

Chapter 33

Building Local Community Awareness of Horseshoe Crabs in Kujukushima, Nagasaki, Japan

Chihiro Nishimura and Chikako Iwaoka

Abstract Kujukushima is one of the several habitats of the horseshoe crab *Tachypleus tridentatus* in Japan. However, this is not widely known by local residents. This article introduces networking activities concerning horseshoe crabs in Kujukushima, Nagasaki, Japan.

The Kujukushima Aquarium was reopened in July 2009. It averages about 400,000 visitors a year with approximately 30 % of them being children. It is a community-based aquarium. Previously, there was only one horseshoe crab exhibition tank, but in the newly renovated aquarium, the horseshoe crab exhibition area is much expanded. Exhibitions include living horseshoe crabs (adults, juveniles, eggs), information on their life history and ecology, and activities on community awareness building and origami (related to marine life) for children. The horseshoe crab laboratory is set up behind the main exhibition room.

The Kujukushima Aquarium is collaborating with the University of Nagasaki. University students, who are studying regional policy with a focus on eco-tourism, participated in the design of the new aquarium. The collaborative work aims to build community awareness and provide quality education on the importance of horseshoe crab conservation. In the aquarium, the students participate as volunteers in the horseshoe crab exhibition and in programs for children once a month in the children's educational playroom.

Former students have organized and established the Kujukushima Ramblers' Club for building community awareness and conservation of horseshoe crabs. They started up the project, the *Kabuto-ganikki* (Horseshoe Crab Diary), and garnered support from the Kao Corporation in 2009 and 2011 as a part of their corporate social responsibility program (CSR). Such kind of cooperation between the aquarium

C. Nishimura (✉)

Department of Regional Policy, Faculty of Economics, University of Nagasaki,
123 Kawashimo, Sasebo, Nagasaki 858-8580, Japan
e-mail: cnishimu@sun.ac.jp

C. Iwaoka

Kujukushima Aquarium, 1008 Kashimae, Sasebo, Nagasaki 858-0922, Japan

and the university serves as a good model to fulfill education goals for both the university and the community.

Keywords Kujukushima • *Tachypleus tridentatus* • Networking activities • Building community awareness

33.1 Introduction

Nagasaki Prefecture is not large in area (4,094 km²), but its coastline is quite complicated, having what is called a “saw-tooth” coastline. Because of this, Nagasaki Prefecture has the longest coastline (4,137 km) in all the administrative divisions of Japan. The notable feature of horseshoe crab habitats in Nagasaki is that many small habitats are scattered along this complicated coastline, and there may be many undiscovered habitats where surveys have not yet been conducted. Therefore, there is a possibility of finding new habitats and spawning sites in the future.

Figure 33.1 shows the distributions of horseshoe crabs in Japan and Nagasaki Prefecture. Habitats in the Seto Inland Sea have almost disappeared, leaving behind Kyushu Island being the main horseshoe crab habitat in Japan. Conservation activities in Nagasaki Prefecture, therefore, are especially important for the survival of horseshoe crabs in Japan.

At the New York symposium in 2007, Iwaoka reported on public awareness activities, including cooperation with local fishermen, exhibitions and environmental education activities in the old aquarium, lectures at elementary and junior high schools, field excursions, the use of mass media, and collaboration with the local

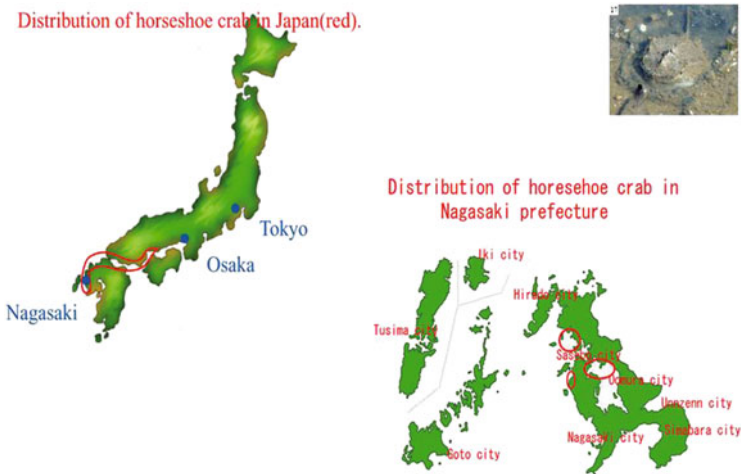


Fig. 33.1 Distribution of horseshoe crabs in Japan and Nagasaki Prefecture

government (Iwaoka and Okayama 2009). In the next symposium in Hong Kong in 2011, we reported on a new network for building community awareness concerning horseshoe crabs in Kujukushima, Nagasaki, Japan. This new network was established between the aquarium and the university with university students studying regional policy helping out in various activities. After these two symposia, we have extended our community-based conservation work to local residents. The aim of this article is to introduce and describe the network for the conservation of horseshoe crabs in Kujukushima.

