REPUBLIK INDONESIA
Kementerian Pekerjaan Umum dan Perumahan Rakyat

Project for Coastal Disaster Risk Reduction Plan Study on the North Coast of Java Island in the Republic of Indonesia

Laporan Akhir
Dokumen Pelengkap

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JAPAN INTERNATIONAL COOPERATION AGENCY

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Dokumen Pelengkap

1. Konsep Rencana Kebijakan Pengelolaan Pantai
    - Konsep Rencana Kebijakan Pengelolaan Pantai (Bahasa Inggris)
    - Konsep Rencana Kebijakan Pengelolaan Pantai (Bahasa Indonesia)
    - Brosur Kebijakan Dasar Pengelolaan Pantai
2. Konsep Rencana Dasar Pengelolaan Pantai
    - Panduan Prosedur Persiapan Rencana Dasar Pengelolaan Pantai
3. Rencana Fasilitas Pantai
    - Kumpulan contoh tindakan perlindungan pantai

Dokumen Pelengkap 1

Konsep Rencana Kebijakan Pengelolaan Pantai

Basic Policy for Coastal Management

Purpose of enforcing Basic Policy for Coastal Management

- In order to protect and preserve human lives, assets and territorial land under the continues coastal development, the purpose of enforcing the Basic Policy for Coastal Management is to establish the fundamental principles on coastal management and development to address coastal vulnerability such as coastal erosion, tidal flood, wave overtopping, sea level rise associate with climate change, while ensuring the harmonization of "protection,' utilization," and "environment."
- The designated coastal areas, in which the Basic Coastal Management Plan is required to be prepared, are coastal areas of the five main islands, that is Sulawesi, Kalimantan, Java, Papua, and Sumatra, and the two main islands group, that is Maluku Islands and Nusa Tenggara.
- The purpose of the Basic Policy for Coastal Management is to clearly define the fundamental requirements and procedures for the Basic Coastal Management Plan which will be issued by the ministers of primary ministry – PUPR, KKP, and KLHK, as the guideline for coastal management in Indonesia

Definition of Basic Terms on Coastal Management

(1) Definition of Area on Coastal Management

- The area for coastal management, in which the Basic Coastal Management Plan shall be prepared, is defined as follows:

    a. Area which defined as coastal area are at least 50 meters from the lowest water level (LWL) offshore and 100 meters from the highest water level (HWS) onshore principally. The final area for each coastline should take account of shore condition, seabed slope and other considerations that may widens the area for specific site.

    b. The "Buffer zone" against coastal disaster is defined on Presidential Decree 51/2016 as public property. It is recommended to keep consistency of both its range and its public status at onshore side.

    c. Boundary of 12 nautical mile defined as provincial jurisdiction area for offshore side is deemed too far for coastal management, thus it is not considered on this plan.

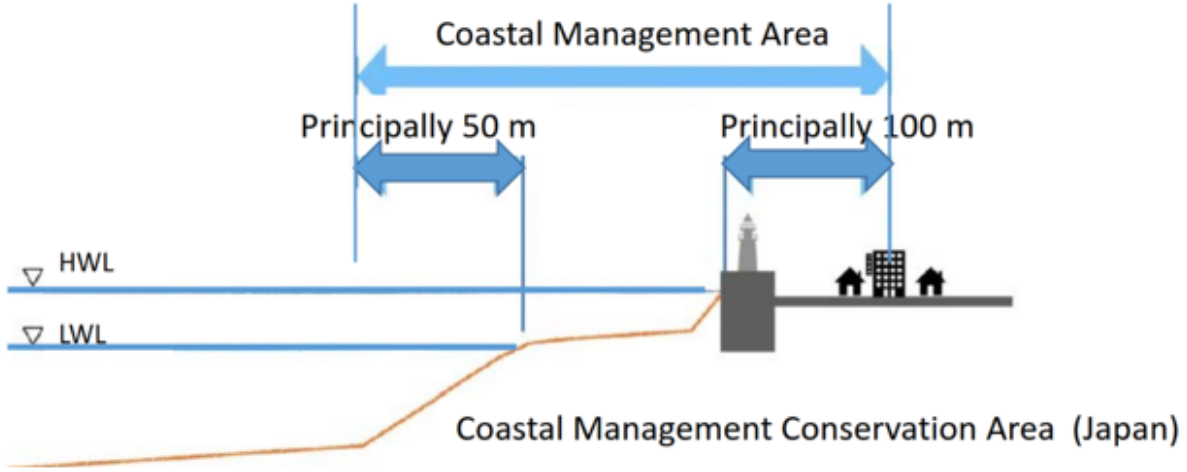


Figure 1. Definition of Coastal Management Area

(2) Position of Basic Coastal Management Plan

- To make it clear that objective and position of coastal management plan and spatial plan (known as Rencana Tata Ruang Wilayah, RTRW) difference, both are defined on this section.
    a. The O
    b. objective of RTRW is to clarify the zoning to show the area for existing – and future development – coastal and marine utilization and activities.
    c. On the other hand, the "Basic Coastal Management Plan" is to clarify the middle and long-term goals on coastal management and its plan at the coastal area, considering the coastal condition and its process, and socio-cultural condition as well as impact of future development of infrastructures at coastal area.

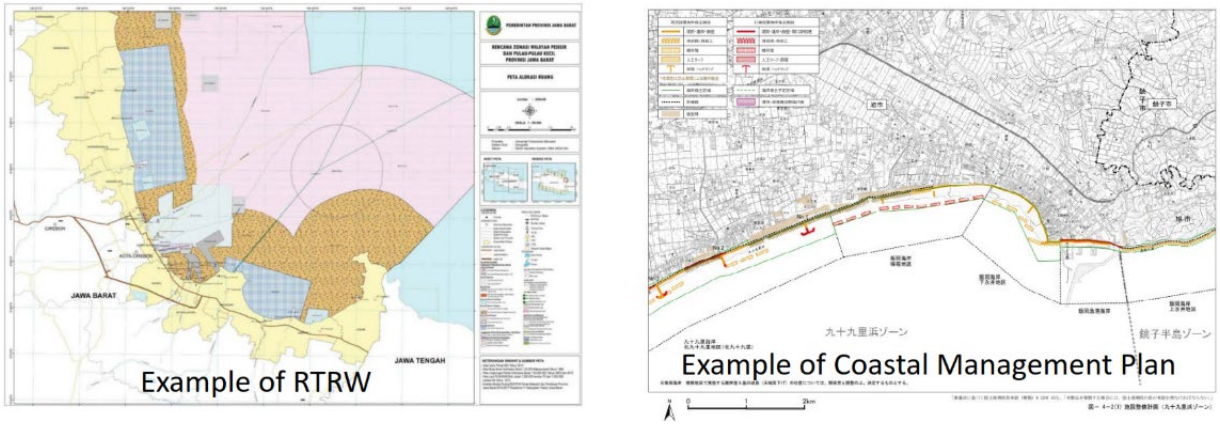


Figure 2. Difference between RTRW and Coastal Management Plan

(3) Definition of Coastal Facility

- Coastal facilities have a variety of types. Examples of coastal facilities such as both "hard" and "soft" or "gray" and "green" facility (measures) are defined as follows:

    a. Groin, revetment, breakwater, detached break water, artificial headland, etc., as hard and gray facilities/measures

    b. Beach nourishment, sand back-pass, sand bypassing, etc. as "soft" measures

    c. Mangrove and other vegetation plantation, coral transplantation, etc. as "green" facilities/measures

    d. Combination of above facilities

    e. Other public facilities to enhance beach utilization such as walkway, parking, rest house, etc.

(4) Agencies who mainly take initiative for preparation and issuing of the Basic Coastal Management Plan;

- Agencies involved in preparation of the Basic Coastal Management Plan are defined as follows:

    a. The Local Governments, mainly DINAS PU and BAPPEDA, prepare the Basic Coastal Management Plan as the leading agencies in cooperation with relevant agencies from the central governments, such as PUPR, KLHK, and KKP.

    b. For the preparation of the Basic Coastal Management Plan in each area, it is recommended to establish the "Ad-Hoc Council" which consists of at least PUPR, KKP, and KLHK from Central Government; and Dinas PU, BAPPEDA and other corresponding agencies from the Local Governments as required; communities, technical adviser of coastal engineering and management, etc.

    c. The Governor in each province shall issue the Coastal Management Plan and submit it to the Central Government (under ATR) to archive and integrate, as same system as that for the Spatial Plan.

