Key words: Spatial conflict, spatial priority, small-scale fishery, seascape, marine spatial area, Central Coast Vietnam.

INTRODUCTION

The Central Coast Vietnam encompasses 9 coastal provinces and cities (from Thua Thien- Hue province to Binh Thuan province), and are well placed for marine tourism, fishery, marine transportation, and urban

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development, which makes a considerable contribution to the national and regional economies (Le et al., 2012). Marine economic sectors have the annual average GDP growth of 11.6% during 2007-2012 (CRDF, 2015). The region has the advantage for fishery development depending on a long coastline (1,430 kilometres, almost half of Vietnam coastal line) (Le, 2008a), and a considerable amount of high commercial value marine species as mackerel, tuna, snapper, grouper, squid, shrimp, crab, seahorse, holothurian, and etc. (Le et al., 2012; CRDF, 2015). The regional fishing output in 2013 was about 776,000 tons, accounted for about 28% of the total fishing production of Vietnam (CRDF, 2015). However, as the Central Coast Vietnam has a narrow continental shelf, fishing is concentrated in the near-shore areas (Le, 2008a, b). Demand for fishery outputs, which has exceeded the capacity of near-shore areas to satisfy all of the demands instantaneously, is causing spatial conflicts among fishing gear operators. This lead to serious problems as overfishing, degradation of coral reefs and other important near-shore habitats, coastal and marine pollution, and others, which could challenge sustainable development at both regional and local scales.

Both conflict and priority in small-scale fisheries are complicated by multiple threats, multiple jurisdictions and scales, multiple stakeholders and perspectives (Coffey and O'Toole, 2012). The conflicts focused on problems that need to change (Bennett et al., 2001), and generally have negative signification (FAO, 1998). The development of small-scale fisheries has threatened coastal and marine habitats and ecosystems because the sharing and contribution of resource benefits in small-scale fisheries are influenced by social factors in the past, which could generate conflicts in many sectors such as tourism, aquaculture, agriculture, energy, mining, industry, and infrastructure developments (FAO, 2015). Conflicts among stakeholders are often expressed in three scales: communities, coastal area, and individual communities. The demands of social information about marine fishery conflicts are available to identify priority issues for the purpose of management (Lina et al., 2015). Conflicts and priorities can be resolved by the detection of values and interests (Burroughs, 2011), knowledge and interpretation of facts (Bruckmeier, 2005). Understanding the complexity and heterogeneity of conflicts plays an important part in resource rational uses and environmental protection (Hirsch et al., 1999; Buckles and Rusnak, 1999).

A number of research studies stressed the importance of identifying spatial conflict and priority in spatial planning generally, in marine and coastal spatial planning particularly. To resolve spatial conflicts among resource users, substantial numbers of important tools and policies have been integrated to marine management: creating planning systems (Gresch and Smith, 1985), spatial priority and policy recommendation (Tuppen and Thompson, 1994), prioritization spatial conservation in the context of climate change (Carissa et al., 2009; Benis et al., 2011; Frederico et al., 2013), integrated environmental analysis in spatial conservation prioritization (Mao et al., 2009; Seyedeh et al., 2012). Tuda et al. (2014) applied marine spatial planning (MSP), geographical information systems (GIS) and multi-criteria decision analysis (MCDA) to conduct maps of conflict hotpots in Kenya. The study results expressed that the successful of future planning depends on the identification of the conflicting parties, the adaptation of multi-use decision making, and the development of allocation planning with existing basic knowledge. Christian et al. (2014) ranked the spatial conflicts by using multi-criteria analysis (MCA). The addition in spatial indicators and value standards allowed simply responding the rapid changes of conflict areas. The results show that, emergences of most expose areas were useful in strategic planning; moreover, integrated approaches in identifying spatial conflicts aim to manage efficiently the overlapping demands in coastal areas.

