Purpose and Objectives
Livelihood development strategies in fishing communities of Indonesia are implemented to encourage and improve participation of fishing communities to diversify livelihoods. This study aims “to assess the livelihood development strategies and resource management in fishing communities towards resilience in Indonesian coastal areas.” Livelihood strategy here focuses on diversification of livelihood through developing seaweed farming in fishing community and other livelihoods outside fisheries. Resource management would concern the management of marine resources through the zoning system in coastal areas harnessing the productivity of each area including mangrove, pond culture, coral reef, seaweed, fishing, and Marine Protected Area (MPA). Evaluation of fisheries management policies is also included in the analysis and discussion of this study.

This study has five specific objectives: 1) to explore the impact of depleted capture fisheries on livelihood activities of fishing communities, 2) to evaluate the livelihood strategies to adapt the decline of fisheries resource impacts, 3) to assess the constraints and opportunities of seaweed farming development in sustaining fisheries resource and fisheries livelihoods, 4) to evaluate the impact of marketing system of fisheries resources on livelihood activity in coastal areas, and 5) to provide recommendations for enhancing resilience in fishing communities. The first objective would be discussed in detail in Chapter 4, and describe in other chapters. The second objective would be explained mainly in Chapter 5, and refer to Chapter 4. The third objective would be discussed in Chapter 6, with the fourth objective to be answered in Chapter 7. The conclusions and recommendations would be described in Chapter 8.

Chapter 2: Methodology
A series of studies were conducted in the eastern part of Indonesia, namely: 1) Laikang Village in Takalar District; 2) Village of Garassikang, LP. Bahari and Ujunga in Jeneponto District, South Sulawesi Province; 3) Pengambengan Village in Jembrana District, Bali Province. Data collection was conducted during three periods: August to September 2010, February to March 2011, and November 2011. Interviews were conducted by using structured and semi-structured questionnaires, by using qualitative and quantitative questions. In South Sulawesi, respondents were covered fishermen/seaweed farmers, fishermen’s wives, seaweed traders/collectors, seaweed exporters, seaweed processing companies, and local fisheries officers. In Bali, the target of respondents were fishermen, fish collectors, owners of purse seine boats, fish traders, and fish processing companies.
Some key informants from marine and fisheries offices of Bali Province and Jembrana District, The villages and local NGOs were also interviewed. The analysis tools adopted consist of: 1) descriptive analysis, 2) a likert type scale analysis, 3) benefit-cost analysis, 4) SWOT analysis, 5) comparative analysis, and 6) qualitative contents analysis.

Chapter 3: Theoretical review

This chapter analytically described interrelation of common-pool resource management in fisheries, livelihood development and its development toward community-self resilience and environmental sustainability, as long as these are concerned with purpose and specific objectives of this study.

Common-pool resources in many parts in the world provide a critical support to the human and natural life in sustainable way. If coastal areas have been managed well, then the coastal resources can contribute to development of local economy towards self-resilient in livelihoods and food production at local level. Currently, “tragedy of the commons”, which is the real effect of malpractice in resource management having been warned by a number of scientists over a period of many years, occurred since stake holders have not learnt from previous bitter experiences and some of them have never stopped exploiting the resources without better and under control.

Many countries in Southeast Asia including Indonesia have improved the policy and regulation framework for community-based management of fisheries and coastal management. However, they have still faced problems caused by commitment and consistency of human behavior in implementing the policy and regulations. Based on successful experience of Indonesia, the community based management system is the best alternative to manage coastal resources. Developing livelihoods strategy can be added into management system as a tool to improve community participation and capacity building of fishing community. Double strategy of livelihood activity is one way that could be adapted to sustain and improving fishermen household economy.

