II LITERATURE REVIEW

2.1 Marine and Coastal Resources Value

Coastal and marine natural resources divided by two, there are: the renewable natural resources such as fisheries and their ecosystems (Mangrove, coral reefs, sea grass) and non-renewable resources such as oil and gas, sand, mining, etc (Clark, 1992). According to CIDA in Dahuri (2001), in 1987, total of coastal and marine development economic value about Rp.36.6 Billions or 22% from Gross Domestic Product (GDP) and indirect for supporting Indonesia economic (60%). In 1990, economic contributions of marine sector increase to be Rp.43.3 Billions or increase 24 % from GDP and absorb the employees about 16 million people. The increasing contribution caused by the activities of oil and gas, fisheries and tourism (Robertson et al., 1992).

Indonesia have area of coastal and marine about 5.8 million Km2 with the density of fisheries in economic value is about 82 billion US $ per year and about 24 million hectares of Indonesia shallow water is suitable for Mariculture with production about 47 million ton/year (Dahuri, 2004). On the other hand Indonesia have oil and gas resources with 60 hydrocarbon basins, where 22 basins have not been explored and 38 basins have been explored. Out of 38 basins 15 have been producing and 70 percent of the oil and gas activities in the coastal area, such as: drilling, refinery, shipping, etc (BP/MI GAS, 2004).

According to Koa and Daya (2004), “Petroleum-related activities have contributed significantly to wetland loss in the Delta. Canals altered natural hydrology by altering water flow pathways, increasing saltwater intrusion, and reducing overland flow and sediment inputs. The combination of these factors increased plant stress and plant death”. As we know, coastal area ecosystems are important to support sustainability fish production, so that the loss or destruction of ecosystem will decline of fish production.

70 percent of the oil and gas activities in Indonesia are located in coastal area. These activities can have an impact on the local communities in the coastal area where the most people have their livelihood from artisanal fisheries (80 percent from the Indonesia fisheries is the artisanal fisheries (Dalzell et.al., 1996)). During 40 years later, Indonesia has been exploited oil and gas to enhanced national economic growth. These activities have given direct or indirect bad impact to other resources. According to Kusumastaniko et al (1998) mallaca strait including: Aceh, North Sumatera and Riau have net value as follows: to net benefit of each management options are US $
105,714,289.85/km for beach protected areas and US$ 118,405.77/km for set back zone. Based on that fact, if the oil and gas deposit is over, in the future it would be better to prepare the fisheries sector as an alternative sector for national growth.

2. Coastal and Marine fisheries

Turner, 1998 said that coastal areas are under intense environmental change and have extensive feedback effects between the natural system and the human system. Indonesians coastal ecosystems are very diverse as the ecological and economic functions. For example, 1) mangrove (wide: 5,209,543. 16 Ha in 1982, and 1993 becomes 496,185 Ha (Dahuri et al, 2001), Kusumastanto et al (1996) said the net benefits of Indonesia Mangrove forest of each management option are US$ 17,391.78/ha for sustainable management, US$ 9,825.20/ha for milk fish and shrimp sylvofishery, US$ 12,259.16/ha for Polyculture sylvofishery (Milk fish and Shrimp) and US$ 14,789.20/ha Shrimp Sylvofishery. 2) Coral reefs, with the sustainable yield of fishes 60,882 ton/km2/year (Dirjen Perikanan,1993) and with wide total about 50,000 Km2 (Gosa et. al, 1996), Kusumastanto et. al. (1998) said the net benefit of each management option are US$ 19,872.52/ha for coral reefs protected areas and US$ 21,48/ha for sustainable Seaweed Harvesting; 3) Sea grass, with sustainable yield for grases 26,700 Ha and productions about 428,400 ton/year (Dirjen Perikanan, 1993). These ecosystems is very important for sustainability of fisheries in Indonesia, but the increasing of development in coastal area was caused degradation of these ecosystems.

Coastal resources exploitation has shown the negative impact for artisanal fisheries and local people, especially the fisherman, because they're the poorest people and very vulnerable from these activities. Government role to facilitate and establish the regulation for poor people are needed, for example, Indonesian Law of Oil and Gas, Number 22/2001, it is stated that oil and gas activities must create the labor, increase social welfare, equity and to keep sustainable environment, and announced by .