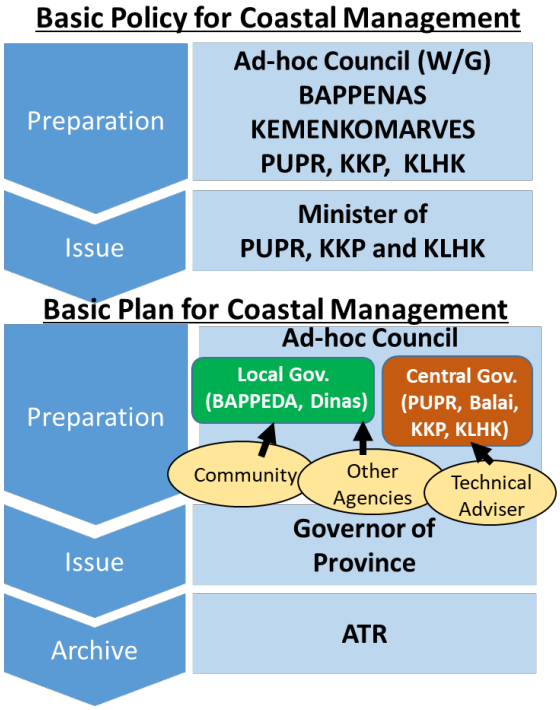


Figure 1 Flowchart on Coastal Management Plan Sequencing

Clause 1 Basic Guidelines for Coastal Management

1. Basic philosophy of coastal management

"Basic philosophy of coastal management based on overview of coastal conditions in Indonesia"

- In Indonesia, which has the second-longest coastal length in the world, each island and area possesses distinct coastal characteristics, coastal hazards, and coastal utilization.
- The basic philosophy is to pass on the coast with "coastal protection and coastal protection in harmony with utilization and environment" to future generation as a shared national asset.

"Ideal situation for coastal management to achieve above mentioned basic philosophy "

- Comprehensive and integrated coastal facility development, conservation, and management from mid-to long-term and wide-area viewpoints are promoted.
- Coastal facility development with the local governance is promoted.

2. Direction on Coastal Management

"Direction on coastal facility development and conservation"

- Coastal facility development and coastal conservation from the three perspectives of protection, environment, utilization is promoted.
- In the context of coastal protection, it shall be promoted to ensure appropriate protection levels considering high waves, wave overtopping, coastal erosion, topographical change and sedimentation surrounding river mouth, land subsidence, climate change, etc., and take integrate measures incorporating both hard and soft measurers.
- In the context of coastal environment, the conservation and maintenance of natural sandy beaches, coral reefs, mangrove forests, as well as conservation of coastal and marine ecosystems including coral and fish and other marine species, shall be promoted.
- In the context of coastal utilization, coastal utilization by tourism and the local society shall be well-considered and enhanced.

2.1 Direction on Coastal Protection

"Classification of targeted coastal disasters"

- In the context of coastal protection, ensuring appropriate protection levels, considering high waves, wave overtopping, coastal erosion, sedimentation, topographical change at river mouth, land subsidence, climate change, etc., shall be clarified.
- Indonesian's coasts vary significantly from one region to another, with distinct natural condition and socio-economic condition of hinterland. Thus, it is required to determine targeted coastal disasters and appropriate protection levels against the disaster, taking into account natural conditions, occurrence of coastal disasters, and population and assets of hinterland, and coastal utilization.

"Setting appropriate protection levels against coastal disasters."

- For coasts targeted to protect against high wavs, overtopping, and tidal flood, the target protection levels are set considering the status of hinterland.

- For coasts targeted to protect against coastal erosion, the basic target of protection level is to maintain the current shoreline, and the further target protection level is to restore the shoreline to a greater extent taking into account coastal utilization, as required.
- For coasts targeted to protect against land subsidence, the protection level is to secure the safety against land suboscine with a timescale ranging from 10 years to 100 years.
- For coasts targeted to protect against Tsunami, the target protection level is set is to protect against relatively frequent tsunamis that occurs once a few decades to a hundred and few decades years, based on records of past inundation and other relevant data.
- For coasts targeted to protect against storm Surge, the target protection level is set to protect against either the highest high tides based on records of past storm surges caused by typhoons, etc., or the tides appropriately estimated based on records or future projections, in addition to the effects of waves appropriately estimated based on records or future projections.

"Direction of measures for coastal protection"

- For developing coastal facilities, considering the status of the hinterland, the goal is to set to prevent seawater intrusion or erosion, and if the sea water overflows the levees, to mitigate the damage to hinterland. Moreover, integrated coastal measures, that is the protection not only by the single structure, but also by the combination of multiples coastal measures including the establishment of buffer zone.
- Conservation and maintenance of natural protection functions such as existing sandy beach, coral reefs, mangrove forests, etc. is promoted.
- Regarding tsunami and storm surge countermeasures, in addition to the development of coastal facilities, comprehensive measures should be implemented that combine hard and soft measures.
- For the countermeasures against coastal erosion, it is promoted to implement measures through adaptive management of beach and from a wide-area perspective taking into account the entire cell of littoral drift.
- Since river mouths experience significant topographic changes in response to wave dynamics and sedimentation due to sediment inflow from the river, measures are promoted from both mid- to long-term and wide-area perspectives. Particularly in sedimentation areas, comprehensive sediment management in the sediment transport system and land management are carried out.

2.2 Direction on Development and Conservation of Coastal Environment

"Functions of coastal environment"

- The coast provides a diverse habitat and growth environment for organisms.
- The coast forms a part of outstanding natural landscapes.

"Direction of measures for coastal environment"

- Conservation and maintenance of coastal environment that coexists harmoniously with nature is promoted.
- Preservation of outstanding landscapes, academically valuable assets, and diverse ecosystems is promoted.
- Regulations for coastal environmental conservation is established.
- In order to create favorable coastal environment, coastal facilities are developed as necessary.
- Environmental impacts resulting from sudden incidents such as oil spills is appropriately managed.
- In order to maintain and conserve the rich biodiversity, conservation of mangrove forests and coral reefs are promoted.
- It is promoted to secure that all parties concerned can share a common understanding of the coastal environment that need to be conserved.

2.3 Direction on Proper Coastal Utilization by Public

"Functions of coastal utilization"

- The coast forms and preserves regional culture of local community.
- The coast encourages diverse coastal utilizations such as leisure, sports, education activities, and recreational spaces.

"Direction for measures of coastal use"

- Coastal facilities that contribute to the enhancement of coastal utilization is promoted to be developed.
- Actions are necessary to deal with the degradation of coastal facilities and abandoned vessels that significantly impair the scenery and convenience of the coast.
- Ensuring public access to the seashore is promoted.
- Awareness rising activities for users of the coast is promoted so as to improve their etiquette and behavior in their coastal utilization is promoted.

3. Direction of Implementation on Coastal Facilities

3.1 Direction on New Implementation or Repair of Coastal Facilities

1) Promotion of development of safer coast

"Measures promoted to achieve target protection level "

- In development of coastal facilities, integrated coastal measures are promoted, including, not only hard structure, but also soft measures such as beach nourishment (including sand bypass from sedimentation area, etc.) as well as green infrastructure such as mangrove plantation, and various measures such as combining these structures are fostered. To enable this, furthermore, the appropriate land management in evolving coastal areas is promoted.
- To prevent widespread and catastrophic damages by Tsunami and storm surges, it is promoted to take measures that efficiently and comprehensively combines multiple coastal facilities.
- The appropriate management of sediment is required, including non-structural measures such as sand nourishment from sedimentation areas to erosion areas on a series of beaches, taking into consideration the movement of sand transport over a wide area.
- To address land subsidence, integrated measures are promoted including non-structural measures such as establishment and enforcement of regulations considering the estimated subsidence amount.
- For protection against Tidal Flood, high waves, and wave overtopping, it is promoted to take measures to prevent negative impacts to surrounding coasts taking into account the continuity of sand transport.

2) Promotion of measures for the conservation of nature-rich coast, and their creation as required.

"Measures to be promoted for the conservation of divers ecosystems and beautiful landscapes."

- Development of coastal facilities in accordance with the natural characteristics.
- Conservations and restoration of sandy beaches, coral reefs, and mangrove forests is promoted.
- Development of coastal facilities in consideration of the natural environment is promoted.

3) Promotion of measures for the beloved coast

"Measures to be promoted for the maintenance and improvement of user convenience and local community's living environment."

- Coastal facilities for enhancing user convenience and maintaining the living environment of the local community area promoted.
- In order to secure the continues access to the seashore, coastal facilities such as stairs, staircase- revetment, and gently sloping revetment, etc. are promoted.
- Conservation and development of sandy beaches is promoted as sandy beaches are an important space for tourism, recreational activities for local residents, and the preservation of local culture.
- Facilitating handicapped accessibility is encouraged.

3.2 Promotion of Implementation of Planned and Effective Maintenance and Repair of Coastal Facilities

"Necessity of maintenance"

- As existing coastal facilities continue to degrade, it is necessary to satisfy the required functions while reducing and equalizing costs.

"Measures to be promoted."

- Patrols or inspections of coastal facilities at appropriate times shall be conducted.
- Systematic and effective maintenance and repair of coastal facilities are promoted.
- The records related to inspections and repairs as well as new construction or repair of coastal facilities are properly prepared and stored.

4. Other Considerations on Coastal Management

4.1 Promotion of Initiatives from Broad and Comprehensive Perspective

"Initiatives that should be promoted from a broad and comprehensive perspective."