Chapter 4: Socio-economic impact of overpressure of Indonesian capture fisheries: Case study of purse seine fishery in Bali Strait

The fishermen in Jembrana have experienced first-hand the various impacts of overfishing of Bali Strait in their daily, monthly or annual activities during the “fish crisis” such as on 2010 to 2011. This condition has given multi player effect to not only fishermen but also processing companies and fish traders. Both boat owners and crew members did not have any option to perform alternative activities outside of the fisheries to meet their daily requirements because the “crisis” is longer than as the period of off-fishing. To adapt this situation, some crew fishermen often worked as construction workers in Denpasar or other cities in Java, and some worked as agricultural laborers in other villages in Jembrana. The boat owners and captains/fishing masters sold their assets to survive their life and maintain of other assets during the “fish crisis”. In fisheries management, establishing joint governors decree (JGD) that manage the operating permits of purse seine boats, mesh size of purse seine nets, zoning, and fishing grounds were not effective yet to control fishing in the Bali Strait. There are many illegal fishing practices that triggered conflict between fishermen related fishing gear and fishing ground. Hence, management body is urgently needed to tackling management in Bali Strait with including community surveillance as part of whole management system.

Chapter 5: Developing livelihood strategies on fishing communities in South Sulawesi coastal areas

Small-scale natural resource management (SNRM) project is one of the successful coastal projects to improve household economy of fishermen by encouraging the prospective fisheries activities, such as seaweed culture and fish peddling. Most of fishermen (77% of total respondent) planted the seaweed with long line floating method after participate in SNRM. At present, seaweed farming plays an important role in the socio-economic condition of fishing communities as the main income source, besides fishing activity. Eighty-seven % fishermen’s income as respondent increased to the
range IDR. 0.5 Million – 1 Million, because seaweed farming gave them additional income that led their income increased. However, they could not fulfill the financial requirement in planting season due to the lack of financial management. To adapt with two monsoon seasons, fishermen change farm (plots) location to Jeneponto during May to November, and they moved to Takalar side during December to April. However, some factors such as changes monsoon seasons, marketing channel, quality of seaweed seed, farm ownerships and commercial price need more attention for improving the quality of seaweed and environment. All of these considerations would be as factors to sustaining seaweed farming in South Sulawesi particularly.

Chapter 6: An assessment of opportunities and constraints of seaweed farming in sustaining livelihoods and fisheries resources

Seaweed farming (Eucheuma cottonii) has become the main livelihood for fishers in the studied area, with providing the major source of income. Capture fisheries have been replaced by the seaweed farming. There were several constraints which prevented from development of seaweed farming, such as disease, shifts in the monsoon season, marketing constraints, low quality of seaweed seeds, and farm ownership. Yet another obstacles were predatory behavior and imperfections in post-harvest methods. However, farmers have made much effort to overcome these obstacles. Positive factors are related to domestic and export market demand of dried seaweed, and supported national policy could be a great opportunity for developing seaweed farming, beside high profit resulted from seaweed farming compared with other fishing activities. The important advantage of seaweed farming was a sharp increase in household income. Thereby encourage participation of family labor and community in pre to post harvest of seaweed farming. Moreover, local stakeholder had set up coastal zones based on local and scientific knowledge to sustaining coastal environment and livelihood activities. They divided Laikang coastal area into 4 main zones: mangrove zone, seaweed farming zone, sea grass and coral reef, and brackish fish pond. Boat track and tourism area were outside of these main zones under consideration of coastal management.

Chapter 7: Impact assessment of marketing system of dried seaweed on sustainable livelihood activities in fishing community

