

Annex 3.3. Project ideas for coastal vulnerability

Coastal protection and coastal reclamation technologies

Technology Transfer

Sanur Beach, Kuta Beach and the beach of Padang city, are examples of areas where coastal protection structures have been implemented. As for coastal reclamation, some coastal areas that have been reclaimed are: the Losari Beach (Makassar), Boulevard Beach (Manado), Sangkapura Beach (Bawean Island) and the Nipah Island. But given the large number of coastal regions which their level of vulnerability are high to very high, then the transfer of technology and dissemination from one area to another area is needed to be immediately carried out. In addition, improvements are still needed, including the current technology (for example, interm of structure and design) and the possibility of innovation in materials from abroad / developed country (transfer of knowledge).

Capacity building

Capacity building includes three aspects: local community, local contractors and project managers. Some things can be done in capacity building are:

- Providing the local community a complete understanding on the benefits and what to do to get the maximum benefits of shore protection / coastal reclamation in their area.
- Involving local community (as local workers) during the construction stage of coastal protection / reclamation project.
- Providing knowledge to local contractors, on how to make the structures/reclamation in accordance with the standards and rules that apply
- Providing knowledge and strengthening the capacity of the project managers (government/ privates) in managing the project based on the project's goals and purposes.

Economic and financing

Currently, the funds used in climate change adaptation efforts on coastal vulnerability sectors, especially in the construction of coastal protection and reclamation, derived from the domestic budget. However, considering the number of priority locations need to be protected base on the length of coasts with high to very high vulnerability level, as well as the expensive cost especially for reclamation, then assistance from external/international funding in the form of grant and experts are still needed.

Resources requirement

Requirements for development of coastal protection structures had been arranged in the Ministry of Public Work's Circular No. 07/SE/M/2010 on Guidelines for Construction of Coastal Protection Structures. For coastal reclamation, it is set in SK issued by the Direktorat General of Marine, Coastal and Small Island SK.64D/P3K/IX/2004 on Guideline for Reclamation in Coastal Area. In general, domestic resources are available in Indonesia, unless there is new material for structure developments.

Timeline

The implementation for the development of coastal protection and reclamation project, from preparation to completion, is divided into three years, i.e.:

First year

- Identify vulnerable coasts/beaches all over the country
In this first year, the first thing to do is identify the coasts all over Indonesia's territory that are prone to climate change impacts. Identification can be done through a number of ways, including through literature study of various research that had been done before, and/or ground-checking to beaches which conditions/status had been known; as well as doing a simulation or modeling to estimate the impacts of climate change in the future, mainly caused by the sea-level-rise.
- Determine priority/rank; location which is very susceptible and having high economical value or vital object should be prioritized
After the results from identification activity obtained, it should be followed by determination of priorities or rankings. Determination of priority or ranking is based on the status of the location or vulnerable coastline. Beach or locations that are particularly vulnerable and having high economic value or a vital object had to be protected and more prioritized than beaches or locations with low economic value.
- Assess which technology is more suitable for specific location
The last thing to be done in the first year is to assess which technology is more suitable for a particular location. For example, based on the analysis it is known that coastal protection is estimated to be better for a specific beach or location, while other beaches or other locations may be more appropriate if reclamation is carried out.

Second year

- Funding and economic analysis
Economic analysis and financing is started to be conducted in the second year. The economic analysis is based on the technology assessment of which technology is more appropriate for a given location/beach. Economic analysis and funding should also consider the following matters: economic feasibility, foreign exchange and cost calculations.
- Preparation of Masterplan
In general, the preparation of master plan for coastal protection project can be started from the project pre-preparation, preparation, construction/ implementation, contract delivery I, maintenance period, and contract delivery II. As for Coastal Reclamation Technology, Masterplan is the key factor in the overall planning of the implementation activities, thus it must accommodate the complexity of the systems in coastal areas by using the Integrated Coastal Zone Management (ICZM) approach as a management tool for sustainable coastal resources utilization. In managing the coasts, we should integrate several things, such as: a variety of planning, either sectoral or levels of government; terrestrial and marine ecosystems; as well as science and management. Before making the masterplan, first thing to do is to draw up a Strategic Plan for Integrated Management of Coastal Areas and Planning Zones around the project location. Masterplan should cover and accommodate the following things: 1) ecological balance, 2) the physical condition of the site; 3) legal aspects; 4) socio-economic-cultural aspects; 5) utilization aspects; and 6) damage prevention (mitigation) aspects.
- Conduct feasibility study
Feasibility studies need to be done for the implementation of coastal reclamation technology should include feasibility of technical aspects, economic-financial aspects,

and the Environmental Impact Assessment (EIA). EIA is conducted in order to assess and to determine whether an activity can be done and feasible in terms of technical, economic and environmental aspects. The results of feasibility study needs to be consulted with all stakeholders. EIA studies consist of Environmental Impact Assessment (EIA), Environmental Management Plan (RKL) and Environmental Monitoring Plan (RPL); and its implementation should be based on existing regulations. The same feasibility studies also apply for the implementation of coastal protection technology.

- Preparation of Detailed Engineering Design

The plans for detailed engineering design of coastal protection technologies include:

- land preparation work;
- mobilization of equipment, field facilities for service providers, laboratory equipment and personnels;
- design review which cover all technical specifications and methods of work implementation, the volume of works and availability of time, as well as eligibility requirements functions and operational construction;
- measurement includes measurement of topography and bathymetry, as well as observation and collection of tidal data;
- setting up base camp and its equipment;
- material, which involves quarrying and stocking of materials, collection of ground water for employment purposes, the provision and installation of fuel;
- regulation of of heavy equipment traffic; and
- Health and safety (HSE) supplies.
- While the detailed engineering design plans for coastal reclamation technology includes the following:
 - planning land preparation and manufacturing infrastructure;
 - planning for land clearing from vegetation or other debris, and leveling of the base land;
 - planning for dredging/pumping of reclamation materials from the quarry location i.e. land and/or sea;
 - planning the construction of of retaining wall (if any) and breakwaters;
 - planning the transportation of materials from the quarry location (in land and / or sea);
 - planning for soil mprovement (if any);
 - the planning of material handling and stocking of the reclamation materials from land or from the sea;
 - planning for land reclamation draining;
 - planning of land reclamation alignment with heavy equipment;
 - planning of land reclamation maturation/compaction;
 - planning of drainage systems;
 - planning of developmen after the land reclamation.