- Regarding sea level rise due to climate change, the common understanding about the target sea level is shared within a society.
- Integrated and systematic disaster prevention and mitigation measures is promoted in cooperation with related organizations.
- Against coastal erosion, it is promoted to take wide-area and comprehensive measures in cooperation with various relevant organizations, such as comprehensive sediment management measures in the entire sediment system from upstream to the coast.
- Further cooperation with various measures implemented in and around the coast is encouraged so as to promote coastal utilization.

4.2 Promotion of Cooperation with Local Communities and Raising Awareness of Coastal Management

"Items which cooperation with local communities and raising awareness of coastal management."

- In order to archive the creation of a disaster-resistant community, enhancing local communities' awareness is promoted.
- Beautification of coasts is promoted with cooperation of participants from local residents, volunteers, etc.
- Awareness-raising activities to improve users' morale in coastal environmental conservation are recommended.
- It is encouraged to create rules for safe and proper coastal utilization.
- Promotion of coastal conservation philosophy and capacity building in local communities are encouraged.
- Coastal management in cooperation with local community is promoted.
- In order to encourage private sector involvement in coastal conservation, coastal conservation programs as part of CSR (Corporate Social Responsibility) initiatives is recommended.

4.3 Promotion of Research, Studies, and Monitoring

"Items that require the promotion of research, studies, and monitoring."

- Collecting basic information on the coasts is promoted.
- It is encouraged to collaborate and share information across a wide range of sectors, including the private sector, and to facilitate international technological exchanges.
- To address the climate change impact, tidal levels and waves is monitored continuously, and the data shall be store and accumulated.
- Continuous monitoring and data accumulation for implemented coastal facilities for both gray and green measures is promoted to be conducted in order to clarify the effectiveness of facilities and impact to surrounding coastal area.

Clause 2 Area for Preparation of Basic Coastal Management Plan

- Five main islands (Sulawesi, Kalimantan, Java, Papua, Sumatra) and two islands group (Maluku Islands and Nusa Tenggara) is designated to prepare the Basic Coastal Management Plan.
- Division of one coastal area, in which one coastal management plan is prepared, shall be determined based on the similarity of topographical and oceanographical condition, the continuity of littoral drift as broadly as possible, and administrative boundary by setting an approximately 50 to 100 kilometers as the extent of a one of unified coastal area.

Clause 3 Basic Items for the Preparation of the Basic Coastal Management Plan

1. Basic Items to be included in the Basic Coastal Management Plan

1.1 Basic items concerning Coastal Management

1) Current status of the coast and the direction of coastal conservation

- The long-term vision of the coast shall be determined based on natural and social characteristics and other factors.

2) Items related to coastal protection.

- It is required to determine the area to be protected, the goals of coastal protection such as the protection level against coastal disasters, and the details of the measures to be implemented to achieve these goals.

3) Items related to the management, maintenance and conservation of the coastal environment.

- It is required to determine the detail of the measures that are to be implemented for the conservation of the coastal environment, and, if necessary, development of the coastal environment.

4) Items related to proper public utilization of the coast.

- It is required to determine the details of the measures that are to be implemented to promote proper coastal utilization by public.

1.2 Basic items concerning the development of Coastal Facilities

1) Items related to new development or improvement of coastal facilities.

a. The area in which coastal facilities are to be newly constructed or improved shall be determined.
b. The type, size, and layout of coastal facilities in each area determined in (a) shall be determined.
c. It is required to show the beneficiary areas through the new construction or improvement of coastal facilities.

2) Items concerning the maintenance or repair of coastal facilities.

a. The area in which existing coastal facilities are subject to maintenance or repair shall be determined.
b. The type, size, and layout of existing coastal facilities in each area determined in (a) shall be determined.
c. The method of maintenance or repair of each type of coastal facilities that identified in (b) shall be determined.

2. Important items to be considered in the Basic Coastal Management Plan

2. 1 Ensuring consistency with relevant development plans

- Basic Coastal Management Plan shall be in line with the relevant plans such as national land use plan, plans on environmental conservation, etc.

2.2 Cooperation and coordination with relevant administrative agencies

- Adequate cooperation and close coordination with relevant administrative agencies related to the coast shall be conducted.
- Local risks, including climate changes, land subsidence, etc. shall be shared with hose involved in community development.

2.3 Participation of residents and information disclosure

- Participation of local residents shall be facilitated.
- Disclosure of information related to the coast shall be carried out in order to enhance the transparency of the project,

2.4 Review of plan and revision properly

- Basic Coastal Management Plan is basically reviewed approximately every five years to assess the need for updates, and it is revised as necessary.
- Basic Coastal Management Plan and the development plan of coastal facilities stated in the Basic Coastal Management Plan shall be revised in response to changes in local condition, socio-economic condition, and the effect of climate change.

Kebijakan Dasar Pengelolaan Pantai

Tujuan Penerapan Kebijakan Dasar Pengelolaan Pantai

- Berlandaskan kepentingan untuk melindungi dan melestarikan kehidupan manusia, aset, dan wilayah teritorial sebagai pengembangan kawasan pantai yang berkelanjutan, tujuan penerapan Kebijakan Dasar Pengelolaan Pantai adalah menjadi prinsip-prinsip dasar pengembangan dan manajemen pantai untuk menjawab ancaman seperti erosi pantai, banjir pantai (rob), limpasan gelombang, kenaikan muka air laut akibat perubahan iklim, dengan memastikan harmonisasi antara "proteksi", "utilitas", dan "lingkungan".
- Wilayah pantai yang perlu dipersiapkan dokumen Rencana Dasar Pengelolaan Pantai adalah wilayah pantai dari lima pulau utama: Sulawesi, Kalimantan, Jawa, Papua, dan Sumatera, serta dua gugus kepulauan besar, yaitu gugus pulau Maluku dan gugus pulau Nusa Tenggara.
- Tujuan dari Kebijakan Dasar Pengelolaan Pantai adalah untuk mendefinisikan dengan jelas persyaratan dan prosedur fundamental untuk Rencana Dasar Pengelolaan Pantai yang akan diterbitkan oleh kementerian utama yang terkait – Kementerian Pekerjaan Umum dan Perumahan Rakyat (PUPR), Kementerian Kelautan dan Perikanan (KKP), dan Kementerian Lingkungan Hidup dan Kehutanan (KLHK), sebagai panduan untuk pengelolaan pantai di Indonesia.

Definisi Istilah yang Digunakan dalam Dokumen Pengelolaan Pantai

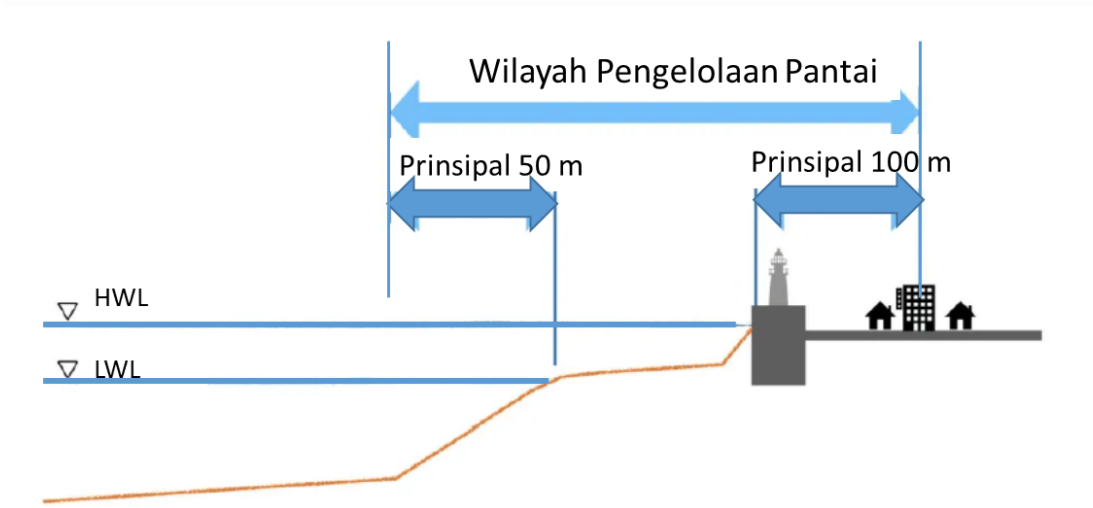
Definisi Wilayah Pengelolaan Pantai

- Wilayah pantai yang didefinisikan dalam penyusunan dokumen Rencana Dasar Pengelolaan Pantai adalah sebagai berikut:

    a. Wilayah yang didefinisikan sebagai area pantai adalah sekurangnya 50 meter dari muka air surut terendah (*Lowest Water Level*, LWL) ke arah laut dan 100 meter dari muka air pasang tertinggi (*Highest Water Level*, HWL) ke arah darat. Wilayah akhir yang ditentukan untuk tiap garis pantai harus mempertimbangkan kondisi pantai, kemiringan pantai, dan pertimbangan lain yang dapat mempengaruhi lebar wilayah di lokasi spesifik.

    b. Berdasarkan Peraturan Presiden Nomor 51 Tahun 2016 tentang Batas Sempadan Pantai, sempadan pantai memiliki lebar minimal 100 (seratus) meter dari titik pasang tertinggi ke arah darat. Sempadan pantai memiliki fungsi sebagai daerah penyangga untuk menghadapi bencana pesisir, pelestarian fungsi ekosistem, alokasi ruang, dan merupakan area publik. Direkomendasikan untuk menjaga konsistensi dan status publik lahan di sisi darat.

    c. Jarak 12 (dua belas) mil laut yang didefinisikan sebagai batas wewenang provinsi untuk arah laut dinilai terlalu jauh untuk keperluan dokumen manajemen pantai sehingga tidak dipertimbangkan dalam dokumen perencanaan manajemen pantai ini.



