

# Current Situation of Edible Snails in Indonesia

K. Schneider, U. ter Meulen, R. M. Marwoto & Soewondo Djojosoebagio

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## Summary

From March 7, 1995 to April 16, 1995 during the rainy season the utilisation of edible snails was investigated in Indonesia. To assess the current situation, the focus was put to answer the following questions:

- Is it feasible under the present circumstances to domesticate these snails with the aim to conserve the natural resources?
- Could any individual or private initiative be enhanced or utilized?
- Would local disadvantaged groups (traditional animal farmers, women or youths) be benefitted through domestication of these snails?
- Is there any existing private organisation or NGO, which already gathers and trades the snails or would be interested to do this in the future?

Snails gatherers, -dealers and -farmers were visited and interviewed on the following topics using standardised questionnaires: Spreading and ecology, ways of marketing, consumption habits, breeding and rearing. Diotopes were also visited and investigated.

## Results

**Spreading and ecology:** *Achatina fulica*, *Pomacea canaliculata*, *Pila ampullacea* and *Bellamia javanica* are eaten. The snails can be found all over Java.

**Ways of marketing:** The snails gathered in the biotope are either marketed directly or through various marketing paths. *A. fulica* is exported in large quantities. The population is therefore endangered.

**Consumption habits:** Snails are not eaten regularly. Snail meat is known to be healthy. The consumption depends on the consumer's ethnic background.

**Breeding and rearing experience:** with simple breeding systems for *A. fulica* and *P. canaliculata* are seldom found. The breeding of *P. canaliculata* is forbidden in Indonesia. There is no interest in breeding *P. ampullacea* or *B. javanica*. The breeding of *A. fulica* can benefit disadvantaged groups financially and help to conserving the natural snail population.

## Résumé

L'utilisation des escargots en Indonésie a été étudiée pendant la saison des pluies du 7 mars jusqu'au 16 avril 1995. Pour pouvoir juger la situation actuelle, on a mis l'accent de cette recherche à la solution des questions suivantes:

- Y a-t-il une possibilité de développer la domestication dans l'objectif de protéger les ressources naturelles sous les situations actuelles?
- Peut-on utiliser l'initiative présente des paysans?
- Peut-on encourager des groupes défavorisés (paysans traditionnels, femmes, les jeunes) par la domestication des escargots?
- Existe-t-il une organisation privée ou professionnelle, qui s'occupe déjà du ramassage des escargots et de leur commercialisation ou qui s'y disposerait.

A l'aide d'un questionnaire-type, on a interrogé les commerçants et les paysans qui récoltent les escargots, sur la distribution, l'écologie, le commerce, les habitudes de la consommation et finalement sur l'élevage des escargots. On a également enregistré les escargots dans leur biotope.

## Les recherches ont mené aux résultats suivants

**Espèces d'escargots:** On mange les *Achatina fulica*, *Pomacea canaliculata*, *Pila ampullacea*, *Bellamia javanica*. Ces escargots sont répandus sur toute l'île de Java.

**Le commerce:** On ramasse les escargots sauvages pour la vente directe, ou par un intermédiaire. On exporte une grande quantité d'*Achatina fulica*, par conséquence son espèce diminue.

**Les habitudes de la consommation.** On ne mange pas régulièrement des escargots, leur viande est estimée bonne pour la santé. La consommation dépend de l'ethnie des consommateurs.

**Élevage:** Il y existe des expériences ponctuelles avec des équipements d'élevage simples pour *Achatina fulica* et *Pomacea canaliculata*. L'élevage de *P. canaliculata* est interdite en Indonésie cependant il n'y pas d'intérêt d'élever *P. ampullaria* et *B. javanica*.

L'élevage de *Achatina fulica* pourrait aider les défavorisés à améliorer leur situation de vie et de même préserverait les populations des escargots sauvages.

## Introduction

Snailmeat has always been eaten in Indonesia. From the Seventies on, snails are exported in great quantities as well. In western Europe, under comparable conditions, the uncontrolled collection of snails in the wild resulted in a threatening decline of the affected populations. In order to assess the affected Indonesian snails, their stock was investigated by focusing on the answers to the following questions:

- Is it feasible under the present circumstances to domesticate these snails with the aim to conserve the natural resources?
- Could any individual or private initiative be enhanced or utilized?
- Would local disadvantaged groups (traditional animal farmers, women or youths) be benefitted through domestication of these snails?
- Is there any existing private organisation or NGO, which already gathers and trades the snails or would be interested to do this in the future?

The investigation may contribute to close some gaps in the knowledge in the following areas:

- spreading and ecology
- ways of marketing
- consumption habits
- breeding and rearing

The investigation supports the aims of the Rio de Janeiro Action Programme „Agenda 21 - chapter 15“ and was financially supported by the German Agency for Technical Cooperation (3) in the context of the tropic-ecological side programme (2).

