TẠP CHÍ KHOA HỌC
TRƯỜNG ĐẠI HỌC QUY NHƠN

Thành phần loài cá rạn san hô vùng biển ven bờ Bắc Hải Vân - Sơn Chà, tỉnh Thừa Thiên Huế

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Ngày nhận bài:10/10/2022; Ngày sửa bài: 10/11/2022;
Ngày nhận đăng: 15/11/2022; Ngày xuất bản: 28/02/2023

TÓM TẮT

Nghiên cứu thành phần cá rạn san hô vùng biển ven bờ Bắc Hải Vân - Sơn Chà, tỉnh Thừa Thiên Huế được thực hiện từ tháng 01 năm 2020 đến tháng 10 năm 2022 nhằm mục đích cập nhật dữ liệu, góp phần xây dựng luận chứng khoa học - kỹ thuật cho việc thiết lập khu bảo tồn biển. Vị trí thu mẫu gồm 4 điểm là Bãi Cả, Bãi Chuối, Sũng Rau Câu và đảo Sơn Chà. Mẫu được thu bằng lưới, lừ, vợt và súng bắn tên/xiên theo định kỳ 2 tháng/lần. Kết quả nghiên cứu đã xác định được 142 loài thuộc 94 chi, 48 họ, 23 bộ cá rạn san hô. Trong đó, 5 bộ có số lượng loài cao gồm Perciformes (36 loài), Ovalentaria (20 loài), Kurtiformes (14 loài), Labriformes (13 loài) và Tetraodontiformes (8 loài). Các bộ còn lại chỉ có từ 1 đến 5 loài. Kết quả nghiên cứu cũng cho thấy độ phong phú về thành phần loài cá ở các điểm khảo sát có sự khác nhau. Trong đó, đảo Sơn Chà có độ phong phú về loài cao nhất với 71 loài thuộc 48 chi, 28 họ và 16 bộ; thấp nhất là Bãi Cả với 51 loài thuộc 35 chi, 24 họ và 13 bộ.

Từ khóa: *Cá rạn san hô, Hải Vân - Sơn Chà, đa dạng thành phần loài cá.*

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QUY NHON UNIVERSITY
JOURNAL OF SCIENCE

Species composition of coral reef fish in the coastal areas of North Hai Van - Son Cha, Thua Thien Hue province

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Received:10/10/2022; Revised: 10/11/2022;
Accepted: 15/11/2022; Published: 28/02/2023

ABSTRACT

The study on coral reef fish species composition in the coastal areas of North Hai Van - Son Cha, Thua Thien Hue province was carried out in the period from January, 2020 to October, 2022 at 4 sites, namely Bai Ca, Bai Chuoi, Sung Rau Cau, Son Cha island to update scientific data to contribute to establishing the marine reserve. Fish were collected using fish nets, fish traps, scoops and spears every two months. 142 coral reef fish species belonging to 94 genus, 48 families and 23 orders were found. There were 5 orders with large number of species such as Perciformes (36 species), Ovalentaria (20 species), Kurtiformes (14 species), Labriformes (13 species) and Tetraodontiformes (8 species). Other orders had from 1 to 5 species. Fish species composition abundance was different between the study sites, of which the highest diversity was found at Son Cha island, with 71 species belonging to 48 genus, 28 families and 16 orders while the poorest composition was recorded at Bai Ca, with 51 species belonging to 35 genus, 24 families and 13 orders.

Keywords: *Coral reef fish, Hai Van - Son Cha, fish species composition diversity.*

1. INTRODUCTION

Thua Thien Hue is one of the central provinces with a long coastline and high marine biodiversity, of which North Hai Van - Son Cha is a typical area. According to Nguyen Van Tien and Nguyen Huy Yet,[1] Hai Van - Son Cha (from Lap An lagoon to South Hai Van) has high biodiversity with 245 microalgae species, 74 zooplankton species, and 135 seaweed species, 3 seagrass species, 14 mangrove species, 142 coral species, 303 benthic animal species, 162 coral reef fish species and 4 sea turtle species. Coral reefs are typical ecosystems of this area and are mostly located at Bai Ca, Bai Chuoi, Bai Dau Heo, Sung Rau Cau, West Son Cha, Northwest Son Cha and South Hai Van.