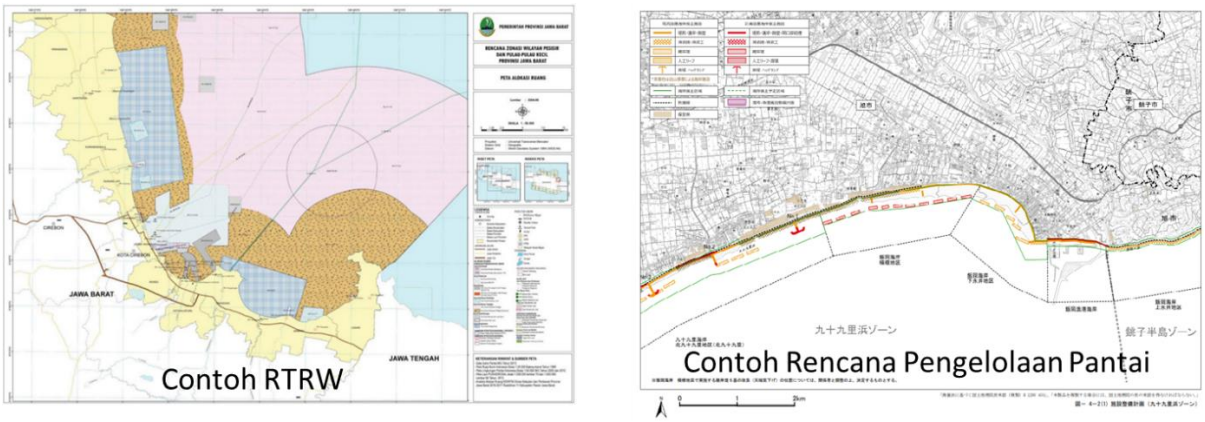
Gambar 1 Definisi Wilayah Pengelolaan Pantai

Posisi Dokumen Rencana Dasar Pengelolaan Pesisir

- Untuk memperjelas perbedaan tujuan dan posisi antara Rencana Pengelolaan Pantai (RPP) dan Rencana Tata Ruang Wilayah (RTRW), penjelasan mengenai keduanya dijelaskan pada bagian ini.

    a. Tujuan RTRW adalah memperjelas pembagian wilayah untuk menunjukkan pemanfaatan aktivitas pantai dan laut, baik eksisting maupun rencana pengembangan di masa mendatang.

    b. Di sisi lain, RPP bertujuan untuk memperjelas tujuan jangka menengah dan jangka panjang dari pengelolaan pantai dan perencanaan wilayah pantai terkait, dengan mempertimbangkan kondisi pantai dan proses pantai di lokasi yang dimaksud, kondisi sosial kultural serta dampak rencana pengembangan infrastruktur kawasan pantai di masa mendatang.



Gambar 2 Perbedaan antara RTRW dan RPP

Definisi Fasilitas Pantai

- Terdapat berbagai jenis fasilitas pantai. Secara umum, fasilitas pantai dapat dikategorikan meniadi “keras” dan “lunak”, atau “abu-abu” dan “hijau”. Contoh dari fasilitas pantai yang dimaksud di antaranya:

a. Groin, revetment, pemecah gelombang (*breakwater*), pemecah gelombang lepas pantai (*detached breakwater*), tanjung buatan, dan sebagainya sebagai fasilitas/tindakan "keras" dan "abu-abu". Kategori ini umumnya berupa infrastruktur keras yang melibatkan pekerjaan sipil dengan memanfaatkan struktur beton dan/atau batuan keras, pembentukan daratan buatan dengan manipulasi topografi pesisir, dan sebagainya;

b. *Beach nourishment, sand back-pass, sand bypassing*, sebagai tindakan "lunak";

c. Penanaman mangrove vegetasi lainnya, transplantasi terumbu karang, dst sebagai fasilitas/tindakan "hijau";

d. Kombinasi fasilitas/tindakan di atas;

e. Fasilitas publik lainnya yang bertujuan untuk meningkatkan utilitas pantai seperti jalan setapak, area parkir, pendopo, dst.

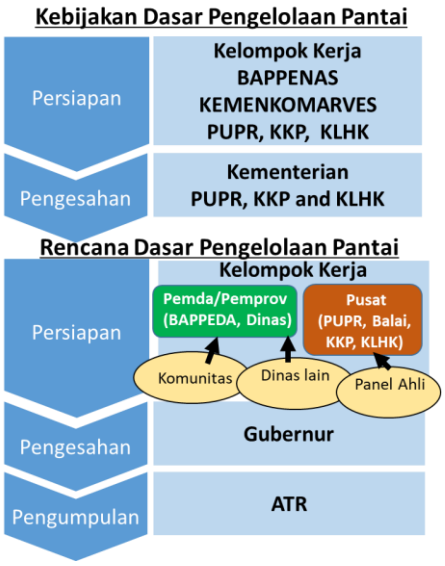
Kementerian yang Bertanggungjawab dalam Menginisiasi Persiapan dan Melaksanakan Rencana Dasar Pengelolaan Pantai;

- Kementerian yang terlibat dalam persiapan Rencana Dasar Pengelolaan Pantai didefinisikan sebagai berikut:

a. Pemerintah Daerah, terutama Dinas PU dan BAPPEDA, memppersiapkan Rencana Dasar Pengelolaan Pantai sebagai lembaga utama (*leading agency*) dengan bantuan dan kerjasama dengan institusi terkait dari Pemerintah Pusat seperti PUPR, KLHK, dan KKP.

b. Untuk persiapan dokumen Rencana Dasar Pengelolaan Pantai di tiap lokasi, direkomendasikan untuk membentuk Kelompok Kerja (*Ad-Hoc Council*) yang terdiri dari perwakilan pusat (sekurangnya PUPR, KKP, dan KLHK), perwakilan daerah (BAPPEDA, Dinas PU, dan dinas terkait dari Pemerintah Daerah/Provinsi), komunitas lokal, panel ahli untuk rekayasa dan pengelolaan pantai, dan sejenisnya.

c. Gubernur dari tiap provinsi lalu akan merilis Rencana Manajemen Pantai dalam bentuk Peraturan Gubernur dan direkap di Kementerian Agraria dan Tata Ruang (ATR) untuk integrasi dengan RPP provinsi lain – sistem yang sama dengan RTRW.



Gambar 3 Bagan alir tahapan RPP

Pasal 1. Panduan Dasar Pengelolaan Pantai

1.1 Filosofi Dasar Pengelolaan Pantai

"Filosofi Dasar Pengelolaan Pantai berdasarkan kondisi pantai di Indonesia"

- Indonesia memiliki garis pantai kedua terpanjang di dunia. Setiap pulau dan wilayah pantainya memiliki karakteristik, ancaman, dan pemanfaatan yang unik untuk lokasi yang terkait.
- Filosofi dasar dalam pengelolaan pantai adalah untuk mewariskan pantai ke generasi mendatang sebagai aset nasional bersama
- Oleh karena itu, diperlukan cara berpikir yang menyelaraskan usaha perlindungan pantai dengan pemanfaatan dan konservasi lingkungan sekitarnya.

"Pengelolaan pantai yang bertujuan untuk mencapai filosofi dasar"

- Direkomendasikan untuk mempromosikan pengembangan, konservasi, dan pengelolaan pantai yang komprehensif dalam jangka menengah dan panjang untuk cakupan wilayah yang luas.
- Pengembangan pantai difokuskan untuk bertumpu pada Pemerintah Daerah.

