A dataset of distribution of *Geothelphusa* (Decapoda: Potamidae) with their environmental parameters and stream indicators in eastern and southern Taiwan

臺灣東部及南部地區的澤蟹屬（Genus *Geothelphusa*）物種分布、溪流環境參數及指標資料集

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Abstract

This paper describes the dataset on the freshwater crab genus *Geothelphusa* (Decapoda: Potamidae), their environmental parameters, and stream indicators in eastern and southern Taiwan. This dataset is the result of 146 surveys (sampling events) of freshwater crab species and stream environment from 2013 to 2015 at 42 sampling sites throughout Taiwan, and a total of 12 species and 1,006 individuals of *Geothelphusa* were recorded. The data include presence, carapace width, carapace length, wet weight, and sex. The stream environmental data include water temperature, pH value, dissolved oxygen, conductivity, and three indicators (River Pollution Index, RPI; Water Quality

Index 7, WQI7; citizen Qualitative Habitat Evaluation Index, cQHEI).

Keywords: Sampling event, occurrence, freshwater crab, *Geothelphusa*, environmental indicator

摘要

此資料集為 2013–2015 年於臺灣 42 處樣點，合計 146 次淡水蟹澤蟹屬物種與溪流環境的調查結果，共發現 12 種 1,006 隻澤蟹。澤蟹的調查項目包括存在與否、背甲寬、背甲長、濕重及性別，溪流環境的調查項目包括水溫、pH 值、溶氧量、導電度與三項溪流環境指標（河川汙染指數 RPI、水質指數 WQI7 及定性棲地評估指數 cQHEI）。

關鍵詞：取樣事件、發現紀錄、淡水蟹、澤蟹、環境指標

Introduction

For decades, there are several indicators developed to evaluate the actual status and trends of freshwater, a vital resource for life on earth, including environmental indicators (Gupta and Gupta 2021, Rankin 1989, Plafkin *et al.* 1989, Uddin *et al.* 2021), biological indicators (Hellawell 1986, Merritt *et al.* 2008), and aggregative indicators (Singh and Saxena 2018).

Freshwater crabs live in rivers, streams, waterfalls, wetlands, karsts, and caves; many are semi-terrestrial. Almost all species require pristine water conditions to survive and are inferred to be excellent indicators of good water quality (Yeo *et al*. 2008, Cumberlidge *et al.* 2009). In addition, *Geothelphusa* species (*Geothelphusa dehaani*) is officially used as the biological indicator of good water quality in Japan (Ministry of the Environment 1985, 1992, 2006, 2022). Nevertheless, only a few studies focus on the relationships between freshwater crabs and freshwater

physicochemical parameters (Fadlaoui *et al*. 2021), and there is no study that has evaluated the relationships between the freshwater crabs and the freshwater quality.

In order to offer more data for studying the relationships between the freshwater crabs and their environments, we collected data on the freshwater crab genus *Geothelphusa* (Decapoda: Potamidae) and their environmental parameters in 42 sampling sites (Fig. 1) from June, 2013, to June, 2015, in Taiwan. We conducted 146 sampling events (Table 1) and recorded 12 *Geothelphusa* species and 1,006 crabs.

Project details

Project title: Constructing monitoring system for the freshwater ecosystem—A study on indicator species of *Geothelphusa*

Funding: Endemic Species Research Institute, Council of Agriculture, Executive Yuan, Taiwan.

Study area descriptions:

Twenty-two sites (52.4%) had been monitored in southern Taiwan in 2011 (Huang and Chen 2014), and 20 more sites were located in eastern and northeastern Taiwan.

Bounding Coordinates: South West [21.959, 120.601], North East [24.751, 121.664]

Taxonomic coverage

General taxonomic coverage description: All the crabs were identified and recorded to species level, but a few individuals labelled as "Geothelphusa" were too small to identify the species. Twelve species and 1,006 individuals of *Geothelphusa* were recorded.