33.2 Kujukushima and the Aquarium

The Kujukushima Islands are located within the Saikai National Park and consist of many small islands which have saw-tooth coastlines (Fig. 33.1). Though “Kujukushima” means “99 islands” in Japanese, there are in fact 208 islands in the area. The Kujukushima Islands have relatively long natural coastlines forming various habitats such as rocky beaches, sandy beaches, tidelands and algal beds, which provide diverse environments for the survival of the horseshoe crab.

The aquarium is located in Sasebo City, Nagasaki Prefecture (Fig. 33.2). Not only the breeding and exhibition of flora and fauna but also public awareness programs and investigation and research activities by local residents are emphasized. For example, the biggest horseshoe crab in Japan was found here. It was dried and preserved, and is now displayed in the aquarium. An American horseshoe crab,



Fig. 33.2 Saikai National Park Kujukushima Aquarium “Umikirara”

Limulus polyphemus, long considered to be an alien species, was found by local residents in a supermarket parking lot. It was delivered to the aquarium by local police. Staff specialists working at the aquarium provide environmental education on horseshoe crabs and tidal flat observation for local resident groups, school groups, etc. Through these activities, we hope that more information on horseshoe crabs from this region will be collected and their conservation value will receive more recognition.

The Kujukushima Aquarium opened at the Saikai Pearl Sea Resort in 1994 and was renovated in 2009. It is a compound type facility having an exhibition pavilion containing a model ship, an IMAX dome theater, and an aquarium. The aquarium operates under the concept of community-based aquarium. Through investigation and research, the aquarium collects information on local flora and fauna with an aim to raise the interest and concern of local residents on them.

Before the renovation, there was only one tank for horseshoe crabs, and no place was available for conservation activities. The new aquarium possesses live display of various life stages of horseshoe crabs (adults, juveniles, eggs) with information on the life history and ecology being shown. Community awareness building, and marine life related activities are organized for children (Fig. 33.3). The horseshoe crab laboratory is set up behind the exhibition area. There are two tanks that are filled with eggs and juveniles. The backyard, where breeding, investigation, and research are undertaking has been enhanced as well. The latest findings of horse-



Fig. 33.3 Horseshoe crab section in Kujukushima Aquarium before and after reopening

shoe crabs provided by staff or local residents can be written directly on a map of the Kujukushima Sea area. With such efforts, we believe that the awareness of the conservation of horseshoe crabs among children of Sasebo will be growing.

33.3 Cooperation with the University Laboratory

33.3.1 *The University Laboratory*

The University of Nagasaki (Sasebo Campus) is only an 8 min drive from the Kujukushima Aquarium. Students from the Department of Regional Policy, Faculty of Economics studying building community awareness participated in the planning and execution for the expansion of the horseshoe crab section of the aquarium. Figure 33.4 shows the conceptual diagram of their study which adopts a trans-scientific approach and is largely field-based with emphasis on evidence-based policy and practice. Another feature is a focus on the “glocal (global and local)” perspective. Kujukushima is one of the field sites of their study and typical activities are shown in Fig. 33.5. These activities include walking in the countryside (Fig. 33.5a) and sea kayaking in the Kujukushima Sea (Fig. 33.5b). These activities are compulsory for all laboratory students. The students shop in the local fish market (Fig. 33.5c) and do their cooking of the seafood (Fig. 33.5d) caught in the Kujukushima Sea. This program is now adapted for children. The visitor experience in the aquarium was measured using psychological and physiological parameters

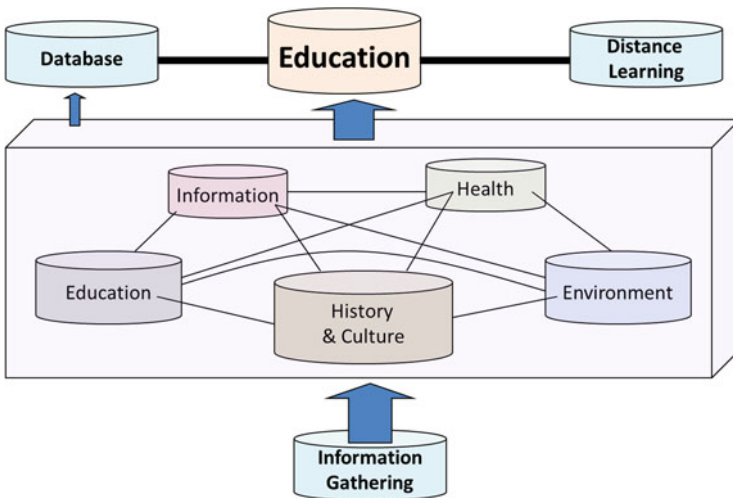


Fig. 33.4 Conceptual diagram of the study in the Department of Regional Policy, Faculty of Economics, The University of Nagasaki



Fig. 33.5 Typical activities for the university laboratory around Kujukushima



Fig. 33.6 Measurements of psychological and physiological effects on visitors to the aquarium

(Fig. 33.6). The photo at the center shows the training of the guides for introducing horseshoe crabs to visitors.