1.2 Arahan Pengelolaan Pantai

"Arah pengembangan fasilitas dan konservasi pantai"

- Penggalakkan pengembangan dan konservasi pantai yang didasarkan pada tiga (3) perspektif: perlindungan, penjagaan lingkungan, dan utilitas pantai.
- Dalam konteks perlindungan pantai, direkomendasikan untuk menjamin tercapainya tingkat perlindungan yang memadai dengan mempertimbangkan gelombang tinggi, limpasan gelombang/ombak, erosi pantai, perubahan topografi dan sedimentasi di sekitar muara sungai, penurunan muka tanah, perubahan iklim, dan sebagainya, dan melakukan integrasi pendekatan tindakan "keras" dan "lunak".
- Dalam konteks penjagaan lingkungan pantai, digalakkan konservasi dan perawatan pantai alami, terumbu karang, hutan bakau (*mangrove*), konservasi ekosistem pantai dan laut termasuk karang, ikan, dan spesies laut lainnya.
- Dalam konteks utilitas pantai, pengembangan utilitas dilakukan berdasarkan masukan dari komunitas lokal dan manfaat untuk menunjang kemudahan akses kepariwisataan.

1.2.1 Arahan Perlindungan Pantai

"Klasifikasi bencana pantai yang dipertimbangkan"

- Dalam konteks perlindungan pantai, direkomendasikan untuk memastikan tingkat perlindungan yang memadai terpenuhi. Pertimbangkan kondisi gelombang tinggi, limpasan gelombang/ombak, erosi pantai, sedimentasi, perubahan topografi muara sungai, penurunan muka tanah, perubahan iklim, dan sebagainya.
- Pantai Indonesia memiliki variasi yang signifikan untuk tiap daerah, dengan kondisi alami dan sosial ekonomi beragam tergantung kondisi daratan (hinterland) sekitarnya. Oleh karena itu, diperlukan penentuan target bencana pantai serta tingkat perlindungan yang memadai untuk menjawab ancaman tersebut, dengan mempertimbangkan kondisi alami, kejadian bencana pantai, populasi dan aset daratan di belakang pantai tinjauan, dan utilitas pantai.

"Mendesain perlindungan yang memadai menghadapi ancaman bencana pantai."

- Untuk pantai dengan sistem perlindungan yang didesain untuk menghadapi gelombang tinggi, limpasan gelombang, dan banjir laut, tingkat perlindungan didesain dengan mempertimbangkan status penggunaan lahan di belakang pantainya.
- Untuk pantai dengan sistem perlindungan yang didesain untuk menghadapi erosi pantai, tingkat perlindungan dasar didesain untuk mempertahankan garis pantai saat ini, dan target perlindungan lanjutannya adalah untuk mengembalikan garis pantai hingga titik tertentu dengan mempertimbangkan pemanfaatan pantai jika diperlukan.
- Untuk pantai dengan sistem perlindungan yang didesain untuk menghadapi penurunan muka tanah, tingkat perlindungan didesain untuk mengamankan wilayah dengan rentang waktu sepuluh (10) hingga seratus (100) tahun.
- Untuk pantai dengan sistem perlindungan yang didesain untuk menghadapi tsunami, tingkat perlindungan didesain untuk menghadapi tsunami dengan kriteria tertentu yang didasarkan pada studi kejadian terdahulu dan informasi lain yang dinilai relevan.
- Untuk pantai dengan sistem perlindungan yang didesain untuk menghadapi gelombang badai (*storm surge*), tingkat perlindungan didesain untuk menghadapi pasang tertinggi berdasarkan rekam historis badai sebelumnya yang disebabkan oleh angin topan dan sejenisnya, atau berdasarkan estimasi elevasi muka air di masa mendatang berdasarkan proyeksi masa depan, dengan mempertimbangkan kondisi gelombang tinggi pada saat prediksi mendatang tersebut pula.

"Arahan terhadap tindakan perlindungan pantai"

- Tujuan pengembangan fasilitas pantai, mempertimbangkan status penggunaan lahan di belakang pantai tersebut, adalah untuk mencegah masuknya air laut, erosi pantai. Jika air laut melimpas ke dalam tanggul, maka tujuan dari tindakan pantai adalah untuk mencegah kerusakan pada lahan yang dilindungi. Integrasi tindakan pantai berupa kombinasi dari beberapa tindakan dan struktur pelindung, termasuk pembentukan area sempadan pantai sebagai area penyangga.
- Direkomendasikan penggalakkan konservasi dan pemeliharaan perlindungan alami pantai seperti keberadaan pantai berpasir, terumbu karang, hutan bakau, dan sebagainya.
- Terkait tindakan penanggulangan menghadapi tsunami dan gelombang badai, selain pengembangan fasilitas pantai, diperlukan pula implementasi komprehensif yang mengombinasikan tindakan "keras" dan "lunak".
- Terkait tindakan penanggulangan menghadapi erosi pantai, direkomendasikan untuk mengimplementasikan tindakan dengan melakukan tindakan adaptif pengelolaan pantai dengan mempertimbangkan seluruh sel *littoral drift*.
- Mengingat muara sungai mengalami perubahan topografis yang signifikan sebagai respon dinamika gelombang dan suplai sedimen dari hulu, setiap tindakan di wilayah muara sungai perlu memperhatikan dampak jangka menengah dan panjang serta melingkupi area yang cukup luas untuk mengakomodasi keseimbangan suplai sedimen di sel wilayah tersebut. Pengelolaan sedimen yang komprehensif pada sistem transportasi sedimen dan pengelolaan lahan penting untuk ditekankan, terutama di daerah yang mengalami sedimentasi.

1.2.2 Arahan Pengembangan dan Konservasi Lingkungan Pantai

"Fungsi lingkungan pantai"

- Pantai menyediakan ekosistem untuk habitat yang beragam dan tempat tumbuh kembangnya organisme
- Pantai membentuk sebagian dari pemandangan alam yang luar biasa.

"Arahan tindakan untuk lingkungan pantai"

- Konservasi dan pemeliharaan lingkungan pantai harus hidup berdampingan dengan alam secara harmonis.
- Digalakkan pelestarian bentang alam, aset bernilai akademis, dan ekosistem beragam
- Bentuk peraturan dan regulasi konservasi lingkungan pantai.
- Untuk menciptakan lingkungan pantai yang memadai, pengembangan fasilitas pantai dilakukan sesuai kebutuhan
- Dampak lingkungan yang diakibatkan oleh kejadian insidental seperti tumpahan minyak harus ditangani dengan tepat
- Konservasi hutan bakau dan terumbu karang digalakkan untuk menjaga dan melestarikan kekayaan keanekaragaman hayati.
- Direkomendasikan untuk memastikan bahwa semua pihak yang terlibat dapat berbagi pemahaman bahwa lingkungan pantai harus dilestarikan.

1.2.3 Arahan Pemanfaatan Pantai oleh Masyarakat

"Pemanfaatan fungsi pantai"

- Pantai membentuk dan menjaga budaya regional komunitas lokal
- Pantai mendorong ragam pemanfaatan pantai seperti wisata, olahraga, aktivitas pendidikan, dan memberi ruang rekreasi.

"Arahan tindakan pemanfaatan pantai"

- Fasilitas pantai yang berkontribusi dalam peningkatan pemanfaatan pantai direkomendasikan untuk dikembangkan
- Diperlukan tindakan yang menjawab masalah penurunan kapasitas fasilitas pantai dan kapal karam dan/atau ditinggalkan yang secara signifikan mengganggu pemandangan dan kenyamanan pantai.
- Pastikan kelayakan dan keterjaminan akses masyarakat ke pantai
- Galakkan aktivitas yang meningkatkan kesadaran pengguna pantai untuk meningkatkan etika dan perilaku dalam memanfaatkan pantai.

1.3 Arahan Implementasi Fasilitas Pantai

1.3.1 Arahan Implementasi Fasilitas Baru atau Perbaikan Fasilitas Pantai

1.3.1.1 Penggalakkan pengembangan pantai yang lebih aman

"Tindakan yang dilakukan untuk mencapai target perlindungan yang diharapkan "

- Dalam pengembangan fasilitas pantai, direkomendasikan untuk melakukan integrasi berbagai tindakan di pantai termasuk namun tidak terbatas pada struktur "keras", melainkan pula memanfaatkan tindakan "lunak" seperti suplai pasir pantai (termasuk *sand bypassing* dari daerah tersedimentasi, dst). Pemanfaatan infrastruktur "hijau" seperti penanaman bakau dan mengombinasikan metode-metode di atas sangat dianjutkan. Untuk mendukung hal tersebut, manajemen penggunaan lahan yang mampu beradaptasi dengan perubahan kondisi wilayah pantai harus dikedepankan.
- Untuk mencegah kerusakan yang massif dan fatal akibat tsunami dan gelombang badai, direkomendasikan untuk dilakukan berbagai tindakan yang mengombinasikan beberapa fasilitas pantai secara komprehensif dengan efektif dan efisien.

- Pengelolaan sedimen pantai yang memadai harus dilakukan, termasuk dengan melakukan pendekan non structural seperti pengisian pasir (*sand nourishment*) dari daerah yang mengalami sedimentasi ke daerah yang mengalami erosi pada satu kesatuan garis pantai, dengan mempertimbangkan pergerakan pasir di wilayah tersebut.
- Untuk menjawab permasalahan penurunan muka tanah, integrasi pendekatan harus dilakukan, termasuk tindakan non struktural seperti penguatan peraturan, dengan mempertimbangkan perkiraan laju penurunan tanah dan perkiraan penyebab fenomena tersebut.
- Untuk perlindungan terhadap banjir pantai, gelombang tinggi, dan limpasan gelombang, direkomendasikan tindakan pencegahan dampak negatif akibat fasilitas pelindung tersebut ke pantai sekitarnya dengan mempertimbangkan kesetimbangan dinamika pantai di cakupan wilayah tersebut.