Taxonomic ranks

Species:

Geothelphusa albogilva 黃灰澤蟹 ,

Geothelphusa bicolor 雙色澤蟹 ,

Geothelphusa caesia 藍灰澤蟹 ,

Geothelphusa cinerea 灰甲澤蟹 ,

Geothelphusa ferruginea 銹色澤蟹 ,

Geothelphusa ilan 宜蘭澤蟹 ,

Geothelphusa lili 力里澤蟹 ,

Geothelphusa olea 黃綠澤蟹 ,

Geothelphusa pingtung 屏東澤蟹 ,

Geothelphusa shernshan 神山澤蟹 ,

Geothelphusa tawu 大武澤蟹 ,

Geothelphusa tsayae 蔡氏澤蟹

Temporal coverage: June 14, 2013—June 11, 2015

Methods

Method step description:

The water sampling and the seven parameters required to calculate two water quality indicators, River Pollution Index and Water Quality Index, including pH value, dissolved oxygen (DO), biochemical oxygen demand (BOD5), ammonia nitrogen (NH3-N), suspended solids (SS), fecal coliform (FC), and total phosphorus (TP), were operated following the protocols published by Taiwan Environmental Protection Administration in 2013.

Study extent description:

Freshwater crabs appear in almost all clean freshwater bodies, from moist lowland forests to rugged mountains (Cumberlidge *et al*. 2009). There are 57 recognized *Geothelphusa* species, with 39 species in Taiwan (Shy *et al*. 2021). Over 20 Taiwanese *Geothelphusa* species live in stream ecosystems below 500 m above sea level (Shy and Lee 2009). In this paper, the 42 sampling sites in Taiwan (Fig. 1) were all natural habitats of streams with an elevation distribution of 2-998 m, and 33 sites (78.6%) were below 500 m altitude. The data of the 22 monitoring sites were collected quarterly from the summer of 2013 to the summer of 2015, but some surveys were abandoned due to a lack of water-related data for the drought. The other 20 sites were surveyed only once in the summer and fall of 2014.

Sampling description:

Crab investigation

A complete search of 50 meters

along the stream was conducted at each site. Then, six traps baited with dry pet food (Fig. 2) were set overnight (Chen *et al*. 2003) to collect the *Geothelphusa* crabs. After identifying species and measuring the traits of carapace breadth, carapace length, wet weight, and sex, the captured crabs were released to their native habitats except for those with doubt in species identification needed for confirmation in the laboratory.

Environmental parameters investigation

The water temperature, pH value, dissolved oxygen, and conductivity of the sampling sites were measured by a water quality meter (Horiba U-53) in situ. The water samples used to measure the values of BOD5, NH3-N, SS, FC, and TP were preserved below 4 degrees Celsius and analyzed in the laboratory within seven days from collection. In addition, the score table of cQHEI was also recorded in situ.

The data of BOD5, NH3-N, SS, FC, and TP were used to calculate two water quality indicators: River Pollution Index (Liou *et al*. 2004) and Water Quality Index 7 (Wen 2006). The data of the score table of cQHEI were used to calculate the other environmental indicator: the citizen Qualitative Habitat Evaluation Index (Hoosier Riverwatch 2019).

Datasets

Dataset description

Object name: Darwin Core Archive A dataset of distribution of *Geothelphusa* (Decapoda: Potamidae) with their environmental parameters and stream indicators in Taiwan

Character encoding: UTF-8

Format name: Darwin Core Archive format

Format version: 1.5

Distribution:

https://ipt.taibif.tw/archive.do?r=crab-indicator

https://www.gbif.org/dataset/0528b82f-

bebb-49b0-ad2e-5082ae002823

Publication date of data: 2023-02-06

Language: English

Metadata language: English

Date of metadata creation: 2022-12-29

Hierarchy level: Dataset

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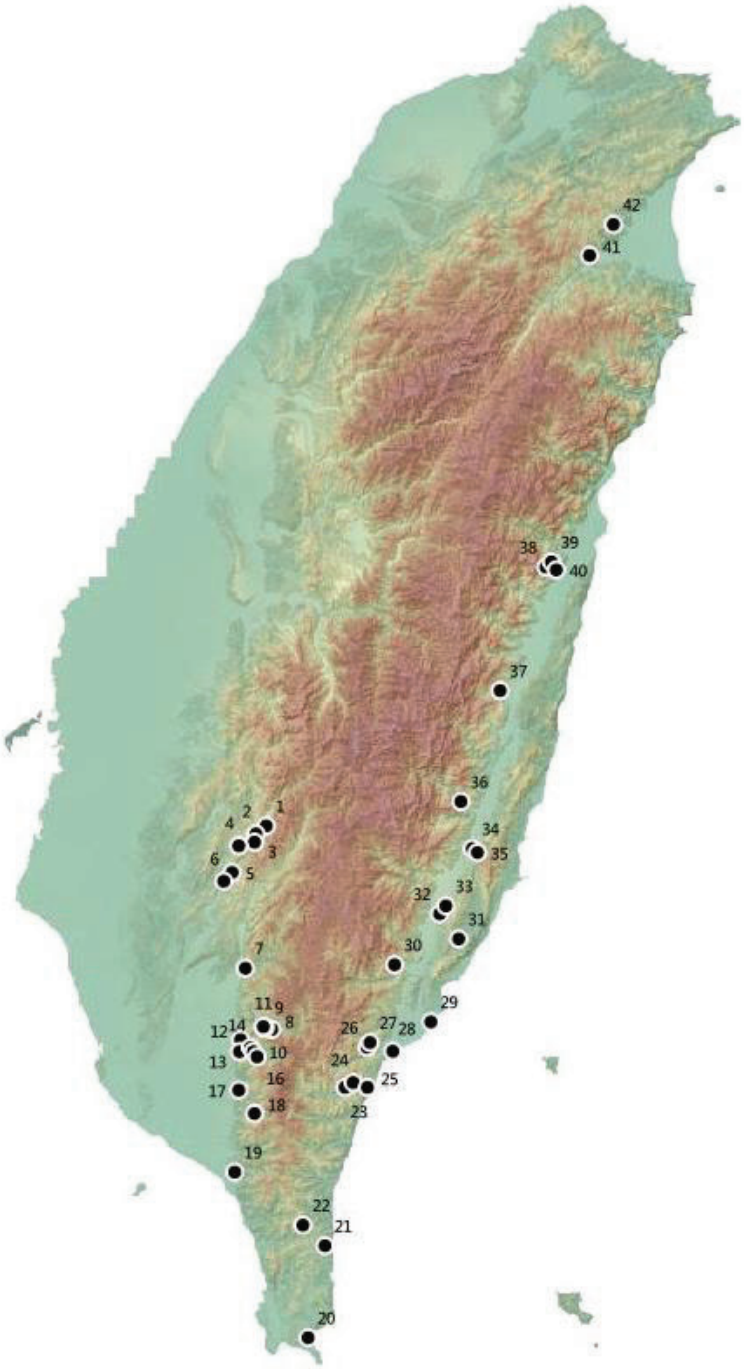

Fig. 1. The distribution of sampling sites. Data on the *Geothelphusa* species and their habitats were collected from 42 sampling sites in eastern and southern Taiwan.

圖 1. 樣點分布位置，澤蟹屬物種與其棲地資料收集自臺灣東部及南部地區42處樣點。

Fig. 2. The baited shrimp traps of size 30 cm (length) x 10 cm (diameter).
圖 2. 捕蟹之蝦籠，尺寸為長 30m、直徑 10m，並裝餌料誘捕。

Table 1. The time and frequencies of sampling events at the 42 sampling sites.
表 1. 42 處樣點的取樣時間與次數。

Survey Time		Sampling Sites																																								
Year	Season	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
2013	2								■			■											■																					
	3																	■	■			■																						
	4	■	■	■		■	■		■	■	■	■	■	■	■	■	■	■	■			■	■																				
2014	1	■	■	■		■	■											■	■			■	■																				
	2					■	■				■													■	■	■	■	■	■	■	■	■	■	■	■								
	3	■	■	■	■	■	■			■		■	■	■	■	■	■	■				■	■												■	■	■	■	■	■	■	■	■
	4												■	■	■	■	■	■				■	■																				
2015	1	■			■	■	■	■			■		■			■	■	■				■	■																				
	2		■	■					■	■		■		■	■				■	■	■																						
Sampling Events		5	5	6	4	7	7	4	5	2	7	6	6	6	6	7	7	7	2	4	6	8	9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1