Freshwater crabs of Gunung Singai, Sarawak: diversity and potential criteria for integrated water catchment management policies

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Abstract

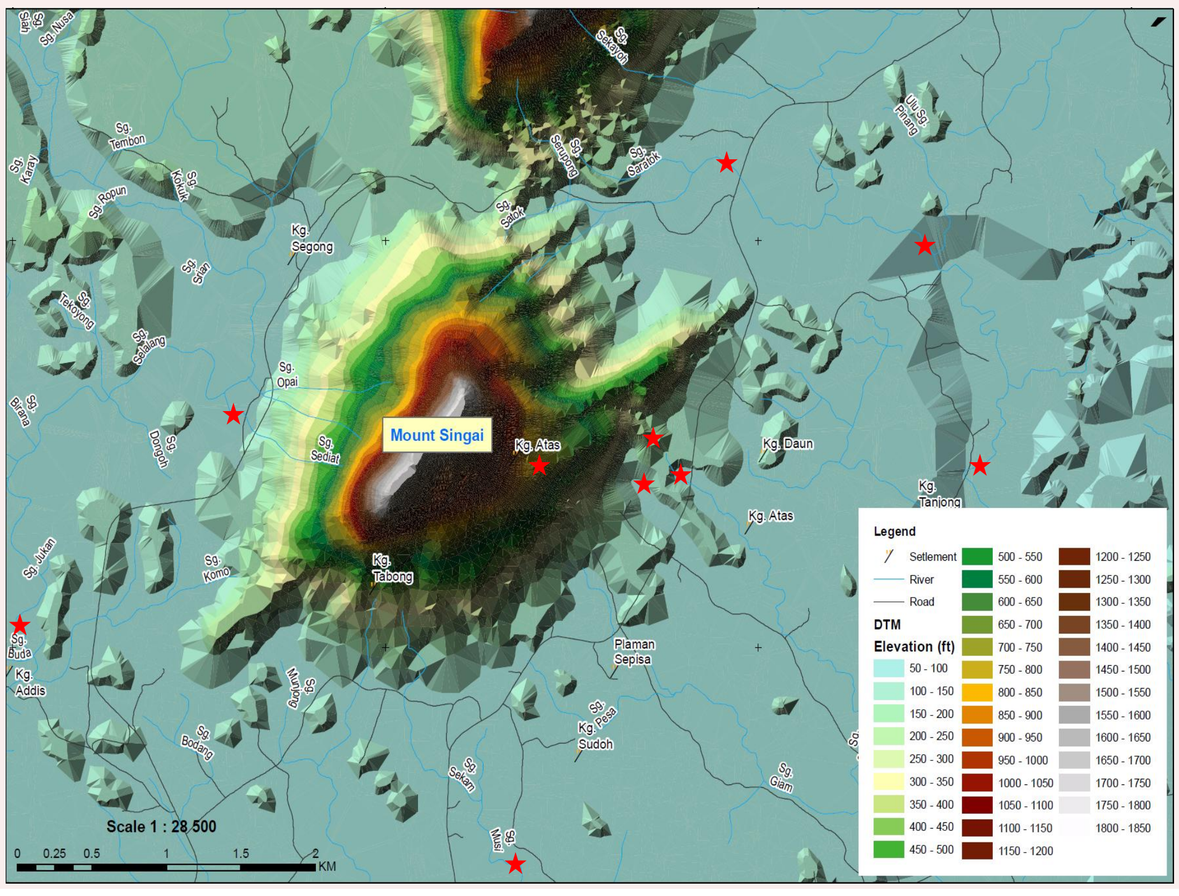
Integrating biological diversity into water catchment management policies has the potential to enhance our understanding of the complexity of interrelationships between organisms and environment and contribute to wise utilization of natural resources. In the case of Sarawak's Gunung Singai, a two-year study found that freshwater crabs have potential to be incorporated into water catchment management policies in the area. First, in terms of conservation value, freshwater crabs of Gunung Singai are fairly diverse, consisting 10 species, all of which are endemic to Borneo, and two (*Ibanum pilimanus* and *Isolapotamon bauense*) classified as 'Threatened' in IUCN Red Lists. Secondly, the distribution structure of freshwater crabs on Gunung Singai is strongly correlated to habitat types and seasons. Some species are widely distributed across the water catchment area, but a few tend to be restricted in habit use (*I. bauense*, *I. collinsi*, *I. doriae* and *Terrathelphusa kuchingensis*). Three semi-terrestrial species were also found in the area, either in holes at localized sites or under leaf litters. The study found that semi-terrestrial species were commonly encountered during the rainy season. Thirdly, from an ecological perspective, freshwater crabs play important roles in nutrient cycling and also as prey to larger animals. The presence of freshwater crabs in streams in large number can help maintaining the integrity of the ecosystem. Ethnozoological value are insignificant in the area, but consuming freshwater crabs (*I. bauense*) had been practiced in the past, and are occasionally harvested at present. Considering these important attributes, integrated management of water catchment in Gunung Singai in the future need include freshwater crabs as one of biological parameters. **Key words**: diversity, freshwater crab, Gunung Singai, water catchment