This study identifies the best practice for inshore fishery management basing on studying the conflict and priority spatially for small-scale fisheries in a case study of HoaiNhon district's near-shore (BinhDinh, Vietnam). Data was collected by using participatory GIS (for spatial seascape mapping) and questionnaires (for investigating perception of conflict and priority) completed by selected local fishers. Data was processed in Likert scales in order to detect significant conflicts and conduct reasonable priorities in fishing gear operators in each spatial marine area.

DATA COLLECTION

Participatory GIS and questionnaires

Data on marine resources, entire seascape and small spatial marine areas, conflicts and priorities was collected by using the participatory GIS and questionnaires for local fishers. The local governments were responsible for organizing the meetings, selecting the most experienced fishers who have over 15 years' experience in fishing. There were 6 completed meetings which had about 10-15 participants. During meeting, participatory GIS was considered available for representing spatial knowledge of local fishers in the forms of a two-dimensional map. Spatial learning, discussion, and information exchange were implemented as follows: firstly, the spatial characteristics of seascape pattern were presented to all local people basing on a printed satellite image map; each people then was invited to share their knowledge about spatial seascapes, marine resources, and existing fishing gears to others in the meeting; they finally drew directly on the map. After meetings, the draft of seascape map was reviewed by fieldworks and using Global Positioning Systems (GPS) during a boat trip around near-shore.

A total of 72 questionnaires were completed with the aim of inventorying the perception of conflicts and priorities over the seascape. As shown in the Table 1, questionnaire consists of three

Table 1. A conflict and priority matrix in questionnaires.

Priority	Conflict	Pu	Tr	Gi
[1]-[2]-[3]-[4]-[5] Reason:………	Bl	[1]-[2]-[3]-[4]-[5] Reason:…………….	[1]-[2]-[3]-[4]-[5] Reason:…………….	[1]-[2]-[3]-[4]-[5] Reason:…………….
[1]-[2]-[3]-[4]-[5] Reason:…………….	Pu		[1]-[2]-[3]-[4]-[5] Reason:…………….	[1]-[2]-[3]-[4]-[5] Reason:…………….
[1]-[2]-[3]-[4]-[5] Reason:…………….	Tr			[1]-[2]-[3]-[4]-[5] Reason:…………….
[1]-[2]-[3]-[4]-[5] Reason:…………….	Gi			

Table 2. The Likert-type scale response anchors for conflict and priority.

Response scale		1	2	3	4	5
Intervals (five-level	Level of influence	Not at all influential	Slightly influential	Somewhat influential	Very influential	Extremely influential
Likert item)	Priority level	Not a priority	Low priority	Medium priority	High priority	Essential

Source: Vagias (2006).

Table 3. The Likert scale for data analysis.

wMean	Conflict	Priority
1,000 - 1,499	Not at all influential	Not a priority
1,500 - 2,499	Slightly influential	Low priority
2,500 - 3,499	Somewhat influential	Medium priority
3,500 - 4,499	Very influential	High priority
4,500 - 5,000	Extremely influential	Essential

Source: Vagias (2006).

similar matrices for three different small spatial marine areas. The respondents were asked to select pairs of conflict and rank it by checking an appropriate number of five-level Likert item. As a result, a total of 10 conflict pairs among baby lobster trap (Bl), purse seine (Pu), trawl (Tr) and gillnets operators (Gi) were conducted. By the way, they were invited to explain the reasons of their choices. Five-level Likert item used in questionnaires was based on Likert-type scale response anchors introduced by Vagias (2006): conflict is divided into five levels (from 1 to 5) according to the signification negative impacts among fishing gear operators. For examples, respondents took their choices about conflict as follows: option "1"indicates "not at all influential", or option "5"means "extremely influential". The same response scale was raised in priority. Priority for a fishing gear indicates anessential rating of that; therefore, the highest level shows that a fishing gear must be dealt with before others, and vice versa. In this study, priority was ranked from mark "5" (the highest level, or "essential") down to mark "1" (the lowest one, or "not a priority") (Table 2).

Ranking conflict and priority

As shown in Table 3, weighted mean (wMean) was first used to rank the conflict and priority; standard deviation (StD) and consensus measure (CnS) then were applied to check how spread out data is.