1.3.1.2 Penggalakkan tindakan konservasi pantai yang kaya akan alam, dan pembentukan pantai tersebut jika diperlukan

"Tindakan yang direkomendasikan untuk konservasi ekosistem penyelaman dan keindahan bentang alam."

- Pengembangan fasilitas pantai harus memperhatikan karakteristik alami pantai tersebut
- Konservasi dan restorasi pantai berpasir, terumbu karang, dan hutan bakau harus dikedepankan
- Pengembangan fasilitas pantai harus memperhatikan lingkungan alami sekitar pantai tersebut

1.3.1.3 Promosi tindakan untuk pantai yang berharga

"Tindakan yang direkomendasikan untuk memelihara dan meningkatkan kenyamanan pengunjung pantai dan lingkungan hidup komunitas lokal."

- Peningkatan kenyamanan pengunjung pantai dan pemeliharaan lingkungan hidup komunitas lokal harus diprioritaskan
- Dalam rangka mengamankan akses ke pantai, direkomendasikan penggunaan fasilitas seperti tangga, revetment berundak, dan revetment landai.
- Pelestarian dan pengembangan pantai berpasir direkomendasikan mengingat pantai berpasir merupakan ruang penting untuk pariwisata, aktivitas rekreasi penduduk setempat, dan pelestarian budaya lokal.
- Sangat dianjurkan untuk memfasilitasi aksesibilitas terhadap penyandang disabilitas.

1.3.2 Implementasi pemeliharaan dan perbaikan fasilitas pantai yang terencana dan efektif

"Perlunya pemeliharaan"

- Seiring penurunan fungsional fasilitas pantai, perlu dilakukan pemeliharaan untuk menjaga fungsi fasilitas tersebut dengan memperhatikan keseimbangan biaya perawatan dan manfaat yang diterima.

"Tindakan yang dianjurkan"

- Patrolia tau inspeksi fasilitas pantai yang berkala harus disiplin dilakukan
- Perawatan yang sistematis dan efektif serta perbaikan fasilitas pantai yang mengalami kerusakan harus dilakukan
- Catatan dan rekam historis hasil inspeksi, perbaikan, dan/atau penambahan konstruksi baru fasilitas pantai harus disimpan dan diarsipkan dengan baik.

1.4 Pertimbangan Lain dalam Pengelolaan Pantai

1.4.1 Inisiatif dari perspektif yang luas dan komprehensif

"Inisiatif tindakan harus didasarkan pada pandangan yang luas dan komprehensif."

- Terkait kenaikan muka air laut akibat perubahan iklim, pemahaman umum mengenai besaran elevasi muka air laut harus dimiliki masyarakat.
- Upaya-upaya pencegahan dan mitigasi bencana yang terpadu dan sistematis dilakukan melalui kerjasama dengan lembaga-lembaga terkait.
- Direkomendasikan untuk meninjau secara komprehensif dan dengan cakupan wilayah yang luas dalam menghadapi erosi pantai. Lakukan kerjasama dengan berbagai lembaga terkait. Tindakan sedimentasi dilakukan dengan mempertimbangkan seluruh sistem sedimen dari hulu sungai hingga sistem pesisir.
- Pemaduan berbagai tindakan yang diimplementasikan di dan sekitar lokasi pantai direkomendasikan untuk mengedepankan pemanfaatan pantai secara terpadu.

1.4.2 Kerjasama dengan Komunitas Lokal dan Meningkatkan Kesadaran Terkait Pengelolaan Pantai

"Hal-hal yang dilakukan bersama komunitas lokal untuk meningkatkan pemahaman dan kesadaran pengelolaan pantai"

- Dalam rangka menciptakan komunitas tahan bencana, peningkatan kesadaran dan pemahaman komunitas lokal terhadap ancaman bahaya di pantai penting untuk dilakukan
- Keindahan pantai ditingkatkan dengan melibatkan kerjasama dengan penduduk setempat, sukarelawan, dst.
- Sosialisasi peningkatan kesadaran pelestarian lingkungan pantai harus dilakukan untuk meningkatkan kepedulian public
- Direkomendasikan untuk menciptakan peraturan dan regulasi pemanfaatan pantai yang aman dan patut.
- Promosi filosofi pelestarian pantai dan *capacity building* di komunitas lokal
- Pelibatan komunitas lokal dalam pengelolaan pantai
- Untuk mendorong keterlibatan sektor privat pada konservasi pantai, canangkan program konservasi pantai dalam skema inisiasi CSR (*Corporate Social Responsibility*)

1.4.3 Mendorong Riset, Studi, dan Pemantauan

"Hal-hal yang perlu didorong oleh riset, studi, dan pemantauan."

- Mengumpulkan informasi dasar mengenai pantai
- Direkomendasikan untuk berkolaborasi dan saling berbagi informasi lintas berbagai sektor, termasuk sektor privat, dan memfasilitasi pertukaran teknologi internasional sebagai ajang pembelajaran
- Pemantauan elevasi muka air laut dan gelombang secara menerus untuk memantau dampak perubahan iklim. Akumulasi hasil pemantauan harus dapat disimpan dan diarsipkan secara cermat dan rapi.
- Pemantauan menerus dan akumulasi data terhadap implementasi fasilitas pantai untuk tindakan "abu-abu" dan "hijau" direkomendasikan untuk dilakukan untuk mengevaluasi efektivitas fasilitas tersebut dan dampaknya terhadap lingkungan pantai sekitar.

Pasal 2. Lokasi Persiapan Rencana Dasar Pengelolaan Pantai

- Lima pulau utama (Sulawesi, Kalimantan, Java, Papua, Sumatra) dan dua gugus kepulauan (Maluku dan Nusa Tenggara) ditunjuk untuk mempersiapkan dokumen Rencana Dasar Pengelolaan Pantai.
- Penentuan pembagian satu wilayah pantai, yang mana satu rencana pengelolaan pantai tersebut disiapkan, dilakukan berdasarkan kesamaan kondisi topografi dan oseanografi, keberlanjutan *littoral drift*, dan batas

administratif wilayah dengan rekomendasi pembagian sekitar 50-100 km per satuan wilayah rencana pengelolaan pantai.

Pasal 3. Pokok-pokok Penyusunan Rencana Dasar Pengelolaan Pantai

3.1 Hal-hal Mendasar yang Perlu Dicantumkan pada Rencana Dasar Pengelolaan Pantai

3.1.1 Hal-hal Mendasar Mengenai Pengelolaan Pantai

3.1.1.1 Status pantai saat ini dan arah konservasi pantai

- Visi jangka panjang pantai ditentukan berdasarkan karakteristik natural, sosial, dan faktor lainnya.

3.1.1.2 Hal-hal terkait perlindungan pantai

- Perlu ditentukan wilayah yang akan dilindungi. Tujuan dari perlindungan pantai adalah perlindungan terhadap bencana pantai, dan detail dari tindakan yang akan diimplementasikan untuk mencapai tujuan tersebut

3.1.1.3 Hal-hal terkait pengelolaan, pemeliharaan, dan konservasi lingkungan pantai

- Perlu ditentukan detail tindakan yang akan diimplementasikan untuk pelestarian lingkungan pantai, dan jika diperlukan pengembangan lingkungan pantai

3.1.1.4 Hal-hal terkait pemanfaatan pantai yang layak oleh publik

- Perlu ditentukan detail tindakan yang akan diimplementasikan untuk meningkatkan pemanfaatan dan utilitas pantai oleh publik.

3.1.2 Hal-hal Mendasar Mengenai Fasilitas Pantai

1) Hal-hal terkait peningkatan atau pengembangan baru fasilitas pantai

a. Lokasi konstruksi fasilitas pantai, baik baru maupun peningkatan yang sudah ada, harus ditentukan
b. Jenis, ukuran, dan denah fasilitas pantai di tiap lokasi yang didefinisikan pada poin (a) harus ditentukan
c. Tunjukkan area penerima manfaat konstruksi fasilitas pantai tersebut.

2) Hal-hal terkait pemeliharaan atau perbaikan fasilitas pantai

a. Lokasi fasilitas pantai yang akan dilakukan pemeliharaan atau perbaikan harus ditentukan
b. Jenis, ukuran, dan denah fasilitas pantai eksisting yang akan dilakukan pemeliharaan atau perbaikan di tiap lokasi yang didefinisikan pada poin (a) harus ditentukan
c. Metode pemeliharaan atau perbaikan tiap jenis fasilitas pantai yang diidentifikadi pada poin (b) harus ditentukan.

