

SEAGRASSES IN BATANES PROVINCE, NORTHERN PHILIPPINES

Hilconida P. Calumpong, Ernani G. Meñez and Ronald C. Philipps

Seagrasses were collected from 11 sites at four islands in Batanes Province, northern Philippines, during 1985 and 1986. Five species in two families and five genera are recorded for the first time.

Batanes is the northernmost province in the Philippines. It lies between Taiwan and the northern tip of Luzon and consists of about a dozen islands (Fig. 1). Most of the islands are volcanic in origin, and a few are coral atolls. The larger islands, i.e. Itbayat, Batan and Sabtang, have permanent inhabitants, while the rest are uninhabited, except for fishermen stopping a few days on fishing journeys. Although fish are abundant, fishing is feasible only during April and May, when the islands are not visited by typhoons. The major source of livelihood is garlic agriculture.

Batanes is the most typhoon-wracked region in the Philippines. Heavy rains usually come in late June and may extend to early November, the month when some of the worst typhoons occur. The islands experience cold temperatures from November to March, due to the northeast winds from the frigid North Pacific and the cold and dry northeast monsoon from Siberia. By June, clouds from the South China Sea deposit rains in the Batanes region. April is the driest month, the dry season sometimes extending to early June. Numerous and treacherous tide rips, currents and swirls, caused by the meeting of the South China Sea and the Pacific Ocean currents, exist inside the channels and alongside the islands, posing a great problem to travellers.

Batanes' only link to the rest of the Philippines is by a commercial flight three times a week to the capital city of Basco, Batan Island, if weather permits. An inter-island ship carries passengers and cargo between Batanes and Luzon twice a year. Small open dories, powered by diesel engines, are used for inter-island travel only during good weather.

The limited travel facilities, bad weather and sea conditions, and isolation are some of the reasons why very few naturalists have ventured to visit Batanes. The region is virtually biologically unexplored. The earliest attempt at biological investigation was perhaps in the first few years of this century. E. Mearns visited Batan Island on 27 May 1907 and spent the day collecting birds, which were eventually deposited at the U.S. National Museum. McGregor, about the same time, collected