The students are also involved in guided tours for introducing horseshoe crabs to visitors using exhibition panels and videos, and they assist in horseshoe crab origami activities (they can complete an origami horseshoe crab within 3 min!) and a program for children once a month in the children’s educational playground.

The aims of these activities are to educate the visitors and enhance their community awareness of the conservation of horseshoe crabs.

The university laboratory students held various activities in the aquarium that formed part of their research for the graduation reports. For example, a female student was involved in the production and delivery of a picture story based on a folk tale of the horseshoe crab (Fig. 33.7a). Some students took charge of the exhibition (Fig. 33.7b) or children's educational programs, which included card-making on Mother's Day, a quiz about Kujukushima and its associated flora and fauna, a picture story show, a short play, and Christmas-tree making (Fig. 33.7c). A female student (Fig. 33.7d) researched on the degree of recognition of the concept of this aquarium by local residents. Two university students participated in a Chinese intensive program in the university and published in Taiwan a picture book of horseshoe crabs (Fig. 33.7e, f). The male student (Fig. 33.7f) took charge of storytelling in Chinese and Japanese at the children's educational playroom and at an elementary school.

33.3.2 *Kujukushima Ramblers' Club*

Kujukushima Ramblers' Club is a citizens' group established in 2001 by students graduated from the University of Nagasaki (Sasebo Campus). When the club was just established, activities only included walking and sea kayaking around Kujukushima but later were extended to building community awareness and horseshoe crabs conservation. Students and graduates of this university started the *Kabuto-ganikki* (horseshoe crab diary) project in 2009. *Kabutogani* means



Fig. 33.7 Various activities planned and led by University students

horseshoe crab and *nikki* means diary in English. The combination in one word means “diary or record of horseshoe crabs.” This club was supported by Kao Corporation in 2009 and 2011 as a part of their corporate social responsibility (CSR).

33.3.3 Educational Programs for Children

Programs for children are offered in the children’s educational playroom and the horseshoe crab section in the Kujukushima Aquarium. Figure 33.8 shows the participation of the children in making a very big origami horseshoe crab with the help of the university students in June of 2011. The size of that origami horseshoe crab is even bigger than the largest biological specimen collected in Japan (Fig. 33.9). The contents and time periods for exhibitions in the horseshoe crab section in the aquarium are shown in Table 33.1.

According to tradition, a pair of horseshoe crabs brings luck. In Japan, they are often mentioned in speeches in wedding ceremonies because, traditionally speaking, people believe that a pair of horseshoe crabs stays together forever. In 2011, The Kujukushima Ramblers’ Club held an event called “Pictures with Horseshoe Crabs,” and couples and families who visited the aquarium took pictures with preserved horseshoe crabs on St. Valentine’s Day (Fig. 33.10). After obtaining permission, pictures were exhibited in the horseshoe crab section in the aquarium a month later.

33.4 Evaluation and Future Prospects

The Kujukushima Aquarium was reopened in July 2009. This community-based aquarium was designed with the help of the University of Nagasaki students who studied regional policy with a focus on eco-tourism. The aims are to build the



Fig. 33.8 Horseshoe crab origami in the children’s educational playroom at Kujukushima Aquarium

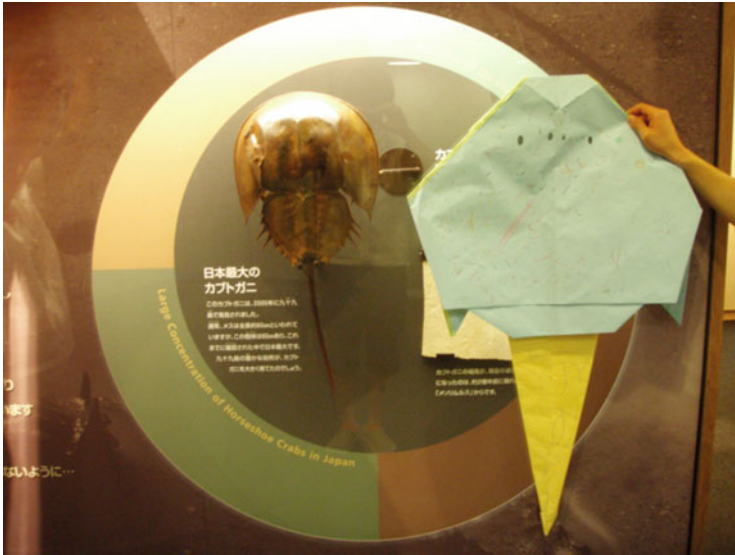


Fig. 33.9 This giant origami horseshoe crab is bigger than the largest specimen of horseshoe crab ever found in Japan