3.2 Hal-hal Penting yang Harus Diperhatikan terkait Rencana Dasar Pengelolaan Pantai

3.2.1 Memastikan Konsistensi dengan Rencana Pengembangan Terkait Lainnya

- Rencana Dasar Pengelolaan Pantai harus sejalan dengan rencana-rencana yang relevan seperti Rencana Tata Ruang Wilayah Nasional, rencana konservasi lingkungan, dan sebagainya.

3.2.2 Kerjasama dan Koordinasi dengan Lembaga Administratif Terkait

- Kerjasama yang memadai dan koordinasi yang intensif dengan lembaga administratif terkait pengelolaan pantai harus dilaksanakan secara efektif dan efisien
- Risiko lokal, termasuk sensitivitas terhadap perubahan iklim, penurunan muka tanah, dan sebagainya, harus diinformasikan kepada semua pihak yang terlibat dalam pengembangan komunitas

3.2.3 Partisipasi Penduduk dan Keterbukaan Informasi

- Partisipasi penduduk setempat harus difasilitasi
- Keterbukaan informasi terkait pantai harus dilaksanakan untuk meningkatkan transparansi proyek

3.2.4 Peninjauan Kembali Dokumen Perencanaan

- Dokumen Rencana Dasar Pengelolaan Pantai pada dasarnya ditinjau kembali setiap lima (5) tahun untuk menilai keperluan pembaruan, dan akan direvisi sesuai keperluan
- Dokumen Rencana Dasar Pengelolaan Pantai dan rencana pengembangan fasilitas pantai yang dinyatakan dalam dokumen tersebut akan disesuaikan sebagai respon perubahan kondisi lokal, sosial ekonomi Masyarakat setempat, dan efek perubahan iklim.

Basic Policy for Coastal Management

Project for Coastal Disaster Risk Reduction
Plan Study on the North Coast of Java Island

Nusa Dua, Bali

1. Basic philosophy of coastal management

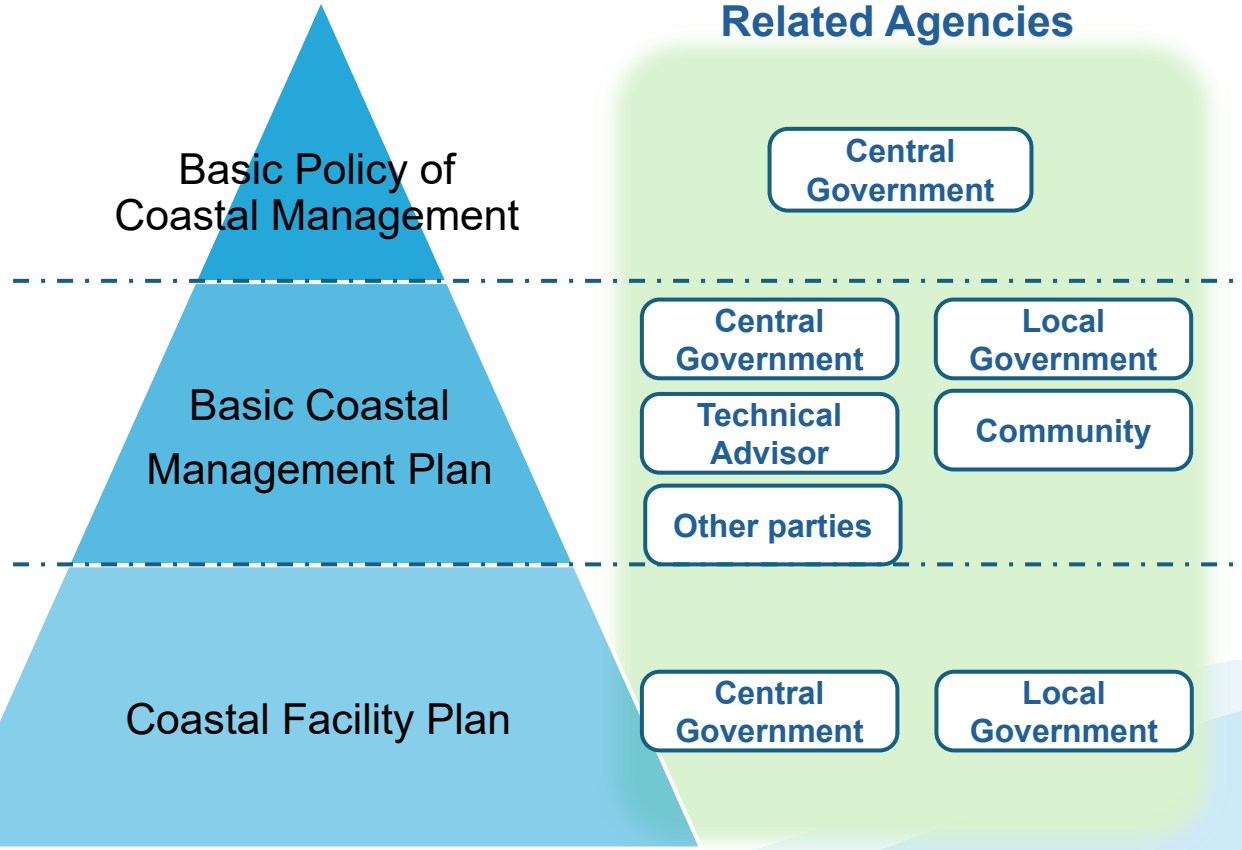
Basic philosophy of coastal management based on overview of coastal conditions in Indonesia

- In Indonesia, which has the second-longest coastal length in the world, each island and area possesses distinct coastal characteristics, coastal hazards, and coastal utilization.
- The basic philosophy is to pass on the coast with “coastal protection and coastal protection in harmony with utilization and environment” to future generation as a shared national asset.

The basic philosophy is to pass on the coast with “coastal protection and coastal protection in harmony with utilization and environment” to future generation as a shared national asset.

Ideal situation for coastal management to achieve the basic philosophy

- Comprehensive and integrated coastal management (planning~ implementation, monitoring & maintenance) from mid-to long-term and wide-area viewpoints are promoted.
- Implementation of coastal management with related organizations and parties is realized .



2. Direction on Coastal Management

Direction on coastal facility development and conservation

- Coastal facility development and coastal conservation from the three perspectives of protection, environment, utilization is promoted.

Protection

- It shall be promoted to ensure appropriate protection levels considering high waves, wave overtopping, coastal erosion, topographical change and sedimentation surrounding river mouth, land subsidence, climate change, etc., and take integrate measures incorporating both hard and soft measurers.

Environment

- The conservation and maintenance of natural sandy beaches, coral reefs, mangrove forests, as well as conservation of coastal and marine ecosystems including coral and fish and other marine species, shall be promoted.

Utilization

- Coastal utilization by tourism and the local society shall be well-considered and enhanced.

Coastal facility development and coastal conservation

2.1 Direction on Coastal Protection

Classification of targeted coastal disasters

- In the context of coastal protection, ensuring appropriate protection levels, considering high waves, wave overtopping, coastal erosion, sedimentation, topographical change at river mouth, land subsidence, climate change, etc., shall be clarified.
- Indonesian's coasts vary significantly from one region to another, with distinct natural condition and socio-economic condition of hinterland. Thus, it is required to determine targeted coastal disasters and appropriate protection levels against the disaster, taking into account natural conditions, occurrence of coastal disasters, and population and assets of hinterland, and coastal utilization.

Setting appropriate protection levels against coastal disasters

Coastal erosion

The basic target of protection level is to maintain the current shoreline, and the further target protection level is to restore the shoreline to a greater extent taking into account coastal utilization, as required.

Storm surge

The target protection level is set to protect against either the highest high tides based on records of past storm surges caused by typhoons, etc., or the tides appropriately estimated based on records or future projections, in addition to the effects of waves appropriately estimated based on records or future projections.

Tsunami

The target protection level is set is to protect against relatively frequent tsunamis that occurs once a few decades to a hundred and few decades years, based on records of past inundation and other relevant data.

Land subsidence

The protection level is to secure the safety against land suboscine with a timescale ranging from 10 years to 100 years.

High wavs, overtopping, and tidal flood

The target protection levels are set considering the status of hinterland.

Source: 1) 2) BBC Asia, https://www.bbc.com/news/world-asia-30034501,
3) Antara Photo, CNN Indonesia https://mediaindonesia.com/galleries/detail_galleries/7809-banjir-rob-pekalongan

2.1 Direction on Coastal Protection

Direction of measures for coastal protection

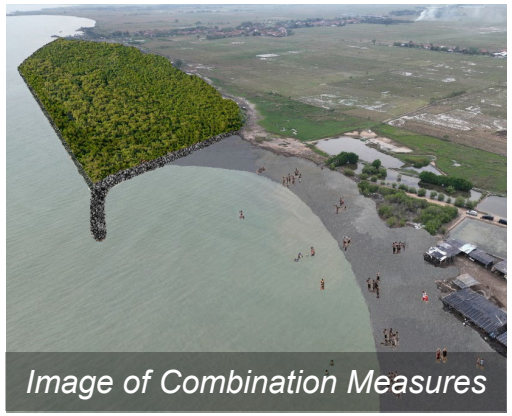


Image of Combination Measures

For developing coastal facilities, considering the status of the hinterland, the goal is to set **to prevent seawater intrusion** or **erosion**, and if the sea water overflows the levees, to mitigate the damage to hinterland. Moreover, **integrated coastal measures**, that is the protection not only by the single structure, but also by the combination of multiples coastal measures including the establishment of buffer zone.

