



Mariculture in SE Sulawesi, Indonesia: Culture practices and the socio economic aspects of the major commodities



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ABSTRACT

South East Sulawesi, Indonesia (120° 45'–124° 06' E: 3°–6° S) has a rapidly developing mariculture sector. The sector essentially consists of small scale farmer owned/leased, operated and managed systems located mainly in rural coastal villages. The study was aimed at evaluating the nature and the socio-economics of the major culture practices in SE Sulawesi. The number of households engaged in mariculture in SE Sulawesi increased from 9929 in 2001 to 31,086 in 2012. Over the same time the culture area increased from 1193 ha to 26,950 ha and production from 9400 t to 640,226 t, with the main commodity, being the seaweed species *Kappaphycus alvarezii* (cottonii) and *Eucheuma denticulatum* (spinosum), accounting for more than 95% of the production, followed by grouper species. In addition farming of lobster, winged pearl oyster and sea cucumber, all based on seedstock collected from the wild, also occurs. In this paper the practices of the four major commodities cultured in SE Sulawesi, viz. seaweed, groupers, lobsters and winged pearl oyster are described and are based on information collected through a number of surveys conducted in the Buton and Muna Islands and in Kendari, in 2012–2013. Accordingly, information on the farming communities, such as the average age of farmers, years of farming experiences, education level and other related aspects together with information on the culture cycle duration, yields, and costs involved for each commodity are presented. For example, in seaweed culture the annual production (by dry weight) per farm ranged from 0.4 to 42 t/yr (mean 6.1 t/year) and the crop size ranged from 0.1 to 10.0 t/yr (mean 1.2 t/yr), and equates to around 1 t/ha and 6 t/ha/yr (assuming 6 crops per year). Operating costs for seaweed culture ranged from IDR 0.01–10.7 × 10⁶ (mean IDR 2.08 × 10⁶), and were mainly for purchase of seed (63%), fuel (20%) and labour (16%). Cost of Production (CoP) ranged from IDR 1000–8000/kg (mean IDR 4900/kg). Policies, strategies and planning to further develop mariculture in SE Sulawesi will need on-going support of farmer clusters, along with training in business management and marketing that will help empower farmers and provide them with the ability to have more influence on the market chain. Environmental factors will also need to be taken into account when planning the development of new and expanding mariculture activities, particularly changing environmental conditions associated with monsoonal weather patterns, and ensuring impacts of farming activities on the environment are minimised.

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1. Introduction

In a previous publication (Sahrir et al., 2014) the importance and relevance of mariculture developments to the Island of Sulawesi,

and in particular the relatively improvised South East Sulawesi Province (120° 45'–124° 06' E: 3°–6° S) of the Island was highlighted. Furthermore, there is an indirect importance of this province, being at the centre of the coral triangle that imposes numerous challenges with regard to ensuring the region's biodiversity when embarking on mariculture development. Briefly, Indonesia is a major aquaculture producing nation globally, with a

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recorded production of 7,937,072 t in 2011, valued at US \$ 7.485 billion, which approximates 9.5% and 10.4% of global and Asian production, respectively and in value of 5.5% and 7.0% (FAO, 2014b). On the other hand, mariculture in SE Sulawesi, as a commercial activity commenced around 2000 when the Provincial government and the associated regencies recognised mariculture development as a major strategy to provide livelihood opportunities, as well as contribute to the economy of the region (Dinas Kelautan dan Perikanan, 2009). The number of households engaged in mariculture in SE Sulawesi increased from 9929 in 2001 to 31,086 in 2012 (Data Source: Dinas Kelautan dan Perikanan Provinsi Sulawesi Tenggara). Over the same time the culture area increased from 1193 ha to 26,950 and production increased from 9400 t to 640,226 t (Sahrir et al., 2014). Mariculture production in SE Sulawesi is primarily dominated by small to medium scale, farmer owned/leased, operated and managed systems dominated in volume by production of seaweed (*Kappaphycus alvarezii*, “cottonii” and *Eucheuma denticulatum*, “spinosum”) and in monetary value by grouper species (e.g. *Epinephelus fuscoguttatus*, tiger grouper, *Cromileptes altivelis*, mouse or humpback grouper etc.). In 2012, for example, seaweed production accounted for more than 95% of total mariculture production in SE Sulawesi (Data Source: Dinas Kelautan dan Perikanan Provinsi Sulawesi Tenggara). In addition to these two commodities, small scale aquaculture practices exist for spiny lobster, winged pearl oyster and sea cucumber.