(-) *Weighted mean* (wMean) shows average value as the sum of the values divided by the number of values. It is calculated based on all obtained data, therefore is affected by unusual and extremely high or low value. wMean is used for grouping collected data from the individual perceptions and ranking quality in five or seven levels of measurement. wMean for 5-level Likert scale is expressed as:

$$wMean(X) = \sum_{i=1}^{5} Xi\, p(Xi), \qquad X_i = 1,\ldots,5 \tag{1}$$

(-) *Consensus measure* (CnS) correspondingly reflects agreement. It is also referred to as strength of accord, consensus strength, or the strength of affirmative consensus (sCns).When all respondents place themselves in a single category, consensus has been maximized and considered being perfect, and that is given "1" value, whereas, a complete lack of consensus must generate "0" value. The further the individual values migrates from the forced central value (response scale of 5in this study), the less the consensus strength (Tastle and Wierman, 2007). The equation of CnSfor 5-level Likert scale is expressed as:

$$CnS(X) = 1 + \sum_{i=1}^{5} p\,(\mathrm{Xi}) \log_2 \left(1 - \frac{|X_i - wMean(X_i)|}{d_X}\right) \tag{2}$$

where,

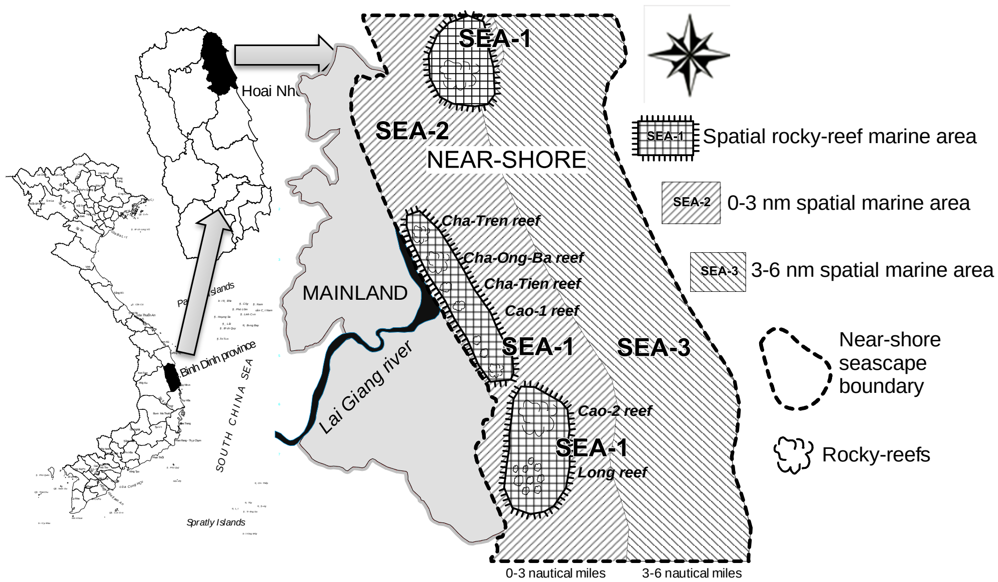

Figure 1. Near-shore seascape map of Hoai Nhon district (Binh Dinh, Vietnam).

$d_x = X_{max} - X_{min},\ X_i = 1, \ldots, 5$ (3)

Where, wMean (X) is the weighted mean of X; $CnS(X)$ is consensus measure of X; $X_i$is the Likert scale; $p(X_i)$ is the probability of the frequency associated with each X; d_x is the width of X;

RESULTS

Spatial near-shore seascape

The selected study area is Hoai Nhon near-shore, the most northern part of BinhDinh province, belonging to the Key Economic Region (KEG) of Central Vietnam. This area is defined as internal waters that extend seaward up to 6 nautical miles (nm) from the shore line. The seascape has characteristic features comparing to others in Binh Dinh province as follows:

(i) It has the best advantage on inshore fishery development including the longest coastline and the most considerable amount of marine species with high commercial value, such as mackerel, tuna, snapper, grouper, squid, shrimp, crab, and holothurian;
(ii) The fishery output reached the highest productivity of any coastal area in Binh Dinh province (48,844 tons estimated in 2014) (Binh Dinh Government, 2015); and
(iii) Spatial conflicts often shown between small fishers applying different fishing gears.