Based on the high biodiversity, Hai Van - Son Cha was proposed to establish a marine protected area in 1998 (Nguyen Chu Hoi et al.).[2] In this proposal, Hai Van - Son Cha marine reserve composes three areas in the south of Phu Loc district, Thua Thien Hue province, namely Son Cha island, Lang Co lagoon and North Hai Van. The total area of the proposed reserve is about 6,000 - 7,000 ha. Then, Nguyen Van Tien and Nguyen Huy Yet[1] investigated

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https://doi.org/10.52111/qnjs.2023.17108

to collect scientific evidence and submitted the People's Committee of Thua Thien Hue province the proposal to establish Hai Van - Son Cha as marine reverse with a total area of 9,503 ha (from Lap An lagoon to South Hai Van). Throughout additional surveys, Hai Van - Son Cha was officially involved in the list of 16 marine reserves approved by the Prime Minister in 2010 (Decision No. 742/QĐ-TTg).[3] The total area of this reserve is 17,039 ha, of which the marine area is 7,626 ha. Up to now, most of the marine protected areas in the central region in the list approved by the Prime Minister have been established such as Con Co, Cu Lao Cham, Ly Son, Nha Trang Bay, Nui Chua, Hon Cau but not for Hai Van - Son Cha.

The coastal areas of North Hai Van - Son Cha is an important fishing ground for 38.5% of households living in Lang Co and the surrounding areas (Le Thi Nguyen and Nguyen Bac Giang).[4] In addition, this area is also the fishing ground of many fishermen in Lien Chieu district, Da Nang city (Nguyen Van Tien and Nguyen Huy Yet).[1] Therefore, the pressure from exploitation on biodiversity and ecosystems in general and on coral reef fish resource of this sea in particular is very large. However, because Hai Van – Son Cha has not been established as a conservation area, biodiversity in this area in general and coral reef fish in particular has not been properly managed and exploited.

This study aimed to update data and contribute to building scientific evidences to establish the Hai Van – Son Cha marine reserve in Thua Thien Hue province.

2. METHODS

2.1. Study sites and period

Study period: This study was conducted in the period of 01/2020 - 10/2022.

Study sites: Fish were collected at 4 sites in the coastal areas of North Hai Van, Thua Thien Hue province (Table 1 and Figure 1).

Table 1. Sample collection sites.

No.	Sites	Longitude	Latitude
1	Bai Ca	108,12152°	16,21450°
2	Bai Chuoi	108,14370°	16,21628°
3	Sung Rau Cau	108,18161°	16,21332°
4	Son Cha island	108,20192°	16,22358°

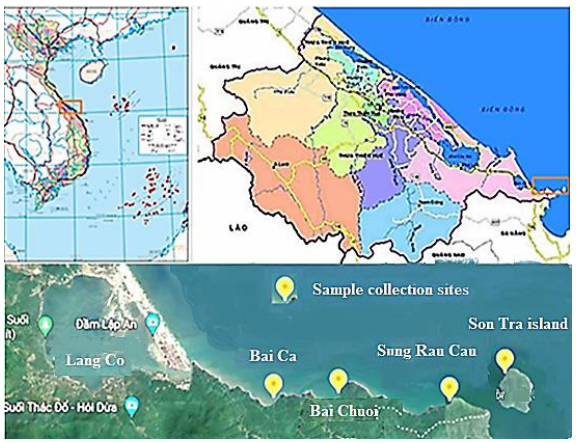

Figure 1. Sample collection sites.

2.2. Sample collection

Fish were collected at the study sites every 2 months (total of 16 times of sampling) using fishing gears such as gillnets, scoops, spears. A total of 726 fish individuals were collected.

After collection, fish were washed and kept into the frozen containers and transferred to the preliminary sample analysis site in the field. Here, fish were preliminarily classified according to their morphology. Then 6-8 individuals were selected to take pictures and tag the sample code. Then, these fish were fixed in 10% formalin solution and transferred to the Central Coast Nature Museum, KQH7 (Diem Phung Thi Street, Vy Da ward, Hue city, Thua Thien Hue Province) for analysis.