Introduction

Integrated management has been stressed in the Agenda 21 of Rio Declaration on Environment and Development as a practical approach for sustainable utilization of natural resources and to minimize the consequent conflicts of developments (United Nations, 1993). As a signatory to the Declaration through Federal Government of Malaysia, the State of Sarawak has adopted the principle in the management of river basins, water resources, and coastal zones (www.did.sarawak.gov.my, www.siwrs.com.my). The elements that have been integrated in the resources management including economics, societies, cultures, and physical features of the systems. In contrast, biological components such as animals and plants have not been well emphasized partly because of insufficient information and lack of experts in the management teams. Because environment and organisms have always been interrelated, integrating biological diversity into water catchment management policies has the potential to enhance our understanding of the complexity of the interrelationships and contribute to wise utilization of natural resources. This paper highlights the potential criteria of freshwater crabs that can be incorporated into water catchment management policies in Gunung Singai, Sarawak in the future.

Materials & Methods

A two-year study was conducted at Gunung Singai and its surrounding area (see Map), covering streams, swampy habitats and forest floor. Techniques used for crab sampling were electro-shocking in 100 m stretch, capture-mark-recapture along 50 m stream transect, and pitfall trapping. Interviews with local assistants were performed to record information on crab consumption and ethnozoological practices by Basingai community. All data were incorporated with information from literatures (Hill & O'Keefe, 1992; Yeo et al., 2008) to classify potential criteria of freshwater crabs for integrated water catchment management.



Results & Discussion

The study classified three criteria of freshwater crabs that have potential to be incorporated into water catchment management policies. In terms of **conservation value**, freshwater crabs of Gunung Singai were fairly diverse, consisting 10 species, all of which are endemic to Borneo. The 10 species were *Ibanum pilimanus* Ng & Jongkar 2004, *Isolapotamon bauense* Ng 1987, *I. borneense* Ng & Tan 1998, *I. collinsi* Holthuis 1979, *I. consobrinum* (De Man 1899), *I. doriae* (Nobili, 1900), *Parathelphusa sarawakensis* Ng 1986, *Perithelphusa borneensis* (Von Martens 1899), *Terrathelphusa kuchingensis* (Nobili 1901) and *Geosesarma bau* Ng & Jongkar 2004. *Ibanum pilimanus* and *Isolapotamon bauense* are classified as 'Threatened' in IUCN Red Lists. The **distribution structure** of freshwater crabs in the area was strongly correlated to habitat types and seasons. Some species were widely distributed across the water catchment area whereas *Isolapotamon bauense*, *I. collinsi*, *I. doriae* and *Terrathelphusa kuchingensis* tend to be restricted in habit use. Three semi-terrestrial species were also found in the area, either in holes at localized sites (*Isolapotamon bauense* and *Terrathelphusa kuchingensis*) or under leaf litters (*Ibanum pilimanus*). The study found that semi-terrestrial species were commonly encountered during the rainy season. From an **ecological perspective**, freshwater crabs play important role in nutrient cycling and also as prey to larger animals. The presence of freshwater crabs in streams in large number can help maintaining the integrity of the ecosystem. **Ethnozoological value** are insignificant in the area, but consuming *Isolapotamon bauense* had been practiced in the past, and are occasionally harvested at present. Considering these important attributes, integrated management of water catchment in Gunung Singai in the future need include freshwater crabs as one of biological parameters.

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References

Hill, M. P. & O'Keefe, J. H. (1992). Some aspects of the ecology of the freshwater crab (*Potamonautes perlatus* Milne Edwards) in the upper reaches of the Buffalo River, eastern Cape Province, South Africa. *South African Journal of Aquatic Science* 18, 42-50

United Nations. (1993). *Earth Summit: Agenda 21 The United Nations Programme of Action from Rio*. United Nations Department of Public Information, New York. ISBN 92-1-100509-4

www.did.sarawak.gov.my (2012). *Department of Irrigation and Drainage Sarawak*. Accessed on June 2012

www.siwrs.com.my (2012). *Sarawak Integrated Water Resources Management: Management Master Plan*. Accessed on June 2012

Yeo, D. C. J., Ng, P. K. L., Cumberlidge, N., Magalhães, C., Daniels, S. R. & Campos, M. R. (2008). Global diversity of crabs (Crustacea: Decapoda: Brachyura) in freshwater. *Hydrobiologia* 595, 275-286

Images (clockwise): *Geosesarma bau*, *Isolapotamon collinsi*, mark-recapture sampling, pitfall trapping, *Isolapotamon bauense* (inside hole & marked), *Terrathelphusa kuchingensis*, *Ibanum pilimanus*