At large scale, marine fishery in Vietnam is commonly classified as being either “near-shore” or “offshore” based on indicators distance from shore, depth of fishing grounds, or boats’ engine size (FAO, 2011). However, at small scale, near-shore must be divided into small spatial marine areas. Figure 1 indicated that, near-shore seascape in Hoai Nhon district is made of a mosaic of three small spatial marine areas: spatial rocky-reef marine area (SEA-1), marine area from the shoreline extend seaward up to 3 nautical miles seaward (0-3 nm spatial marine area for short, or SEA-2), and marine area that extends seaward between 3-6 nautical miles from the shoreline (3-6 nm spatial marine area for short, or SEA-3).

SEA-1 showed its fragmented distribution along the coastline, covered rocky-reefs which mostly locate around 500-800 meters seaward from the shoreline; it provides essential habitats for valuable marine species as baby lobster, crab, squid, and immature sea fishes. SEA-2 has the high species diversity with the most popular marine species as anchovy, pompano, grouper, mullet, fat-snail, cuttlefish, red crab, clam mud crabs, swimming crab, crayfish, shrimp tie, shrimp eggs, fish pit, small tuna, anchovy, pompano, and mackerel. Deep sea fishes as small tuna, mackerel, and grouper are found in the SEA-3. Baby lobster trap is concentrated in SEA-1. Both of purse seine, gillnet, and trawl have been found within study seascape boundary (Figure 1).

Perceived spatial conflicts in near-shore seascape

In Hoa iNhon near-shore, there are a number of fishing gears: baby lobster trap, lift net, gill net, trawl, and etc. However, significant conflicts arose between fishers applying four fishing gears including baby lobster trap, trawl, gill net, and purse seine. Six conflict pairs were

Table 4. Perceived conflicts among fishing gear operators in Hoai Nhon near-shore seascape.

Conflict pairs	Proportion of respondents					WMean	CnS	Conflict ranking
	1	2	3	4	5			
SEA-1: spatial rocky-reef marine area								
Bl - Tr	0.0385	0.0385	0.1538	0.0962	0.6731	4.3269	0.5724	1
Gi - Tr	0.0455	0.0682	0.0909	0.2727	0.5227	4.1591	0.5825	2
Pu- Tr	0.0526	0.0789	0.2368	0.2105	0.4211	3.8684	0.5367	3
Bl - Pu	0.1111	0.0833	0.3333	0.1944	0.2778	3.4444	0.4988	4
Bl – Gi	0.1087	0.1739	0.1087	0.4565	0.1522	3.3696	0.5110	5
Gi - Pu	0.0667	0.4667	0.2000	0.1333	0.1333	2.8000	0.5553	6
SEA-2: 0-3 nm spatial marine area								
Bl - Tr	0.0303	0.0909	0.0909	0.2424	0.5455	4.1818	0.5849	1
Pu - Tr	0.0217	0.0870	0.2174	0.1957	0.4783	4.0217	0.5800	2
Gi - Tr	0.0667	0.0667	0.1778	0.2444	0.4444	3.9333	0.5363	3
Bl - Pu	0.1739	0.1739	0.1739	0.2174	0.2609	3.2174	0.4018	4
Gi - Pu	0.0385	0.3846	0.3077	0.1538	0.1154	2.9231	0.6179	5
Bl - Gi	0.1429	0.2857	0.3333	0.2381	0.0000	2.6667	0.6326	6
SEA-3: 3 - 6 nm spatial marine area								
Gi - Tr	0.0400	0.0800	0.2000	0.1800	0.5000	4.0200	0.5487	1
Bl - Tr	0.0000	0.1250	0.2500	0.1875	0.4375	3.9375	0.5851	2
Bl - Tr	0.0833	0.1389	0.2222	0.0833	0.4722	3.7222	0.5710	3
Pu - Tr	0.2222	0.1111	0.4444	0.0000	0.2222	2.8889	0.4465	4
Gi - Pu	0.1250	0.3750	0.3125	0.0625	0.1250	2.6875	0.5436	5
Bl - Gi	0.1429	0.4286	0.1429	0.2143	0.0714	2.6429	0.4903	6