2.3. Sample analysis

Fish were classified using morphological methods. The fish classification documents of

authors as Nguyen Huu Phung et al.,[5-8] Mansor et al.,[9] Rainboth et al.[10] and Nelson[11] were used.

In addition, the website http://www.fishbase.org was also used to update fish classification information. The fish taxon was based on the method of Nelson.[11]

3. RESULTS AND DISCUSSION

3.1. Fish species composition diversity

In the study period, 142 coral reef fish species belonging to 94 genus, 48 families and 23 orders were found in North Hai Van – Son Cha (Table 2).

Table 2. The list of coral reef fish species in the coastal areas of Hai Van – Son Cha.

Number	Order/ Subseries	Number	Species
I	**Anguilliformes**	1	*Pisodonophis boro* (Hamilton, 1822)
		2	*Gymnothorax undulatus* (Lacepède, 1803)
II	**Clupeiformes**	3	*Encrasicholina punctifer* (Fowler, 1938)
		4	*Stolephorus* sp.
		5	*Stolephorus commersonnii* (Lacepède, 1803)
		6	*Sardinella gibbosa* (Bleeker, 1849)
III	**Siluriformes**	7	*Plotosus* sp.
		8	*Plotosus lineatus* (Thunberg, 1787)
IV	**Aulopiformes**	9	*Synodus dermatogenys* (Fowler, 1912)
		10	*Trachinocephalus myops* (Forster, 1801)
V	**Holocentriformes**	11	*Myripristis pralinia* (Cuvier, 1829)
		12	*Sargocentron praslin* (Lacepède, 1802)
		13	*Sargocentron rubrum* (Forsskål, 1775)
		14	*Sargocentron melanospilos* (Bleeker, 1858)
VI	**Kurtiformes**	15	*Apogon imberbis* (Linnaeus, 1758)
		16	*Apogonichthyoides taeniatus* (Cuvier, 1828)
		17	*Cheilodipterus macrodon* (Lacepède, 1802)
		18	*Jaydia melanopus* (Weber, 1911)
		19	*Lepidamia kalosoma* (Bleeker, 1852)
		20	*Ostorhinchus aureus* (Lacepède, 1802)
		21	*Ostorhinchus cookii* (Macleay, 1881)
		22	*Ostorhinchus doederleini* (Jordan & Snyder, 1901)
		23	*Ostorhinchus endekataenia* (Bleeker, 1852)
		24	*Ostorhinchus lateralis* (Valenciennes, 1832)
		25	*Ostorhinchus semilineatus* (Temminck & Schlegel, 1842)
		26	*Ostorhinchus compressus* (Smith & Radcliffe, 1911)
		27	*Ostorhinchus fasciatus* (White, 1790)
		28	*Taeniamia fucata* (Cantor, 1849)

VII	**Gobiiformes**	29	*Butis butis* (Hamilton, 1822)
		30	*Oxyurichthys* sp.
		31	*Glossogobius giuris* (Hamilton, 1822)
VIII	**Ovalentar**ia	32	*Ambassis kopsii* (Bleeker, 1858)
		33	*Chromis margaritifer* (Fowler, 1946)
		34	*Chromis xanthura* (Bleeker, 1854)
		35	*Dascyllus trimaculatus* (Rüppell, 1829)
		36	*Neoglyphidodon melas* (Cuvier, 1830)
		37	*Neoglyphidodon nigroris* (Cuvier, 1830)
		38	*Neopomacentrus azysron* (Bleeker, 1877)
		39	*Neopomacentrus cyanomos* (Bleeker, 1856)
		40	*Plectroglyphidodon leucozonus* (Bleeker, 1859)
		41	*Pomacentrus brachialis* (Cuvier, 1830)
		42	*Pomacentrus coelestis* (Jordan & Starks, 1901)
		43	*Pomacentrus flavioculus* (Allen, Erdmann & Pertiwi, 2017)
		44	*Pomacentrus moluccensis* (Bleeker, 1853)
		45	*Pomacentrus simsiang* (Bleeker, 1856)
		46	*Stegastes obreptus* (Whitley, 1948)
		47	*Stegastes* sp.
		48	*Abudefduf saxatilis* (Linnaeus, 1758)
		49	*Abudefduf sexfasciatus* (Lacepède, 1801)
		50	*Abudefduf sordidus* (Forsskål, 1775)
		51	*Amphiprion clarkii* (Bennett, 1830)
IX	**Mugiliformes**	52	*Osteomugil cunnesius* (Valenciennes, 1836)
		53	*Upeneus sulphureus* (Cuvier, 1829)
X	**Blenniiformes**	54	*Aspidontus* sp.
		55	*Aspidontus taeniatus* (Quoy & Gaimard, 1834)
		56	*Cirripectes filamentosus* (Alleyne & Macleay, 1877)
		57	*Istiblennius edentulus* (Forster & Schneider, 1801)
		58	*Meiacanthus* sp.
XI	**Atheriniformes**	59	*Atherinomorus lacunosus* (Forster, 1801)
XII	**Beloniformes**	60	*Hemiramphus lutkei* (Valenciennes, 1847)
		61	*Hyporhamphus quoyi* (Valenciennes, 1847)
XIII	**Carangiformes**	62	*Alepes apercna* (Grant, 1987)
		63	*Alepes djedaba* (Forsskål, 1775)
		64	*Selaroides leptolepis* (Cuvier, 1833)
		65	*Trachinotus mookalee* (Cuvier, 1832)