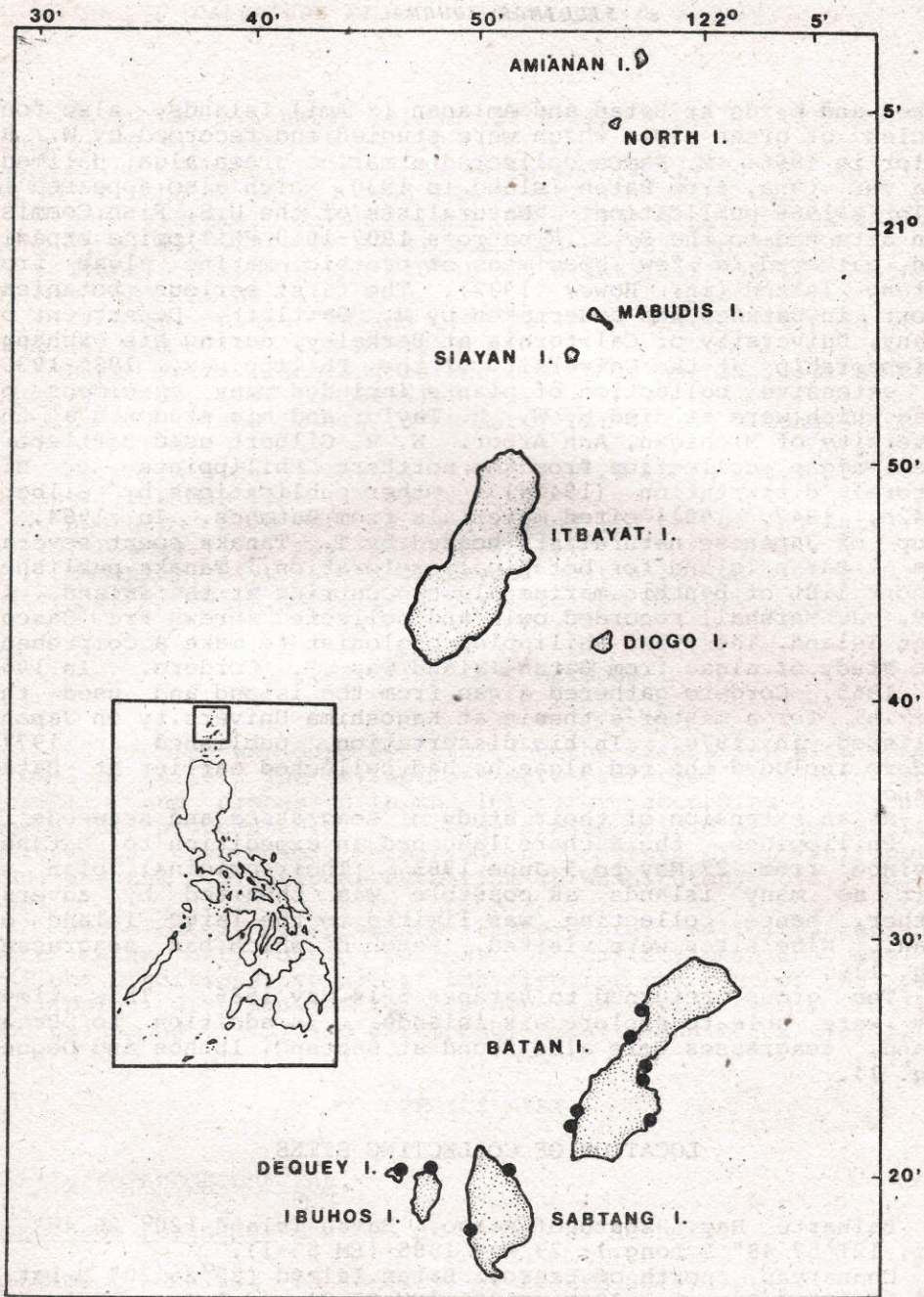


Fig. 1. Map of Batanes Province, northern Philippines. Inset is a general map of the Philippines showing location of Batanes Province. Black dots indicate collecting sites.



snakes and birds at Batan and Amianan (Y Ami) Islands, also four species of green algae which were studied and recorded by W. R. Taylor in 1966. M. Ramos collected a marine green alga, Halimeda tuna var. tuna, from Batan Island in 1930, which also appeared in Taylor's 1966 publication. Naturalists of the U.S. Fish Commission attached to the S. S. Albatross 1907-1910 Philippine expedition gathered a few specimens of benthic marine algae from Sabtang Island (in: Howe, 1932). The first serious botanical effort in Batanes was undertaken by H. Bartlett, Department of Botany, University of California at Berkeley, during his exchange professorship at the University of the Philippines, 1935-1936. His extensive collection of plants included many specimens of algae which were studied by W. R. Taylor and his students at the University of Michigan, Ann Arbor. W. R. Gilbert used Bartlett's green algae collection from the northern Philippines for his doctoral dissertation (1942a). Other publications by Gilbert (1942b, 1947, 1961) cited materials from Batanes. In 1964, a group of Japanese naturalists headed by T. Tanaka spent several days at Batan Island for botanical exploration. Tanaka published a short list of benthic marine algae occurring at the island. In 1979, J. Marshall recorded owls and collected shrews from Basco, Batan Island. The first Philippine biologist to make a comprehensive study of algae from Batan Island was P. Cordero. In 1964 and 1965, Cordero gathered algae from the island and used the material for a master's thesis at Kagoshima University in Japan, published in 1976. In his dissertation, published in 1977, Cordero included the red algae he had collected earlier at Batan Island.

As an extension of their study of seagrasses and seaweeds in the Philippines, the authors launched an expedition to Batanes Province from 27 May to 5 June 1985. Their original plan to visit as many islands as possible was thwarted by adverse weather, hence collecting was limited to the large island of Batan. Nine sites were visited, seven of which had seagrasses (Fig. 1).

The group returned to Batanes 5-14 May 1986. This time, they were able to explore six islands. In addition to Batan Island, seagrasses were also found at Sabtang, Ibhos and Dequey (Fig. 1).

#### LOCATION OF COLLECTING SITES

Baluarte Bay, south of Basco, Batan Island (20° 26' 45" N Lat., 121° 57' 48" E Long.); 29 May 1985 (EM 85-1).

Chanaryan, north of Basco, Batan Island (20° 26' 20" N Lat., 121° 57' 20" E Long.); 30 May 1985 (EM 85-3) and 1 June 1985 (EM 85-12).

Mahatao, Batan Island (20° 24' 50" N Lat., 121° 56' 10" E Long.); 30 May 1985 (EM 85-4).