The marketing system of seaweed (Eucheuma cottonii) has provided benefits, such as speedily supplying investment and daily operational funds without interest, to seaweed farmers through the efforts of middlemen. However, such an exclusive link between fishermen and middlemen has created a heavy dependency on middlemen and, consequently, brought a monopoly in marketing. The existence of middlemen is crucial in the dried seaweed supply chain, as long as the local/central government could not implement a better and effective market chain for seaweeds at local level. This traditionally disadvantageous relationship between middlemen and seaweed farmers would be maintained in the absence of government intervention and big industry players that could offer more equitable business terms to further encourage seaweed farming. Fishermen sold the dried-raw seaweed to middlemen at village. The middlemen sold dried seaweed to wholesaler at district after the stock was enough for shipping. The wholesaler could sell the dried seaweed for two possibilities to exporters and/or processing company at province. Dried-raw seaweed is exported to some Asian countries, European countries and United Stated of America (USA). Meanwhile, the dried-raw seaweed sold to processing company that produced Alkali Treatments Cottonii (ATC) and Semi Refined Carrageenan (CRC) as intermediate products. These products are used for domestic supply to foods, cosmetics, and health industries. For this case, market demand of domestic and export is become main factor to determine seaweed production. It would encourage fishermen to improve not only the production volume, but also value-added product and expanding farm area.

Chapter 8: Conclusions and recommendations

As a case study of purse seine fishery in Bali Strait, uncontrolled exploitation with ever-increasing catch effort and management malpractices have caused a reduction of fisheries resource. "Fish
crisis” was the cause of “collapse” of livelihood in fishing communities. In this case, all parts of the supply chain including fishermen, traders, processing plant and factory have been adversely affected and have ceased their economic activities.

At present, seaweed culture becomes the “prime mover” for household economy rather than capture fisheries in Laikang Bay. It could be as a double strategy for fishermen’s income sources to sustain their livelihood. This is one way to response for decreased fish production. However, this strategy could not generalize to apply in all type of fisheries. In Pengambengan, alternative livelihoods of both outside and inside fisheries have not yet been diversified. There is less alternative resource available and job opportunities are scarce. Therefore, fishermen, boat owners, and captains sell their assets to adequate daily expenditures and maintain another asset (for boat owners) as short-term adaptation.

The constraints of developing seaweed farming in coastal area of Indonesia can be divided into 4 major factors that are related to: 1) farming activity, including pre-farming, planting, harvesting and drying, 2) marketing system including market channels and prices, 3) financial management, and 4) environmental changes. However, livelihood diversification through seaweed farming succeeded in improving domestic economy as well as family member participation in income generating activities.

Market channel of fishes is dynamics. It always gives an opportunity for fishing community participates in marketing process. As industrial raw material such as Sardinella lemuru (SL), the channels has already fixed from fishermen directly distributed to processing companies with pass through to the fish auction only for weighing and data recorded. For other fishes, the new market players can develop distribution cell individually or cooperate with others and can be improved by themselves according to market opportunities. Market channel of seaweed product such explained in Chapter 7 is fixed by exporters and processing companies as end users at local. Product diversification from seaweed for human food is not yet developed in Indonesia. This is the reason that marketing system of seaweed cannot be equated with conventional fish marketing system. Fishermen are still satisfied with existing market channels of dried seaweed.

Finally, this study proposes four main recommendations according to the outcomes of analysis:

1. Encouraging self-monitoring of coastal and marine resources uses by all stakeholders. In this case, fishing community and local government should collaborate to perform one management body, which responsible in managing the fisheries management area and livelihood development.
2. Livelihood diversification on fisheries and non-fisheries products, and improving alternative fishing technology are better choices against the capture fishery resource depletion.
3. Sustaining seaweed farming by expanding the potential farm area in an optimal and environmentally friendly way to meet the market demand for seaweed, improving farmers’ knowledge about production technique, quality control, business management and marketing practices, environmental protection and farming technique.
4. Improve existing market channels by giving participation opportunities to coastal communities and develop the cold chain system for fish product. On the other hand, shortening the market channels of seaweed by formalizing the “seaweed cooperative” at the local level, besides maintaining existing market channels is advisable. Modification and creating alternative marketing channels is needed to address the stable price at the farm level.

Finally, the type of alternative livelihood that recommended of this study can be applied to other places with the same characteristics. Livelihood diversification is the key factor for fishing community to achieve self-resilience against decrease and depletion of fisheries resources in coastal areas. However, these study findings should be further evaluation for possible implication for livelihood development strategy and coastal resource management.