XIV	**Istiophoriformes**	66	*Sphyraena barracuda* (Cuvier, 1832)
		67	*Sphyraena obtusata* (Cuvier, 1829)
XV	**Pleuronectiformes**	68	*Brachirus niger* (Macleay, 1880)
		69	*Solea elongata* (Day, 1877)
		70	*Cynoglossus bilineatus* (Lacepède, 1802)
XVI	**Syngnathiformes**	71	*Fistularia commersonii* (Rüppell, 1838)
		72	*Dactyloptera orientalis* (Cuvier, 1829)
XVII	**Labriformes**	73	*Cheilinus trilobatus* (Lacepède, 1801)
		74	*Halichoeres bicolor* (Bloch & Schneider, 1801)
		75	*Halichoeres hortulanus* (Lacepède, 1801)
		76	*Halichoeres marginatus* (Rüppell, 1835)
		77	*Labroides dimidiatus* (Valenciennes, 1839)
		78	*Macropharyngodon meleagris* (Valenciennes, 1839)
		79	*Stethojulis interrupta terina* (Jordan & Snyder, 1902)
		80	*Stethojulis* sp.
		81	*Stethojulis terina* (Jordan & Snyder, 1902)
		82	*Thalassoma lunare* (Linnaeus, 1758)
		83	*Leptoscarus vaigiensis* (Quoy & Gaimard, 1824)
		84	*Scarus rivulatus* (Valenciennes, 1840)
		85	*Scarus psittacus* (Forsskål, 1775)
XVIII	**Perciformes**	86	*Gerres oyena* (Forsskål, 1775)
		87	*Parupeneus heptacanthus* (Lacepède, 1802)
		88	*Upeneus tragula* (Richardson, 1846)
		89	*Pempheris oualensis* (Cuvier, 1831)
		90	*Therapon jarbua* (Forsskål, 1775)
		91	*Rhynchopelates oxyrhynchus* (Temminck & Schlegel, 1842)
		92	*Cephalopholis boenak* (Bloch, 1790)
		93	*Aethaloperca rogaa* (Forsskål, 1775)
		94	*Diploprion bifasciatum* (Cuvier, 1828)
		95	*Epinephelus merra* (Bloch, 1793)
		96	*Epinephelus sexfasciatus* (Valenciennes, 1828)
		97	*Hyporthodus septemfasciatus* (Thunberg, 1793)
		98	*Siganus guttatus* (Bloch, 1787)
		99	*Monodactylus argenteus* (Linnaeus, 1758)
		100	*Eubleekeria* sp.
		101	*Karalla daura* (Cuvier, 1829)
		102	*Leiognathus equulus* (Forsskål, 1775)
		103	*Chaetodon auriga* (Forsskål, 1775)
		104	*Chaetodon auripes* (Jordan & Snyder, 1901)