Table 33.1 Exhibition list for children in the horseshoe crab section in the aquarium

1. Habitat (2009.07–2009.08)
2. Natural monument (2009.08–2009.10)
3. Conservation (2009.10–2009.11)
4. Events (2009.11–2009.12)
5. Exchanges (2009.12–2010.01)
6. Kujukushima Ramblers’ club (2010.01–2010.03)
7. Ecotourism (2010.03–2010.04)
8. Community building in Japan (2010.03–2010.05)
9. Education for children (2010.05–2010.09)
10. Story around the world (2010.09–2011.02)
11. Public awareness (2011.02–2011.06)

community awareness and provide the general public education on horseshoe crab conservation. Figure 33.11 shows the mode of cooperation between the aquarium and the university. Their activities reflect the community-based concept of the Kujukushima Aquarium. The exhibition presented by university students catches visitors’ interest and is very popular. Moreover, various advices from the university especially with regard to the building of community awareness provide much support to the aquarium staff and strengthen the recognition of the importance of horseshoe crabs among local residents and visitors. In addition to field surveys in collaboration with the university, a program that makes the horseshoe crab a motif is offered in the children’s educational playroom. It seems that this may be a chance to successfully instill a concern for valuable living organisms such as horseshoe crabs in the next generation. The aquarium intends to strengthen the cooperation



Fig. 33.10 "Pictures with horseshoe crabs" on Valentine's Day

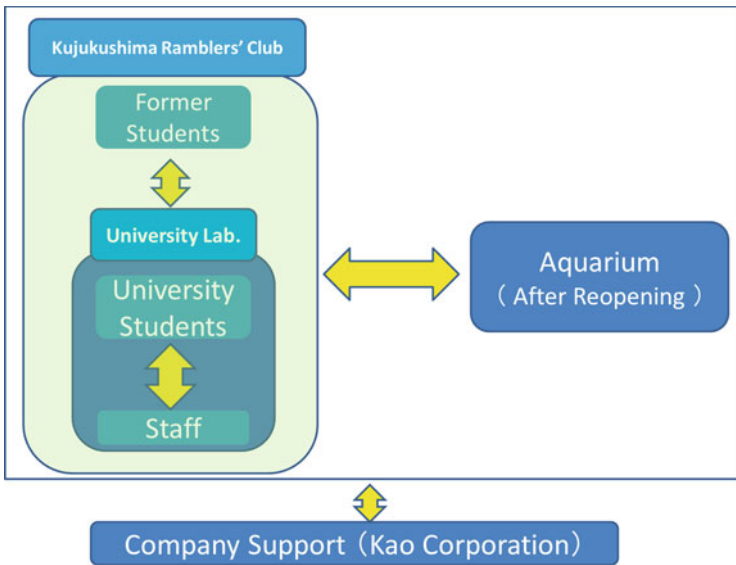


Fig. 33.11 The model of cooperation between the University of Nagasaki and the Kujukushima Aquarium

with local residents and local educational institutions on the conservation of horseshoe crabs and to continue to provide community-based activities in the future. On the other hand, the personal development of the university students was observed with abilities to take action, and skills in thinking and teamwork much enhanced. It suggests that such kind of cooperation between the aquarium and the university serves as a good model to fulfill education goals for both the university and the community.

33.5 Conclusion

As mentioned above, such cooperation on horseshoe crabs is underway in Kujukushima, and new efforts have been made from a local perspective. We would like to extend our effort to regional collaborations and establish a network in East Asia on the conservation of horseshoe crabs. It is well known that Japan has had a deep connection with China and Taiwan in a range of areas including natural, historical, cultural, and economic. A typical example is the establishment of friendship cities between Japan and China such as between Hirado City, Japan and Nan'an City, China, and between Nagasaki City, Japan and Fuzhou City, China. We wish to study the conservation of horseshoe crabs from a trans-scientific approach with all of our Asian friends.

Acknowledgments These activities were supported by the Kao Community Museum Project of the Kao Corporation. Mr. S.E. Rife provided helpful advices on the manuscript. The authors thank Kao Corporation and Mr. S.E. Rife for their support.

Reference

Iwaoka C, Okayama T (2009) Public awareness and community-based conservation for the horseshoe crab at Saikai National Park in Nagasaki Prefecture, Japan. In: Tanacredi JT, Botton ML, Smith DR (eds) *Biology and conservation of horseshoe crabs*. Springer, New York, pp 571–581