Based on the oil and gas data and expands to the future, to concern the fishery sustainability for artisanal fisheries are very important. In this case Indonesia's Ministry of Mines and Energy had regulatory approval requirements which they argue hinder their efficiency. One concern foreign oil companies have with the new law is the granting of a limited authority to regional governments to tax oil companies' profits.

If we compared with coastal length of Indonesia, the production of Indonesian fisheries is still not optimal. The reason are development of fisheries in Indonesia still in
the low levels and the increasing of development in coastal area that changes function of conservation zone to become development zone. On this case, the artisanal fisheries get the direct impact because they are lack on capital, technology and market.

2.3. The Impact of Oil And Gas Activities to the Fisheries

Among all the diversity of human activities and sources of pollution, we can distinguish three main ways that pollutants enter the marine environment: (i) direct discharge of effluents and solid wastes into the seas and oceans (industrial discharge, municipal waste discharge, coastal sewage, and others); (ii) land runoff into the coastal zone, mainly with rivers; (iii) atmospheric fallout of pollutants transferred by the air mass into the seas' surface (Baker, 1975; Carter, 1988; Clark, 1986).

Oil and gas activities will give impact to wetlands and coastal ecosystems, through the various stages of oil and gas development including oil exploration, site access, site preparation, drilling, production, pipeline installation, spill control and cleanup, and site closure. Koa and Daya (2004) "The ecology of the coast is susceptible to oil and gas-related activities for a number of reasons: (1) the high productivity of wetland vegetation is dependent on natural hydrologic flows that provide nutrients and sediments to the Mississippi Delta; (2) artificial levees, canals, and impoundments disrupt the natural hydrologic and in turn affect plant health and sediment dynamics; (3) subsidence due to depressurization from oil and gas production enhances subsidence; (4) pipeline building for transporting oil and gas produced inside the coastal zone and from the Outer Continental Shelf, disrupts the natural hydrologic regime and provides additional stresses; (5) spilled oils deteriorate vegetation habitats; (6) spilled oil and produced water stress estuarine consumers by increasing turbidity, introducing toxins, etc., and (7) loss of wetland area decreases the value of the estuarine zone as a nursery ground for estuarine consumers (e.g., shrimps and fishes) and its economic value to human economy.

Oil or gas pipeline activities can be impact to and disturbance of potentially sensitive environments; changes in the lifestyle of local populations and socio-economic impacts; risk of soil and water contamination. Oil pipelines also present a risk of soil and water pollution as a result of chronic or accidental hydrocarbon spill-over.

Oil spills can give an impact to disruption of plant-water relationships, plant metabolism, toxicity to living cells, and reduced oxygen (Koa and Daya, 2004) and biological impacts after oil spill area (Dicks, 1999) are includes: 1) Physical and chemical
alternation of natural habitat; 2) physical smothering effect of flora and fauna; 3) lethal or sub-lethal toxic effects on flora and fauna; 4) change in biological communities resulting from oil effects on key organism.

The spills effect to fish and shell fish eggs and larva which are found in plankton, especially as their sensitivity to oil pollution. However, there is no definitive evidence that the induced mortalities of fish and shell fish eggs and larva in the open sea have result in significant effect on future adult population. More viscous oil tends to be retained in greater quantities as surface accumulation than less viscous oil. Broken uneven and gently sloping shore lines with a large tidal range can hold more oil than step, smooth shores with a small tidal range. If sediment are penetrated by the oil, than considerable quantities may help likelihood of long term retention and longer term impacts is greatly increased. However, the more viscous nature of weather oil may result in reduced penetration compared to fresh, less viscous crude's (Dicks, 1999).

Ballou et al, 1989 said Fresh untreated oil had severe long-term effects on survival of mangroves and associated fauna. Oil which was chemically dispersed just off shore had minor effects on the mangroves but affected corals. (This experiment is described in more detail in the IPIECA report Biological Impacts of Oil Pollution: Coral Reefs,), and Thomas et al, 1987 said Mangroves treated with pre-dispersed light crude oil (emulating a well-dispersed slick moving inshore) showed no greater mortality than was found in untreated plots. High-pressure sea-water washes applied to the mangroves the day after oiling with no dispersed oil were ineffective in reversing oil toxicity, as were post-oiling washes containing a non-ionic water-based dispersant.