https://doi.org/10.52111/qnjs.2023.17108

		105	*Chaetodon speculum* (Cuvier, 1831)
		106	*Chaetodon trifascialis* (Quoy & Gaimard, 1825)
		107	*Chaetodon wiebeli* (Kaup, 1863)
		108	*Lutjanus argentimaculatus* (Forsskål, 1775)
		109	*Lutjanus johni* (Bloch, 1792)
		110	*Lutjanus* sp1.
		111	*Lutjanus* sp2.
		112	*Lutjanus vitta* (Quoy & Gaimard, 1824)
		113	*Lutjanus* sp3.
		114	*Lutjanus fulviflamma* (Forsskål, 1775)
		115	*Caesio cuning* (Bloch, 1791)
		116	*Siganus canaliculatus* (Park, 1797)
		117	*Siganus javus* (Linnaeus, 1766)
		118	*Siganus spinus* (Linnaeus, 1758)
		119	*Siganus virgatus* (Valenciennes, 1835)
		120	*Sigunus canaliculatus* (Park, 1797)
		121	*Scatophagus argus* (Linnaeus, 1766)
XIX	**Scorpaeniformes**	122	*Parascorpaena mossambica* (Peters, 1855)
		123	*Scorpaenodes evides* (Jordan & Thompson, 1914)
		124	*Scorpaenopsis cirrosa* (Thunberg, 1793)
		125	*Sebastapistes cyanostigma* (Bleeker, 1856)
		126	*Minous inermis* (Alcock, 1889)
XX	**Moroniformes**	127	*Drepane punctata* (Linnaeus, 1758)
XXI	**Acanthuriformes**	128	*Zanclus cornutus* (Linnaeus, 1758)
		129	*Ctenochaetus striatus* (Quoy & Gaimard, 1825)
XXII	**Spariformes**	130	*Sillago aeolus* (Jordan & Evermann, 1902)
		131	*Sillago sihama* (Forsskål, 1775)
		132	*Scolopsis ciliata* (Lacepède, 1802)
		133	*Scolopsis vosmeri* (Bloch, 1792)
		134	*Lethrinus nebulosus* (Forsskål, 1775)
XXIII	**Tetraodontiformes**	135	*Ostracion cubicus* (Linnaeus, 1758)
		136	*Cantherhines pardalis* (Rüppell, 1837)
		137	*Cantherhines* sp.
		138	*Pervagor alternans* (Ogilby, 1899)
		139	*Monacanthus chinensis* (Osbeck, 1765)
		140	*Arothron immaculatus* (Bloch & Schneider, 1801)
		141	*Rhynchostracion nasus* (Bloch, 1785)
		142	*Diodon hystrix* (Linnaeus, 1758)

Of 23 orders, Perciformes was most dominant in all taxon levels, taking account 25% in family, 24.5% in genus and 25.7% in species level, followed by Ovalentaria (13.9%), Kurtiformes (10.4%), Labriformes (9.2%), Tetraodontiformes (5.6%) in total of species. Number of species of Blenniiformes, Scorpaeniformes and Spariformes took account 3.5%. The lowest percentage in species (0.7%) was found in orders Moroniformes and Atheriniformes. Other orders held 1.4% to 2.8% in total of species (Table 3).

Table 3. Number of orders, families, and genus of fish in the coastal areas of North Hai Van – Son Cha.

Number	Order	Family		Genus		Species	
		n	Percentage	n	Percentage	n	Percentage
1	Anguilliformes	2	4.2	2	2.1	2	1.4
2	Clupeiformes	2	4.2	3	3.2	4	2.8
3	Siluriformes	1	2.1	1	1.1	2	1.4
4	Aulopiformes	1	2.1	2	2.1	2	1.4
5	Holocentriformes	1	2.1	2	2.1	4	2.8
6	Kurtiformes	1	2.1	6	6.4	14	9.9
7	Gobiiformes	2	4.2	3	3.2	3	2.1
8	Ovalentaria	2	4.2	9	9.6	20	14.1
9	Mugiliformes	1	2.1	2	2.1	2	1.4
10	Blenniiformes	1	2.1	4	4.3	5	3.5
11	Atheriniformes	1	2.1	1	1.1	1	0.7
12	Beloniformes	1	2.1	2	2.1	2	1.4
13	Carangiformes	1	2.1	3	3.2	4	2.8
14	Istiophoriformes	1	2.1	1	1.1	2	1.4
15	Pleuronectiformes	2	4.2	3	3.2	3	2.1
16	Syngnathiformes	2	4.2	2	2.1	2	1.4
17	Labriformes	2	4.2	8	8.5	13	9.2
18	Perciformes	12	25.0	23	24.5	36	25.4
19	Scorpaeniformes	2	4.2	4	4.3	5	3.5
20	Moroniformes	1	2.1	1	1.1	1	0.7
21	Acanthuriformes	2	4.2	2	2.1	2	1.4
22	Spariformes	3	6.3	3	3.2	5	3.5
23	Tetraodontiformes	4	8.3	7	7.4	8	5.6
	Total	**48**	**100**	**94**	**100**	**142**	**100**