Bl is baby lobster trap operators; Tr is trawl operators; Gi is gill net operators; Pu is purse seine operators.

conducted: baby lobster trap – trawl operators, gill net – trawl operators, purse seine – trawl operators, baby lobster trap - purse seine operators, baby lobster trap - gill net operators, and gill net - purse seine operators. For the entire near-shore seascape, spatial conflicts among fishing gear operators were ranked very influential, however, no conflict is really serious.

Table 4 shows that, considerable spatial conflicts in SEA-1 emerged among trawl operators and others (gill net, purse seine, and baby lobster trap operators). Conflict between baby lobster trap operators and trawl operators is ranked very influential (wMean= 4.3269). The lower negative effect is caused by trawl to gill net and purse seine, however it makes conflict among these operators is also very influential (wMean values are 4.1591 and 3.8684, respectively). The reason is that, trawl destroys mesh, affecting fishing gear of baby lobster traps. On the sea, trawl also affected negatively fishery resources by its non-selected exploitation, especially, immature individuals of fish and lobster species that inhabit rocky-reefs. Conflict among baby lobster trap, gill net and purse seine operators came from the fact that, baby lobster traps occupied large marine areas, which affected negatively operations of fishing boats and other fishing gears. The using and disposing of sandbags in baby lobster trap and lift net operations is causing coastal and marine environmental pollution. Actually, the conflict rankings got a quiet consensus in respondent's perceptions. (CnS values are more than 0.5). All most all the respondents placed themselves in "4" or "5" option.

In SEA-2, trawl operation caused very influential conflicts with others. By using exploiting series, irrespective of type and size, trawl was negatively impact on other fishing gears. The most considered conflict is between trawl and baby lobster trap operators (wMean = 4.1818).Conflict between trawl and purse seine operators was ranked at lower level (wMean = 4.0217). The degree of consensus for ranking is quiet high (CnS = 0.5849) resulting from the high proportion of respondent selecting "4" or "5" options. Remarkably, the lowest (somewhat influential) conflict was seen between baby lobster trap and gill net operators (wMean = 2.667). The consensus eventually approach 1 on the unit interval (CnS = 0.6326) indicated the high degree of consensus. The reason is due to gill net generally account for a small marine area, making insignificant conflict with baby lobster trap

Table 5. Perceived priority among fishing gear operators in Hoai Nhon near-shore seascape.

Fishing gear operators	Proportion of respondents					wMean	CnS	Ranking priority
	5	4	3	2	1			
SEA-1: spatial rocky-reef marine area								
Bl	0.6000	0.0667	0.3000	0.0333	0.0000	4.2333	0.6112	1
Pu	0.3846	0.4231	0.1923	0.0000	0.0000	4.1923	0.7466	2
Gi	0.0833	0.5833	0.1667	0.1667	0.0000	3.5833	0.6958	3
Tr	0.0000	0.0000	0.3333	0.6667	0.0000	2.3333	0.8286	4
SEA-2: 0-3 nm spatial marine area								
Pu	0.4815	0.3704	0.1481	0.0000	0.0000	4.3333	0.7402	1
Gi	0.3462	0.3462	0.3077	0.0000	0.0000	4.0385	0.7244	2
Bl	0.3478	0.1739	0.1304	0.3478	0.0000	3.5217	0.4700	3
Tr	0.0000	0.1818	0.3636	0.4545	0.0000	2.7273	0.7309	4
SEA-3: 3-6 nm spatial marine area								
Gi	0.6538	0.2692	0.0769	0.0000	0.0000	4.5769	0.7784	1
Pu	0.2917	0.5833	0.1250	0.0000	0.0000	4.1667	0.8037	2
Bl	0.3333	0.0667	0.0667	0.5333	0.0000	3.2000	0.4117	3
Tr	0.0000	0.1053	0.7368	0.1579	0.0000	2.9474	0.8780	4

Bl is baby lobster trap operators; Tr is trawl operators; Gi is gill net operators; Pu is purse seine operators.

operators.