- White Beach, Batan Island (20°24'32" N Lat., 121°55'40" E Long.); 30 May 1985 (EM 85-5).
- Below Mabatui Point, Batan Island (20°24'00" N Lat., 121°55'23" E Long.); 30 May 1985 (EM 85-6).
- San Vicente, Batan Island (20°23'23" N Lat., 121°55'17" E Long.); 31 May 1985 (EM 85-8) and 2 June 1985 (EM 85-13).
- Ivana, Batan Island (20°21'05" N Lat., 121°55'14" E Long.); 31 May 1985 (EM 85-9).
- Imnajbu, Batan Island (20°22'42" N Lat., 121°58'10" E Long.); 31 May 1985 (EM 85-10).
- Asked Point, Sabtang Island (20°20'30" N Lat., 121°52'00" E Long.); 10 May 1986 (EM 86-5).
- Dequey Island (20°20'10" N Lat., 121°47'20" E Long.); 10 May 1986 (EM 86-6).
- Northern side of Ibhuhos Island (20°20'15" N Lat., 121°48'30" E Long.); 10 May 1986 (EM 86-7).
- Southern side of Sabtang Island (20°18'00" N Lat., 121°50'25" E Long.); 11 May 1986 (EM 86-9).
- Mananiy Bay, south of Basco, Batan Island (20°24'15" N Lat., 121°57'40" E Long.); 12 May 1986 (EM 86-10).

#### MATERIALS AND METHODS

Collecting was done by uprooting the seagrasses with a small trowel or knife. The collections were preserved in a solution of formalin and processed in the laboratory according to standard herbarium procedures. Specimens are deposited at the Silliman University Cryptogamic Herbarium in Dumaguete City, Philippines (SU) and the U.S. National Herbarium in Washington, D.C., U.S.A. (US).

Hydrological measurements (temperature, salinity, currents) were taken only during periods of collection, and may not reflect conditions typical of the site for the rest of the year. Philippine distribution records were taken from Meñez, Phillips and Calumpong (1983) and Calumpong, Medalla and Meñez (1985).

#### SPECIES LIST

##### Family POTAMOGETONACEAE.

Cymodocea rotundata Ehrenb. et Hempr. ex Aschers.

Specimens studied: EM 85-4, 5, 6, 12; EM 86-6, 7, 9.

Philippine distribution: Batanes (Batan I., Sabtang I., Ibhuhos I., Dequey I.). Luzon (Lingayen Gulf). Catanduanes. Mindoro. Palawan (Cuyo I.). Visayas (Samar, Negros, Siquijor). Mindanao (Gulf of Davao). Tawi-tawi (Pearl Bank).



Halodule uninervis (Forssk.) Aschers.

Specimens studied: EM 85-3, 4, 12.

Philippine distribution: Batanes (Batan I.). Luzon (Ilocos Norte, La Union, Pangasinan, Manila Bay, Albay). Catanduanes. Mindoro. Palawan (Cuyo I.). Visayas (Cebu, Bohol, Leyte, Negros). Mindanao (Gulf of Davao, Zamboanga).

Syringodium isoetifolium (Aschers.) Dandy

Specimens studied: EM 85-3, 12; EM 86-7.

Philippine distribution: Batanes (Batan I., Ibohos I.). Luzon (La Union, Pangasinan, Albay). Catanduanes. Mindoro. Visayas (Bohol, Negros, Siquijor). Mindanao (Gulf of Davao, Zamboanga).

Family HYDROCHARITACEAE.Halophila ovalis (R. Br.) Hook. f.

Specimens studied: EM 85-3.

Philippine distribution: Batanes (Batan I.). Luzon (La Union, Pangasinan, Albay). Catanduanes. Mindoro. Masbate. Palawan (Quezon, Cuyo I.). Visayas (Samar, Leyte, Bohol, Cebu, Negros, Siquijor, Sumilon, Panay). Mindanao (Gulf of Davao, Zamboanga, Bancoran I.).

Thalassia hemprichii (Ehrenb.) Aschers.

Specimens studied: EM 85-3, 4, 5, 6, 12, 13; EM 86-6, 7, 9, 10.

Philippine distribution: Batanes (Batan I., Ibohos I., Sabtang I., Dequey I.). Luzon (La Union, Ilocos Norte, Cagayan, Pangasinan, Manila Bay, Batangas, Albay). Catanduanes. Mindoro. Palawan (Quezon). Visayas (Samar, Leyte, Bohol, Cebu, Negros, Siquijor). Mindanao (Surigao, Gulf of Davao, Cavili I.).