4 Resources Damage Assessment

According to Grigalunas et al, 1998, there are two types of regulations available for assessment of natural resource damages:

Type A is standard simplified procedures requiring minimal field investigation
Type B, protocols for conducting assessments in individual cases, type B Assessment requires a multistage administrative process, with opportunities for public and Potentially Reponsible Party (“PRP”) participation in the latter stages. The stages of a Type B Assessment are summarized as follows:

1) Pre assessment Phase. This phase provides for notification, coordination, and emergency action.
Assessment Plan Phase. If the trustees decide to proceed with a NRDA, the Assessment Plan ensures that the assessment is performed in a planned and systematic manner and that the methodologies chosen demonstrate a reasonable cost.

2) Type B Assessments. The process for implementing Type B assessments has been divided into the following three phases:

- Injury Determination phase. In this phase, the trustees formally establish that one or more natural resources have been injured as a result of a release of a hazardous substance.
- Quantification Phase. The purpose of this phase is to establish the baseline condition of the injured resource, the areal and temporal extent of the injury, and estimates of the likelihood and time for recovery.
- Damage Determination Phase. The purpose of this phase is to establish the appropriate compensation expressed as a monetary value for the injuries to natural resources. The regulations include guidance on acceptable cost estimation and valuation methodologies for determining compensation based on the cost of restoration, rehabilitation, replacement, and/or acquisition of equivalent resources, and the lost value of the injured resources from the time of injury until the resources recover or are restored.

3) Post-assessment Phase. This phase requires a Report of Assessment containing the results of the assessment and it documents that the assessment has been carried out according to regulations.

A natural resource damage assessment process is used to determine whether natural resources have been injured and to calculate compensatory monetary damages to be used to restore the natural resources. In addition to restoration costs, damages may include costs of conducting the damage assessment and compensation for interim resource services that occur before resource restoration is complete (U.S. Department of Energy, 1993) and Grigalunas et al., 1998 said, damage assessments typically must establish a cause and effect linkage between a spill, natural resources to the spilled substance, and injury to those resources from the exposure.

According to Pagiola, 2004, the four approaches to valuations, there are:

1) Determining the total value of the current flow of benefits from an ecosystem
2) Determining the net benefits of interventions that alter ecosystem conditions. This question typically arises in a project or policy context: Would the benefits of a given investment, regulation, or incentive justify its costs? It differs fundamentally from the previous question in that it asks about changes in flows of costs and benefits, rather than the sum total value of flows.

3) Examining how the costs and benefits of ecosystems are distributed. Different stakeholder groups often perceive very different costs and benefits from ecosystems. Understanding which groups are motivated to conserve or destroy an ecosystem, and why, can help to design more effective conservation approaches. From an equity perspective, the impact of conservation on particular groups such as the poor, or indigenous peoples, is also often of significant concern in and of itself.

4) Identifying potential financing sources for conservation. Knowing that ecosystem services are valuable is of little use if it does not lead to real investments in conserving the natural ecosystems that provide them.

Sathirathai, 1997 said that economic valuation methodology involves the monetary measure of a change in an individual's well-being due to a change in environmental quality. This measured value is known as Total Economic Value (TEV) which consists of Use Value (UV) and Non-Use Value (NUV). Use Values can be disaggregated into Direct Use (DUV), Indirect Use (IUV) and Option Values (OV). Non-Use Values are more difficult to define and measure, and can be subdivided into Existence (EV) and Bequest (BV) Value. Pearce and Warford (1993) breakdown and terminology vary from analyst to analyst, but generally include:

Direct use values refer to ecosystem goods and services that are used directly by human beings. They include the value of consumptive uses.

Indirect use values are derived from ecosystem services that provide benefits outside the ecosystem itself. Examples include the natural water filtration function of wetlands, which often benefits people far downstream, the storm protection function of coastal mangrove forests, which benefits coastal properties and infrastructure, and carbon sequestration, which benefits the entire global community by abating climate change. These functions often affect activities that have directly measurable values, allowing their value to be estimated.

Option values are derived from preserving the option to use in the future ecosystem goods and services that may not be used at present, either by oneself (option value) or by others/heirs (bequest value).
may form part of option value to the extent that they are not used now but may be used in the future.

Non-use values refer to the enjoyment people may experience simply by knowing that a resource exists even if they never expect to use that resource directly themselves. This kind of value is usually known as existence value (or, sometimes, passive use value).