## Methods

The investigation was carried out from March 7, 1995 to April 16, 1995 during the rainy season in Java, which is the island with the highest population density of all Indonesian islands. Most important centres of snail processing are located there. The investigation team first contacted local administrations in five different areas in Java and questioned them about activities in their department. Afterwards, snail gatherers, -dealers and -farmers were visited and interviewed using standardised questionnaires. Also, biotopes of snails were investigated and assessed, their population density was ascertained. Starting with the snail gatherer or -farmer, the investigation team followed the products to the local markets, to the kitchen and on to the export.

## Results

List of edible snail species found

**Table 1: Potential population expansion of edible snails in snail farms**

	<i>A. fulica</i>	<i>P. canaliculata</i>
Nests/Egg-cluster	4/year	4-10 /month
Eggs per nest/egg-cluster	75-300	400-700
Hatching rate	90%	95%
Generation interval	13 months	6 months

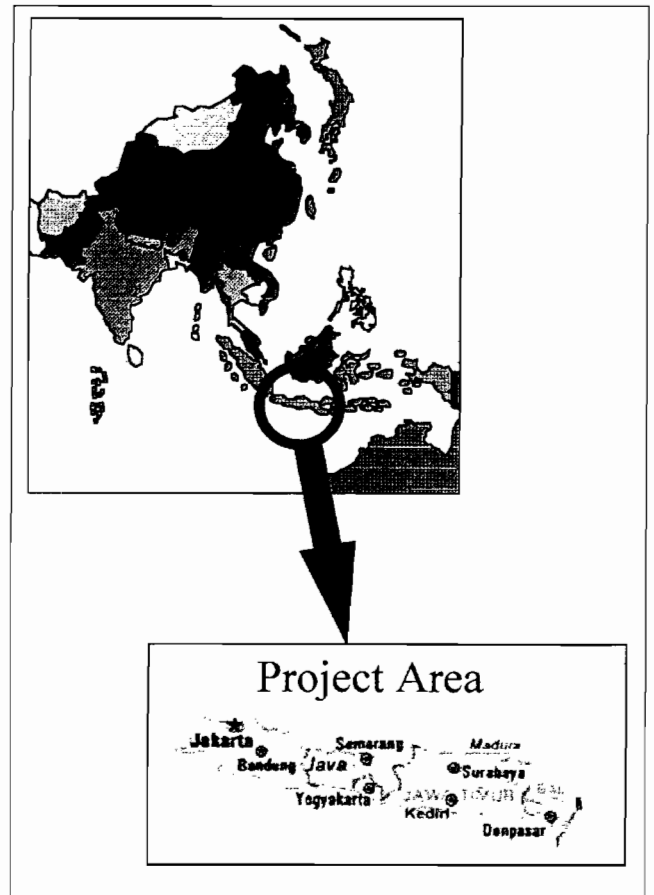


Figure 1: Project area : Java in Indonesia

### *Achatina fulica*

Indigenous name: Bekicot

*A. fulica* originally comes from Africa and was brought to Java about 1925, where it is now widely spread. At first the population density increased very fast and threatened to damage the crops (9). By now the population has settled on a relatively low level and to none of the interviewed persons is it a serious problem in their gardens or plantations any more.

With the shell length of 6 cm *A. fulica* reach sexual maturity. By that time they are at least 6 to 7 months old and weigh 35 g. The shell length of the adult animals reach about 100 mm to 130mm, occasionally up to 170 mm. The snails have a life expectancy of at least five years. Four times a year the animals lay about 75-300 eggs, 10 to 30 days after the egg-laying hatch the young snails, whereas the hatching rate amounts to 90 %. The snails are fattened for 5 to 6 months and with 33 g they are ready for marketing.

This snail finds suitable conditions near people and is therefore found in gardens, orchards and vegetable plantations, on rubbish heaps and on fallow land. In wood plantations with leafy undergrowth the snail is also found. The population density is very unstable and influenced by several environmental factors:

- Soil: chalky and loose soil with high humus content has a positive influence. Volcanic ashes can be very

detrimental.

- Food supply: mulch layers, rubbish heaps and weeds in gardens and plantations are good for snails.
- microclimate: windsheltered and moist places are preferred habitats.
- natural enemies and collecting: snail predators and the gathering of snails by man reduce the population density.

### ***Pomacea canaliculata***

Indigenous name: Keong mas

*P. canaliculata* is indigenous to South America and was brought to Indonesia in 1984. Approximate measurements are a height of up to 110 mm and a width of up to 100 mm. The aquatic snail spreads into all the five sample areas. Paddy fields, fish ponds, irrigation channels and shallow lakes are preferred habitats of this snail. It's population density can be extremely high, the demand on it's habitat is very low. The so called golden apple snail can appear in any water accumulation, even in sewers or in puddles with not more than one liter of water, animals and nests were spotted.