https://doi.org/10.52111/qnjs.2023.17108

There have been many studies on coral reef fish composition diversity in Vietnam in general as well as in Central Vietnam in particular, but there has been no such records in the coastal areas of North Hai Van – Son Cha. Compared to other studies, the species abundance of fish in our study areas is lower than that in Cu Lao Cham island (Nguyen Van Long et al.),[12] Ly Son island (Hoang Xuan Ben et al.),[13] but higher than that in Con Co (Tran Van Huong et al.).[14] Cu Lao Cham and Ly Son have been establishes as the marine reserves so organism resource can be well protected and this can be one of reasons leading to the high diversity of coral reef fish here (Table 4).

Table 4. The comparison of number of species of coral reef fish in the coastal areas in Central Vietnam.

Number	Areas	Number of species	References
1	Hai Van – Son Cha	142	This study
2	Cu Lao Cham	267	Nguyen Van Long et al. [12]
3	Con Co	104	Tran Van Huong et al. [14]
4	Ly Son	232	Hoang Xuan Ben et al. [13]

There were 142 species of coral reef fish found in our study that is less than records of Nguyen Van Tien and Nguyen Huy Yet[1] (162 species were found in Hai Van – Son Cha, of which there were 21 species not identified). This difference can be due to different study areas. We just investigated in the North Hai Van – Son Cha while Nguyen Van Tien and Nguyen Huy Yet[1] collected samples in the North Hai Van – Son Cha and 5 sites in the South Hai Van belonging to Da Nang city.

3.2. The coral reef fish composition distribution at the study sites

The results showed that number of orders, families, genus and species of fish was different between the study sites (Figure 2).

Figure 2. The coral reef fish composition distribution in the North Hai Van – Son Cha.

The abundance of coral reef fish composition at Son Cha island was highest (Figure 2), with 71 species belonging to 48 genus, 28 families and 16 orders. There were 61 species belonging to 49 genus, 32 families and 17 orders found at Sung Rau Cau, 52 species, 36 genus, 19 families and 14 orders found at Bai Chuoi. The lowest abundance of fish was recorded at Bai Ca, with 51 species, 35 genus, 24 families and 13 orders.

Nguyen Van Tien and Nguyen Huy Yet[1] reported that the highest diversity of fish species composition was at Sung Rau Cau (84 species), followed by Bai Chuoi (54 species) and the abundance of fish composition at the areas around Son Cha island was low, with 23 species (Northwest Son Cha) and 49 species (West Son Cha). However, our results (Table 5 and Figure 2) show the rich fish composition at the areas around Son Cha (71 species), Sung Rau Cau (61 species) and Bai Chuoi (52 species). It is speculated that Son Cha has been well managed so illegal fishing activities are reduced, leading to the ecosystems are better protected in comparison to other areas. However, this is our preliminary speculation and it is necessary to do surveys on coral reef coverage and fishing status in this area in order to give accurate evidences.

4. CONCLUSION AND SUGGESTION

There were 142 coral reef fish species belonging to 94 genus, 48 families and 23 orders found in the coastal areas of North Hai Van – Son Cha. Among them, Perciformes was dominant, with 36 species, 23 genus and 12 families.

In the North Hai Van – Son Cha, the most abundant composition of coral reef fish was at Son Cha island, with 71 species, 48 genus, 28 families and 16 orders.

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