According to Barton (1994), Economic valuation techniques enable use to estimate in money terms the direct and indirect use value, as well as the option, quasi-option, bequest and existence values. These techniques are:

1. Effect on Production (EoP), this technique, also referred to as the ‘change in productivity’ method, looks at the difference in output (production) as the basis of valuing related services. The technique mainly applies here to fisheries and tourism (producer surplus) to estimate the difference in value of productive output before and after the impact of a threat. The main challenge is the calculation of the changes in productivity in physical terms between the ‘with’ and ‘without’ scenario.

2. Replacement Costs (RC), the replacement cost approach is used to value the ecosystem service of coastal protection.

3. Damage Costs (DC), in the absence of coastal protection, the monetary damage to property and infrastructure from surge and storms can be enormous. Hence, the damage cost approach uses the value of the expected loss of the ‘stock at risk’ as a straightforward proxy for the value of the coastal protection service.

4. Travel Costs (TC), this approach is often used to estimate the welfare associated with the recreational use of a National Park, where the travel time or travel costs are used as an indicator of the total ‘entry fee’, and therefore, a person’s willingness to pay for visiting a Park. The further away

Contingent Valuation Method (CVM), the contingent valuation method tries to obtain information on consumers’ preferences by posing direct questions about willingness to pay and/or willingness to accept. It basically asks people what they are willing to pay for a benefit, or what they are willing to accept by way of compensation to tolerate a loss. This process of obtaining information may be carried out either through direct questionnaire/survey or by experimental techniques in which subjects respond to different stimuli in ‘laboratory’ conditions. Sought are personal valuations of the respondent for increases or decreases in the quantity of some goods, contingent upon a hypothetical market.
According to Bann, 1997, Benefits of Sustainable Mangrove Management divided by four are:

1. **Environmental Benefits**, as preserved biodiversity of the mangroves themselves, nutrients, and protection from sedimentation, for migratory birds and source of medicinal plants, decreased coastal erosion and increased protection against Coastal storms and tidal waves

2. **Benefits to Human Welfare**, sustainable flow of forest products, including wood products such as round wood, poles, fuel wood, and charcoal, and non-wood such as nypa palm shingles, bark for tannin, traditional foods, dyes, and kudzu

3. **Sustainable fisheries**, both mangrove fisheries and nearby marine fisheries, for which the mangroves provide nutrients and serve as spawning grounds and nurseries (mangrove fisheries) for finfish and crustaceans (shellfish), Recreation (ecotourism) for visitors to the mangroves, enhanced recreation for and scuba divers by filtering out sedimentation in offshore sea grasses and Protection of freshwater supplies (inland aquifers) from salination, by a ground water pump and barrier between the aquifers and the sea

4. **Benefits to Human Health**, increased protection from coastal storms and tidal waves due to the mangroves serving as a buffer zone, possible health benefits from the availability of medicinal plants and foodstuff (e.g., fisheries) in the mangrove areas

Global Benefits, for rehabilitation, conservation, and management of mangrove areas may increase carbon storage or prevent transforming areas to uses that decrease carbon sequestration or increase greenhouse gas emissions

**2.5 Sustainable Livelihood System For Artisanal Fisheries**

The artisanal fisheries are the poorest groups in the fisheries system, their workers are commonly in vulnerable. Many of the world's resources are at or beyond maximum yields can be sustained in the long term. The vulnerability of fisheries is decline and if those sectors are poor, their livelihoods are under threatened. Vulnerability is "the susceptibility of people to poverty. They may not be
poor or present but they livelihoods, or the external environment that shape them, may have features that risk movement toward poverty" (Campbell, 1999).

Sustainable Livelihood Approach (SLA) framework consists of five components: (1) the vulnerability context of the world in which the fisherman operate, (2) the livelihood assets of the fisherman, (3) the transforming structures and processes which affect their lives, (4) the livelihood strategies which the fisherman adopt, and (5) the outcomes they achieve or aspire to. The SLA is mainly concerned with the poor and vulnerable people, such as many of the groups who depend on artisanal fisheries. It starts from understanding peoples' strengths and builds on them and it also refers to peoples' strengths as Capital Asset (Human capital, Social capital, Natural capital, Physical capital and Financial capital).

To solve this problems, government should have good policy to protect local fishermen from the poverty with incentive system, such as: charges applied directly to pollutant discharges, charges applied to inputs to production or to product outputs; property/rights traded in open markets, and emission or effluent permits; direct-use fees and for access to protected marine areas; indirect-use fees and environmental taxes; license and permit fees (Cin cin et al., 1997).