Third year

Construction

Coastal protection technology (Seawall / revetment)

Seawall construction implementation consists of two kinds, namely masive seawall and permeable sea wall.

a) Masive seawall

The construction of masive structure of seawall is strongly influenced by the waves height and tide level as well as the wave periods. Implementation method using concrete blocks sea wall are as follows:

- installation of the profile;
- excavation of foundation using the excavator / backhoe;
- installation of filter layers on the foundation up to the slope behind the wall using geotextile;
- installation of toe protection, the core layer, filter layers and armor layer;
- installation of concrete blocks in accordance with the form specified in the design, filling in the concrete cyclops;
- excavation of foundation masonry;
- installation of coneblock.

b) Permeable seawall

The method of construction of permeable seawall is as follows:

- Stones placement is carried out by dumping the stones and trimmed by human/labor or heavy equipment; armor layer is then arranged individually using excavators;
- Stones are placed on the foundation, and should not affect by the tide.
- Placement of rip-rap revetment (stones or precast concretes with various forms) can be done from the main land or from the sea if the depth and draft is sufficient. Revetment construction method is as follows:
- Installation of profiles;
- Excavation of foundation using excavator
- Installation of geotextile over the top to the bottom of the foundation, geotextile at the slope should be tied with peg / iron clamp to prevent folding;
- Core materials are placed over the geotextile, then armors are put on top of the core (up to the design level) using excavators at the offshore side;
- Installation of the core layer and the upper armor using excavators on the onshore side.

Coastal reclamation technology

The execution of coastal reclamation construction phase should consider several things as follows:

- dredging activities (quarrying), both on land and / or at sea, starting from:
- setting up semi-permanent buildings and other infrastructures as a temporary residence for construction's workers;
- the dredging/pumping of sands/ muds (reclamation materials);
- transportation of mud or sand dredged to the disposal sites using dredger ship or other conveyances.
- Reclamation activities and flattening of basement:

- land preparation and setting up semi-permanent buildings and other infrastructures as a temporary residence for construction's workers;
- Flattening of basement for reclamation, taking into account the construction methods applied and the type of materials used;
- cleaning of vegetation and other debris and leveling the basement;
- Retaining wall construction activities (if any) and breakwaters;
- installation of silt screens around potential land reclamation to avoid the spread of fine sediment particles into the waters around the reclamation site;
- Soil improvement activities (if required);
- handling and stocking of reclamation materials from main land or from the sea;
- draining of land reclamation activities;
- leveling and compacting the land reclamation with heavy equipments;
- Maturation of land reclamation activities;
- Drainage system development activities;
- Developing and building the land reclamation areas

Monitoring and evaluation

Coastal protection technology

Monitoring activities include:

- Initial mutual check, made and agreed between the service provider (consultant) and the board of directors, stated in the job and work of drawings (soft drawing) which then approved by the technical directors, as a temporary or permanent guidelines for the implementation of the works;
- Monthly mutual check, intended to monitor the monthly progress of works that have been carried out/ completed and are entitled for payment;
- Final mutual check, performed in order to know the volume of work already carried out until the end of the work, including the calculation of the work progress for addendum contract or other kinds of works, as a reference for determining the total amount of payment;
- The results of a joint final check is executed and agreed between the service provider (consultant) with the users, then the "as built drawing" is made, which draws the complete project, which describes all the changes and additions as well as job reductions to the detail design, approved by the board of directors for technical implementation.
- The evaluation consists of maintenance and repairs, and performed for a minimum of six months. Activities conducted during the evaluation are:
 - Service providers must constantly monitor the damage that occurred during the maintenance period;
 - The damage that occurs due to incomplete implementation of the work or the usage of bad quality/unqualified materials, should be improved and become the responsibility of service providers;
 - The damage that occurred outside of the stated above, such as design errors, natural disasters and extraordinary events, becomes the responsibility of the users (project owners).

Coastal Reclamation Technology

Monitoring and evaluation activities are conducted during the pre-construction phase, construction and post construction. This M & E covers the method of implementation, the type of material used and the impact of activities. Aspects being monitor include physical, ecological, social, economic, law and institutional aspects. M & E activities executed by local governments that issue the reclamation permit. To carry out the reclamation activities from planning to monitoring and evaluation, a Management Board of Coastal Reclamation needs to be set by the government or local government, in accordance with their authorities. In the implementation of monitoring and evaluation of reclamation work, several things need to be considered:

- to be conducted periodically and sustainable,
- must be in accordance with the EIA documents,
- should be conducted scientifically, and can be accounted for.

Indicators of success

Some indicators of success on assessing how the implementation of the making of coastal protection and reclamation works are:

- Coastal protection structures or coastal reclamation do exist.
- The existence of coastal protection / reclamation can give a sense of security to the community and the public can also make use and get the benefit of them.
- The existence of coastal protection and reclamation not lowering the level of the economy and the lives of local people.

Domestic partners

Domestic partners for the creation of coastal protection and reclamation should fit with the location where they will be built. Domestic partners may consist of the Government or the local institutions, related communities live in the area, and local contractors (local government, local community, local contractor).