*P. canaliculata* reach sexual maturity by the age of 60 to 90 days and with the size of 25 mm. The animals may lay 20 cm above the waterline four to ten times per month pink coloured egg clusters containing 400 to 700 eggs each. Adult snails with a size of about 70 mm can lay egg clusters containing up to 1000 eggs, if feeded well. After 8 to 10 days and with 95 % hatchability, the 1,5 mm-sized little snails hatch. They can reach the age of three years..

The population density can be supported by the following factors:

- optimum water temperature of 27 °C
- low flow velocity of the occupied water
- sufficient food supply (dense vegetation)
- given structures for delivering the eggs (about 20 cm above watersurface - e.g. plants, walls, posts etc.)
- few natural enemies and not too much gathering.

The presently high population density is - especially in West-Java- a serious problem to irrigated cropping systems.

### ***Pila ampullacea***

Indigenous name: Keong gondang, Kool, Kreco

*P. ampullacea* is native to Java and lives in fresh water of the lowlands, lakes, ponds, marshes, irrigation works and in paddy fields. The large brown shell is rounded-pyriform, with inflated last whorl and comparatively low spire. Approximate measurements are a height of up to 100 mm and a width of up to 100 mm. The investigation team could only find a few specimens in the area around Kediri (Desa Tulungagung). But at the market places in the investigation areas of Bogor and Sukabumi, snails were sold which were supposedly gathered around these regions. Breeding takes place at the onset of the rainy season. Eggs are laid at the water's edge on plants or floating branches in egg cluster with 15 to 50 eggs.

### ***Bellamya javanica***

Indigenous name: Tutut, Kreco

*B. javanica* is also native to Java and lives in rivers, ponds and paddy fields. The shell is pyramidal, with elevated spire and rounded base. Height 34-40 mm, width 22-26 mm. The snail is found in lakes, pools, sawahs and rivers, where the water quality is not poor and where the population density of *P. canaliculata* is low. One female bears about 15-20 pulli at a time in her uterus. Of these the 4-6 embryos closest to the vaginal opening are on the point of hatching and are already well developed. The snail is viviparous.

### **Consumption habits**

Snail meat is prepared and eaten using varied recipes. The consumers say it is very healthy. Pregnant women, sick people and people rehabilitating from an illness are served snails. Snails are also recognised as a fast-ing dish. The steam, when inhaled, while cooking the snails is regarded as a remedy for asthma patients. The snail slime is also said to have healing qualities for skin diseases.

Meals containing snail meat are eaten at an average of six times per year. The slaughtering output differs from 13-45 % by the preparation method, resulting from the proportionate consumption of the intestines.

In central and eastern Java, snails are more often eaten than in western Java.

Snails are eaten mostly by people who live in the country. Indonesian farmers feed ducks, pigs, chicken and fish (tilapia, catfish and eels) using snails and slaughtering left-overs

### **Pathological aspects**

In the research area four local doctors were questioned on health risks resulting from the consumption of snails. None of them has ever had any experience with diseases brought on by snails. Eventually existing pathogens are surely killed in the course of the long cooking times (90 min). Any consumption of raw or insufficiently cooked soft parts of snails must be seriously rejected. *B. javanica* and *P. ampullacea* can serve as an intermediate host of a Trematode worm (Echinostoma), containing the cercaria stage. Neither the gatherers nor workers in snail factories show specific diseases caused by the handling of aquatic snails.

**Table 2: Comparing Prices**

Goods	Quantity	Price (RP)
<i>A. fulica</i>	1 kg	250-300
<i>P. canaliculata</i>	1 kg	800-1000
Chicken	1	5000
Egg	1	150
Goat	1	80.000
Cow (for work)	1	1.000.000
Buffalo (for meat)	1	1.200.000
Moped, 100ccm	1	1.300.000

## Ways of marketing

Upon analysing the market structure, two types of marketing were found.

1. Direct marketing involves a family which collects and sells either live or processed snails to a consumer.
2. The animals can also reach the consumer through various marketing paths with either one or more traders.

*A. fulica* is marketed both ways. The snails are not sold to regional markets. The largest quantity of snails is processed and exported by a factory located in Kediri. The factory started processing *A. fulica* in 1989. The capacity of the factory is 50 ton/day but only about 10 ton/day is processed because of the limited amount of gathered snails. The factory has suppliers with trucks who buy the snails from the gatherer in the villages. Because of the limited amount of raw material it is difficult for the managers to make supply contracts with customers. The customers order the processed snails and were put on a priority list.

The manager noticed, that the size of the snails and the amount of snails, gathered in the villages recedes year by year. The factory processes 732 to 1,420 ton living *A. fulica* snails per year.