## DISCUSSION

There are 13 species of seagrasses recorded from the Philippines (Meñez and Calumpang, 1982, 1985; Meñez, Phillips and Calumpang, 1983), five of which occur in the northernmost province of Batanes. The five species, Cymodocea rotundata, Halodule uninervis, Syringodium isoetifolium, Halophila ovalis and Thalassia hemprichii, are widely distributed (see species list). Of the 21 sites surveyed in 1985 and 1986, 11 had seagrasses (Fig. 1). Except for Baluarte Bay, all the sites have backreefs cut by surge channels. The substrate is limestone or sand (either volcanic or coral sand); water temperatures ranged 29-31 °C at the time of collection and salinities, 30-34 ppt. The seagrasses were found growing at depths of not more than 4 m



in protected bays or on very exposed tidal flats that become dry during low tides. All five species occur at the bigger island of Batan, which has protected bays and coves. Although Itbayat is the biggest island in the whole island group, the shoreline consists mostly of jagged rocks and rocky benches which make collecting impossible. No seagrasses were found at the northern islands of Diogo and Siayan. Diogo is of volcanic origin, with a rocky shore and bottom (big boulders) and virtually no suitable substrate for seagrasses to settle on. Water currents are relatively strong, and would prevent settlement even if substrate made it possible.

We were, however, puzzled at the absence of seagrasses at Siayan Island, considering that it has extensive tidal flats with tide pools and coral sand, very much like Dequey Island. It will be interesting to study water current patterns that may have limited dispersal of seagrasses to Siayan.

Thalassia hemprichii was the most commonly encountered seagrass, appearing in 10 out of 11 sites. On exposed tidal flats (EM 85-4), the plants are small and stunted, with short, narrow and highly curved leaves, generally 0.5 cm wide and 6 cm long. In protected bays (EM 85-3), plants are large, with leaves reaching 1 cm wide and 20 cm long. It was either growing in pure stands (Imnajbu) or mixed with Cymodocea rotundata (San Vicente, Ivana, White Beach, Mahatao, Asked Point, northern side of Ibhos Island and Dequey Island), Halodule uninervis (Chanaryan, Mahatao, and southern side of Sabtang Island), Syringodium isoetifolium (Chanaryan, Mananiy Bay, and northern side of Ibhos Island) and Halophila ovalis (Chanaryan). Halophila ovalis was rare, occurring only in one site (Chanaryan).

#### LITERATURE CITED

- Calumpang, H. P., S. G. Medalla and E. G. Meñez 1985. Taxonomy and distribution of seagrasses in the western coast of the Gulf of Davao, southern Philippines. *Philipp. J. Sci.* 114(1-2):69-85.
- Cordero, P. C. 1976. The marine algae of Batan Island, northern Philippines. I. Cyanophyceae and Phaeophyceae. *Fish. Res. J. Phillip.* 1(2):3-29.
1977. Studies on Philippine marine red algae. *Spec. Publ. Seto Mar. Biol. Lab. ser 4.*
- Gilbert, W. J. 1942a. Studies on marine Chlorophyceae of the Philippines. Ph.D. dissertation, University of Michigan.
- 1942b. Notes on Caulerpa from Java and the Philippines. *Pap. Mich. Acad. Sc. Arts & Lett.* 27:7-26.
1947. Studies on Philippine Chlorophyceae. III. The Codiaceae. *Bull. Torrey Bot. Club* 74(2):121-132.
1961. An annotated checklist of Philippine marine Chlorophyta. *Philipp. J. Sci.* 88:413-451.



- Meñez, E. G. and H. P. Calumpong 1982. *Thalassodendron ciliatum*: an unreported seagrass in the Philippines. *Micronesica* 18:103-108.
- \_\_\_\_\_ 1985. *Halophila decipiens*, an unreported seagrass from the Philippines. *Proc. Biol. Soc. Wash.* 98(1):232-236.
- \_\_\_\_\_, R. C. Phillips and H. P. Calumpong 1983. Seagrasses from the Philippines. *Smithson. Contrib. Mar. Sc.* 21.
- Tanaka, T. 1967. Some marine algae from Batan and Camiguin Islands, Northern Philippines - I. *Mem. Fac. Fish. Kagoshima Univ.* 16:13-27.
- Taylor, W. R. 1966. Records of Asian and Western Pacific marine algae, particularly algae from Indonesia and the Philippines. *Pac. Sci.* 20(3):342-359.

Department of Botany, University of California, Berkeley, California 94720. (EGM): Smithsonian Oceanographic Sorting Center, Museum of Natural History, Smithsonian Institution, Washington, D.C. 20560. (RCP): School of Natural and Mathematical Sciences, Seattle Pacific University, Seattle, Washington 98119.

#### ADDENDUM:

#### ACKNOWLEDGMENTS

E. Meñez and R. Phillips wish to acknowledge the travel support given by the Smithsonian Institution Research Opportunities Fund and Seattle Pacific University, respectively. We thank Lawton Alcala, Daniel Catada, Janet Estacion and Wilfredo Uy for helping us collect and process the specimens.