In SEA-3, conflict between trawl and gill net operators is ranked very influential (wMean = 4.0200). The high consensus measure value (CnS = 0.5487) indicates the high degree of consensus about this conflict. Conflict between baby lobster trap and trawl operators is also ranked very influential (wMean = 3.9375). Conflicts among other fishing gear operators were negligible. The baby lobster trap was somewhat influential to gill net (wMean = 2.6429), which indicated a slight conflict between baby lobster trap and gill net operators. The consensus strength in this ranking was medium because of spread selections from “1” to 5” of respondents. The lowest consensus measure value (CnS = 0.4465) shows that ranking conflict between purse seine and trawl operators has not reached really high consensus because of a wide spread in selecting options from “1” to “5”.

Perceived spatial priorities in near-shore seascape

As shown in Table 5, wMean values illustrated priority ranks among fishing gear operators in Hoai Nhon near-shore seascape. Spatial priorities were not the same in different spatial marine areas. Trawl operators were ranked the lowest priority in both SEA-1 and SEA-2.

In SEA-1, the first priority (high priority in Likert scale) is baby lobster trap operators (wMean = 4.2333). Purse seine operators are prioritized secondly (with wMean = 4.1923), in the evaluation of “high priority” interval. The respondents optioned trawl operators is final priority with weighted mean (wMean = 2.3333) located in “low priority” interval (wMean is from 1.5 to 2.499). They responded that trawl not only affects the other fishing gears especially trawl might tear the net of baby lobsters trap and get away but also causes depletion of coastal fishery resources because of indiscrimination the size of fish when capture.

In marine area from the shoreline extend seaward up to 3 nautical miles (SEA-2), purse seine is the most preferred gear and then is gill net (wMean values are 4.3333 and 4.0385 respectively). Both two wMean values are in the interval of high priority. Trawl operators is also prioritized finally with wMean is 2.7273 belonging to the assess interval of medium priority (wMean is from 2.5 to 3.499).

Gill net operators are the biggest priority in marine area between that extends up to 6 nautical miles from 3 nautical miles. wMean is 4.5769 belonging to valuation of “essential” interval (wMean is from 4.5 to 5.0). The selection prioritized for gill net operators mainly concentrated on “4” and “5” option (Table 5). In addition, purse seine operators are prioritized highly (wMean is 4.1667, belonging to “high priority” interval). The trawl operators are ranked the lowest (wMean = 2.9474).

Calculated result also shows that the degree of consensus in the priority for fishing gear operators in three seascapes is high (CnS is from 0.6112 to 0.8780), except baby lobster trap in SEA 2 and SEA 3 (CnS is 0.4700 and 0.4117, respectively).

In SEA-1, the priority for baby lobster trap operators was reached average consensus strength (CnS = 0.6112). In other words, fishers have various choices about the levels of priority for baby lobster trap operations. The degree of consensus in choosing priority for fishers using purse seine is higher than baby lobster trap (CnS = 0.7466). This indicated that the selection focus on two options, namely “4” and “5”). The degree of consensus in choosing the last priority is the highest (CnS = 0.8286). It can be seen that most of fishers optioned trawl operators are final priority and this selection is focused on “2” and “3” option.

In SEA-2, the degree of consensus in the selection of priority for fishers using purse seine and gill net is also high (> 0.7) indicating that choices of the people concentrated at “4” and “5” option. The last priority for trawl operators had reached a high consensus in the choice of the local fishers (CnS = 0.7309).

Gill net operators is the first priority with a high degree of consensus (CnS = 0.7784) in SEA-3. The priority for purse seine operators reaches higher consensus strength (CnS = 0.8037). Table 5 also showed that the attitude of last priority for trawl reaches a high degree of consensus (CnS = 0.8780).