*P. ampullacea* and *B. javanica* are sold to the regional markets. At some of the major markets in the research area, up to 50 kg of live snails are offered daily. These snails are not exported.

The Indonesian government forbid the marketing and breeding of *P. canaliculata* in 1993, because great damage to irrigation systems was caused by snails which had escaped from their breeding ponds.

Snail gathering is a very profitable job for the rural population. A gatherer who gathers 50 kg *A. fulica* per day can earn 12.000 to 15.000 RP, while a worker earns only 2400 -5000 RP a day. If there is also a market for *P. canaliculata*, a gatherer can earn up to 50.000 RP a day.

## Breeding and rearing

Experience with simple breeding systems are seldom found for *A. fulica* and *P. canaliculata*. The breeding systems for *P. canaliculata* were either destroyed or given up and there is no interest in breeding *P. ampullacea* or *B. javanica*.

The following breeding forms were used for reproduction and fattening of *A. fulica*:

- snail garden with hut
- pens in different models
- snail fattening boxes.

Table 3: Total *Achatina fulica* collected (kg)

Village	1990	1991	1993
Babat	65,000	39,000	24,000
Tuban	54,000	28,000	19,000
G.Kidul	38,000	24,000	19,000

*P. canaliculata* can be bred in ponds or large containers without any problems. The snails can breath oxygen in the air as well as in the water and are therefore not dependent on the water quality.

There are no known diseases for both snail species, although in the 60's intensive research was made to find a disease of *A. fulica*, in order to control the population density by spreading pathogens artificially (9). But there are other nonbiotic impacts that might influence population density sustainably in a negative way, as there are e.g. draughts or volcanic eruption with rains of ash. Some times *A. fulica* snail farms have problems with predators like rats and ants.

## Danger of snail extinction

The collected amount of *A. fulica* is continually declining. Obviously this is due to the pressure put on the snails by collecting them.

*P. canaliculata* is expanding in Indonesia, there is no danger to this species.

*B. javanica* is not in demand and this species is not endangered.

*P. ampullacea* is also not important for culinary usage, but the population density is decreasing probably due to the competition with the introduced *P. canaliculata*.

## Conclusion

The observations show that there is a low consumption of edible snails in Indonesia and the snail population is not influenced by this consumption. However, gathering of *A. fulica* for export could endanger this species. Although *A. fulica* is not a indigenous species but brought in by accident, it would not be advisable to drive it out of Java, because man and environment have adapted themselves to the existence of this snail during the past 70 years and *A. fulica* no longer causes any damage worth mentioning. The driving out of the snail would cause the loss of jobs, currency and raw material for animal nutrition.

To preserve the natural resources it seems to be necessary to domesticate especially *A. fulica*. The animal breeders are innovative and are willing to invest in a „new“ animal species. The marketing of snails is already well organized and the demand for additional quantities is given. Disadvantaged groups (traditional animal farmers, women or youths) could find an income in snail breeding as well as in snail processing. There is still a need to clear up the questions about basic biological parameters, breeding systems, feeding and management. The following points should be given priority:

- Efficiency and possibilities to optimize breeding systems.
- Feeding of snails with residue from agriculture and agroindustry.
- Basic biological parameters: importance of drought dormancy for growth and reproduction and the possibility to influence these.

In contrast to the conventional domestic animals, snails are extremely well adapted to the hot and humid tropical climate and can fully develop to their potential.

According to first experiences, domestication is possible. In the future, snail breeding can contribute to food security in the humid tropics.

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## AVIS

Nous rappelons à tous nos lecteurs, particulièrement ceux résidant dans les pays en voie de développement, que TROPICULTURA est destiné à tous ceux qui œuvrent dans le domaine rural pris au sens large.

Pour cette raison, il serait utile que vous nous fassiez connaître les adresses des Institutions, Ecoles, Facultés, Centres ou Stations de recherche en agriculture du pays ou de la région où vous trouvez. Nous pourrions les abonner si ce n'est déjà fait.

Nous pensons ainsi, grâce à votre aide, pouvoir rendre un grand service à la communauté pour laquelle vous travaillez.

Merci.

## BERICHT

Wij herinneren al onze lezers eraan, vooral diegenen in de ontwikkelingslanden, dat TROPICULTURA bestemd is voor ieder die werk verricht op het gebied van het platteland en dit in de meest ruime zin van het woord.

Daarom zou het nuttig zijn dat u ons de adressen zou geven van de Instellingen, Scholen Faculteiten, Centra of Stations voor landbouwonderzoek van het land of de streek waar u zich bevindt. Wij zouden ze kunnen abonneren, zo dit niet reeds gebeurd is.

Met uw hulp denken we dus een grote dienst te kunnen bewijzen aan de gemeenschap waarvoor u werkt.

Dank U.