This paper attempts to describe the prevailing mariculture practices and related socio-economic factors of the respective farming communities, based on extensive surveys conducted between 2012 and 2013. Accordingly, the prevailing culture practices on seaweeds, *K. alvarezii* and *E. denticulatum*, grouper species, lobster (*Panulirus* spp) and winged pearl oyster (*Pteria penguin*) are presented. In respect of each of the above commodities (a) production, (b) socio-economic aspects, and (c) disease occurrence are dealt with. It is expected that these data will provide useful information with regard to the farming practices that could be adopted in other regions in Indonesia and elsewhere, and also highlight the problems that are encountered by small scale mariculture farmers. The overall rapid development of mariculture practices in SE Sulawesi in relation to the prevailing policy *milieu* and the potential impacts on it from major developments on land are also highlighted.

2. Materials and methods

Production and revenue statistics were obtained from the Kementerian Kelautan dan Perikanan (Ministry of Maritime Affairs and Fisheries) (Kementerian Kelautan dan Perikanan) for 2003–2010, and Dinas Kelautan dan Perikanan Provinsi Sulawesi Tenggara (Department of Marine and Fisheries of South East Sulawesi) (DKP), the governmental authority responsible for provincial agriculture and fisheries developments, for 2011–2013. The primary data on the farming activities were collected through a structured questionnaire, farm visits and farmer interviews. This questionnaire(s) was initially tested with randomly selected stakeholders (farmers, village farm cooperative leaders, collectors, wholesalers), and suitably modified based on the responses received, before the revised version was used in the main survey. In this regard the experiences gained in the past on, for example, surveys of catfish farming practices in the Mekong Delta, Vietnam (Phan et al., 2009) by some of the researchers in the group, were used to improve the questionnaire and make it more user friendly. The interviewers were trained in the interviewing process, and two interviewers were always involved in each farmer interview.

Villages and commodities to be the focus of the survey were selected by general consensus of DKP regional and district staff, staff of the Faculty of Fisheries and Marine Science, Halu Oleo University who have been involved in mariculture research and development activities in the past, and district representatives from the mariculture industry who participated at an initial consultation convened for the purpose (Kendari, September 2012). Mariculture farmers to be surveyed were drawn from villages in the Regencies of Kendari, Muna Island and Buton Island, SE Sulawesi (Fig. 1). Although mariculture is developing along almost all of the coastline of SE-Sulawesi, these areas are where a larger acreage of farms operate (Dinas Kelautan dan Perikanan, 2009). The commodities selected were seaweed, lobster, grouper and winged pearl oyster, which are the dominant species cultured in these areas (Aslan et al., 2008; Dinas Kelautan dan Perikanan, 2009).

A total of 104 farmers from Kendari (Purirano and Tondonggeu villages), Muna Island (Bahari, Renda and Napabalo villages) and Buton Island (Palabusa village) were surveyed (Table 1). Renda and Palabusa had been part of an earlier study (Albasri et al., 2010). Each farmer was asked a series of questions that covered general

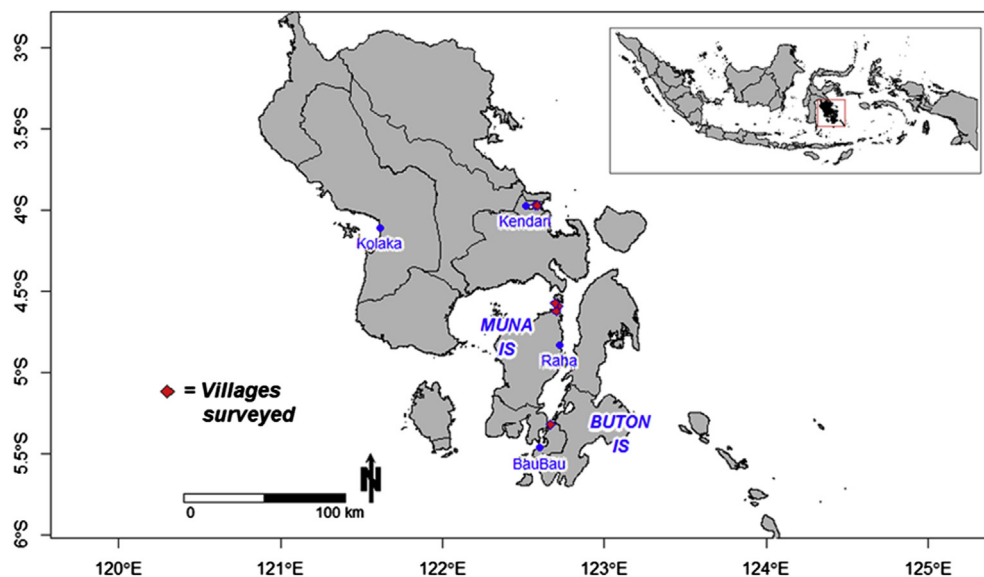


Fig. 1. SE Sulawesi showing location of villages where farmers were surveyed (inset: Indonesia showing location of SE Sulawesi).

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