CONCLUSION AND RECOMMENDATION

Internationally, conflicts have emerged not only in small-scale and but also large scale fisheries (FAO, 2011). Vietnam’s marine fisheries are largely small-scale, multi-species and multi-gear. This paper shows that the spatial conflict and priority for small-scale fisheries in near-shore seascape of the Central Coast Vietnam can be summarized as: Small-scale fisheries in Hoai Nhon district (Binh Dinh, Vietnam) has a diverse fishing gears as baby lobster trap, purse seine, trawl, gill net, lifts net, and etc. Using the same spatial marine area for different fishing operations causes conflicts among local fishers and outside fishers. The highest conflict is between trawl and other fishing gear operators. Due to indiscriminate mass and size categories, trawl not only negatively affects others (especially might tear the net of baby lobsters trap and get away) but also causes the depletion of fishery resources. Conflicts among the fishing gear operators in rocky-reefs are popular because fishery resources are rich and diversified.

The result from a case study of Hoai Nhon district shows that, the spatial conflict arising in Vietnam may be similar to other ASEAN countries. For example, in Songkhla area of Thailand, three conflicts in fishery are conducted as follows: conflicts among fishers took about by competition for access to resources; conflicts between provincial fishery officers and local influential people who allegedly try to protect illegal fishers; and conflicts between local fishers and outside fishers due to resources use competition and the outsiders who use illegal fishing gears (Ahmed et al., 2006). Information collected from local fishers in meetings showed that all these conflicts had happened in the study area. In the section 3, the result of ranking conflict among local and outside fishers using various gears was presented.

The practice of small-scale fisheries management in study area can implement with state evolvement, which trends to the sustainable development. Coastal resource management requires the comparative analyses about complex conflicts before making implementation (Stepanova, 2015). Integrated coastal zone management (ICZM) and ecosystem-based management (EbM) come out the most common approaches to manage conflicts among the resource users (Tuda et al., 2014). A marine spatial planning (MSP) or an integrated spatial planning (ISP) is essential for sustainable resource management in coastal area because they can help detecting conflict and identifying priority where multiple activities took place (Douvere, 2008; Halpern et al., 2008). In fact, both MSP and ISP are now practicing in some coastal provinces of Central Coast Vietnam. MSP or ISP for study area should be focused on the result of ranking priority of fishing gear operators over each spatial marine area: baby lobster trap should be the highest priority in SEA-1; purse seine and gillnet should be prioritized in SEA-2 and SEA-3 respectively; finally, trawl should be the lowest priority because of its negative signification to fishing resources and other fishing gears.

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Conflict of Interests

The authors have not declared any conflict of interests.

REFERENCES

Ahmed M, Salayo ND, Viswanathan KK, Garces LR, Pido MD (2006). Management of Fishing Capacity and Resource Use Conflicts in Southeast Asia: A Policy Brief. T.W.F. Center, Malaysia.

Bennett E, Neiland A, Anang E, Bannerman P, Rahman A, Huq S, Bhuya S, Day M, Fulford-Gardiner M, Clerveaux W (2001). Towards a better understanding of conflict management in tropical fisheries:

evidence from Ghana, Bangladesh and the Caribbean. Mar. Policy 25:365-376.
Binh Dinh Government (2015). Binh Dinh statistical yearbook 2014. Statistical Publishing, Hanoi, Vietnam. 452 p.
Bruckmeier K (2005). Interdisciplinary conflict analysis and conflict mitigation in local resource management. Ambio 34(2):65-73.
Buckles D, Rusnak G (1999). Introduction in conflict and collaboration in natural resource management. In “Cultivating peace: Conflict and Collaboration in Natural Resource Management”. (Ed. Daniel Buckles). International Development Research Centre, Ottawa, Ontario.
Burroughs R (2011). Coastal Governance. Island Press, Washington, D.C.
Carissa JK, Kerrie AW, Matthew W, Janet S, Josie C, Brendan M, Hugh PP (2009). Spatial conservation prioritization inclusive of wilderness quality: A case study of Australia’s biodiversity. Biol. Conserv. 142(7):1282-1290.
Central Research Development Fund (CRDF) (2015). Central Coast Vietnam database (http://duyenhaimientrung.vn).
Coffey B, O'Toole K (2012). Towards an improved understanding of knowledge dynamics in integrated coastal zone management: a knowledge systems framework. Conserv. Soc. 10(4):318-329.
Christian II, Mihai RN, Gabriel OV, Diana AO, Athanasios AG (2014). Using multi-criteria analysis for the identification of spatial land-use conflicts in the Bucharest Metropolitan Area. Contemporary concepts and novel methods fostering indicator-based approach to urban complexities. Ecol. Indic. 42:112-121.
Douvere F (2008). The importance of marine spatial planning in advancing ecosystem based sea use management. Mar. Policy 32(5):762-771.
FAO (1998). Integrated coastal area management, agriculture, forestry and fisheries. Rome.
FAO (2011). Towards voluntary guidelines on securing sustainable small scale fisheries. Rome.
FAO (2015). Voluntary guidelines for securing sustainable small-scale fisheries in the context of food security and poverty eradication. Rome.
Frederico VF, Ricardo BM, Rafael DL (2013). Defining spatial conservation priorities in the face of land-use and climate change. Biol. Conserv. 158:248-257.
Gresch P, Smith B (1985). Managing spatial conflict: planning system in Switzerland (Progress in Planning). Pergamon Press. 88 p.
Halpern BS, McLeod KK, Rosenberg AA, Crowder LB (2008). Managing for cumulative impacts in ecosystem-based management through ocean zoning. Ocean Coast. Manage. 51:203-211.
Hirsch P, Phanvilay K, Tubtim K (1999). Nam Ngum, Lao PDR: Community-based natural resource management and conflicts over watershed resources. In “Cultivating peace: Conflict and Collaboration in Natural Resource Management” (Ed. Daniel Buckles). International Development Research Centre, Ottawa, Ontario.
Le DA (2008a). Nearshore island systems in Vietnam, resources and development. Natural Science and Technology Publishing,. Hanoi, Vietnam (in Vietnamese). 199 p.
Le DA (2008b). Position resource of nearshore island systems in Vietnam. Paper collection, Vietnam National Conference on "Vietnam marine geology and sustainable development", , Natural Science and Technology Publishing, Hanoi, Vietnam (in Vietnamese). pp. 396-402.
Le T (chief author), Nguyen QT, Nguyen MT, Dang DL, Nguyen VP, Phi CV, Bui XD, Nguyen DV, Vu VC, Thanh NL (2012). Vietnam land and people. Vietnam Education Publishing. Hanoi, Vietnam. 544 p.
Lina MS, Andrew AR, Berta ML (2015). Social perceptions of Colombian small-scale marine fisheries conflicts: Insights for management. Mar. Policy 56:61-70.
Mao AA, Mathieu R, Mervyn L, Jenny D (2009). Integrating freshwater and terrestrial priorities in conservation planning. Biol. Conserv. 142(10):2217-2226.
Seyedeh MS, Moilanen A, White A, Burgman A (2012). Integrating environmental gap analysis with spatial conservation prioritization: A case study from Victoria, Australia. Environ. Manage. 112:240-251.
Stepanova O (2015). Conflict resolution in coastal resource management: Comparative analysis of case studies from four European countries. Ocean Coast Manage. 103:109-122.
Tastle WJ, Wierman MJ (2007). Consensus and dissension: A measure of ordinal dispersion. Approximate Reasoning, 45(3):531-545.
Tuda AO, Stevens TF, Rodwell LD (2014). Resolving coastal conflicts using marine spatial planning. Environ. Manage. 133:59-68.
Tuppen JN, Thompson IB (1994). Industrial restructuring in contemporary France: Spatial priorities and policies. Prog. Plann. 42(2):99-172.
Vagias WM (2006). Likert-type scale response anchors. Clemson International Institute for Tourism & Research Development, Department of Parks, Recreation and Tourism Management. Clemson University.