Tsunami Information Board

Regarding tsunami and storm surge countermeasures, in addition to the development of coastal facilities, comprehensive measures should be implemented that **combine hard and soft measures**.

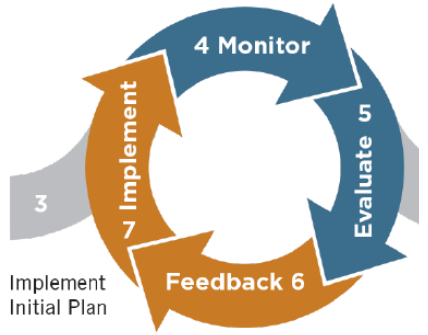
Source: 1) Monitoring and Adaptive Management Procedures and Guidelines Manual, USDA 2019

Indramayu

Since river mouths experience significant topographic changes in response to wave dynamics and sedimentation due to sediment inflow from the river, measures are promoted from **both mid- to long-term and wide-area perspectives**. Particularly in sedimentation areas, **comprehensive sediment management** in the sediment transport system and land management are carried out.

Tuban

Conservation and maintenance of **natural protection functions** such as existing sandy beach, coral reefs, mangrove forests, etc. is promoted.



Adaptive Management 1)

For the countermeasures against coastal erosion, it is promoted to implement measures through **adaptive management of beach** and from a **wide-area perspective** taking into account the entire cell of littoral drift.

2.2 Direction on Development and Conservation of Coastal Environment

Functions of coastal environment

The coast provides a **diverse habitat** and **growth environment for organisms**.


Kuta, Bali


Nusa Dua, Bali

The coast forms a part of **outstanding natural landscapes**.

Direction of measures for coastal environment

- Conservation and maintenance of coastal environment that coexists harmoniously with nature is promoted.
- Preservation of outstanding landscapes, academically valuable assets, and diverse ecosystems is promoted.
- Regulations for coastal environmental conservation is established.
- In order to create favorable coastal environment, coastal facilities are developed as necessary.
- Environmental impacts resulting from sudden incidents such as oil spills is appropriately managed.
- In order to maintain and conserve the rich biodiversity, conservation of mangrove forests and coral reefs are promoted.
- It is promoted to secure that all parties concerned can share a common understanding of the coastal environment that need to be conserved.

2.3 Direction on Proper Coastal Utilization by Public

Functions of coastal utilization

The coast forms and preserves **regional culture** of local community.


Sanur, Bali


Ancor, Jakarta

The coast encourages **diverse coastal utilizations** such as leisure sports, education activities, and recreational spaces.

Direction for measures of coastal use

- Coastal facilities that contribute to the enhancement of coastal utilization is promoted to be developed.
- Actions are necessary to deal with the degradation of coastal facilities and abandoned vessels that significantly impair the scenery and convenience of the coast.
- Ensuring public access to the seashore is promoted.
- Awareness rising activities for users of the coast is promoted so as to improve their etiquette and behavior in their coastal utilization is promoted.

3. Direction of Implementation on Coastal Facilities

Promotion of development of safer coast


Sanur, Bali

- **Integrated coastal measures** are promoted, including, not only hard structure, but also soft measures such as beach nourishment (including sand bypass from sedimentation area, etc.) as well as green infrastructure such as mangrove plantation, and various measures such as combining these structures are fostered. To enable this, furthermore, the appropriate land management in evolving coastal areas is promoted.
- To prevent widespread and catastrophic damages by Tsunami and storm surges, it is promoted to take measures that efficiently and comprehensively combines **multiple coastal facilities**.

- The appropriate management of sediment is required, including non-structural measures such as sand nourishment from sedimentation areas to erosion areas on a series of beaches, taking into consideration the movement of sand transport over a wide area.
- To address land subsidence, integrated measures are promoted including non-structural measures such as **establishment and enforcement of regulations** considering the estimated subsidence amount.
- For protection against Tidal Flood, high waves, and wave overtopping, it is promoted to take measures to **prevent negative impacts** to surrounding coasts taking into account **the continuity of sand transport**.

Semarang


Candidasa, Bali

Promotion of measures for the beloved coast

- Coastal facilities for enhancing **user convenience** and maintaining **the living environment of the local community** are promoted.
- In order to secure **the continues access to the seashore**, coastal facilities such as stairs, staircase- revetment, and gently sloping revetment, etc. are promoted.
- **Conservation and development of sandy beaches** is promoted as sandy beaches are an important space for tourism, recreational activities for local residents, and the preservation of local culture.
- **Facilitating handicapped accessibility** is encouraged.


Sanur, Bali

Promotion of measures for the conservation of nature-rich coast, and their creation as required.

- **Development of coastal facilities in accordance with the natural characteristics** are promoted.
- Conservations and restoration of **sandy beaches**, **coral reefs**, and **mangrove forests** is promoted.
- Development of coastal facilities **in consideration of the natural environment** is promoted.


Indramayu

Promotion of Implementation of Planned and Effective Maintenance and Repair of Coastal Facilities

- As existing coastal facilities continue to degrade, it is necessary to satisfy the required functions while reducing and equalizing costs.
- **Patrols or inspections of coastal facilities** at appropriate times shall be conducted.
- **Systematic and effective maintenance and repair** of coastal facilities are promoted.
- **The records related to inspections and repairs** as well as new construction or repair of coastal facilities are properly prepared and stored.


Nusa Dua, Bali

4. Other Considerations on Coastal Management


Working Group for Coastal Management (JICA North Java Project)

Promotion of Initiatives from Broad and Comprehensive Perspective

- Regarding sea level rise due to climate change, the common understanding about the target sea level is shared within a society.
- Integrated and systematic disaster prevention and mitigation measures is promoted in cooperation with related organizations.
- Against coastal erosion, it is promoted to take wide-area and comprehensive measures in cooperation with various relevant organizations, such as comprehensive sediment management measures in the entire sediment system from upstream to the coast.
- Further cooperation with various measures implemented in and around the coast is encouraged so as to promote coastal utilization.

Coastal Management


Beach clean activities Sukabumi, West Java 1)

Promotion of Cooperation with Local Communities and Raising Awareness of Coastal Management

- In order to archive the creation of a disaster-resistant community, enhancing local communities' awareness is promoted.
- Beautification of coasts is promoted with cooperation of participants from local residents, volunteers, etc.
- Awareness-raising activities to improve users' morale in coastal environmental conservation are recommended.
- It is encouraged to create rules for safe and proper coastal utilization.
- Promotion of coastal conservation philosophy and capacity building in local communities are encouraged.
- Coastal management in cooperation with local community is promoted.
- In order to encourage private sector involvement in coastal conservation, coastal conservation programs as part of CSR (Corporate Social Responsibility) initiatives is recommended.


Wave Monitoring (JICA North Java Project)

Promotion of Research, Studies, and Monitoring

- Collecting basic information on the coasts is promoted.
- It is encouraged to collaborate and share information across a wide range of sectors, including the private sector, and to facilitate international technological exchanges.
- To address the climate change impact, tidal levels and waves is monitored continuously, and the data shall be store and accumulated.
- Continuous monitoring and data accumulation for implemented coastal facilities for both gray and green measures is promoted to be conducted in order to clarify the effectiveness of facilities and impact to surrounding coastal area.

Source: 1) Foto tempo, https://foto.tempo.co/read/108877/dahului-pandawara-group-pembak-sukabumi-bersihkan-pantai-cibutun-loji

Clause 2 Area for Preparation of Basic Coastal Management Plan

Target islands

Five main islands **(Sulawesi, Kalimantan, Java, Papua, Sumatra**) and two islands group (**Maluku Islands and Nusa Tenggara**) is designated to prepare the Basic Coastal Management Plan.

Division of coastal area

Division of one coastal area, in which one coastal management plan is prepared, shall be determined based on the similarity of **topographical and oceanographical condition**, **the continuity of littoral drift** as broadly as possible, and **administrative boundary** by setting an approximately **50 to 100 kilometers** as the extent of a one of unified coastal area.

Clause 3 Basic Items for the Preparation of the Basic Coastal Management Plan

1. Basic Items to be included in the Basic Coastal Management Plan

1.1 Basic items concerning Coastal Management

1)Current status of the coast and the direction of coastal conservation

The long-term vision of the coast shall be determined based on natural and social characteristics and other factors.

2)Items related development of the coastal environment. to coastal protection.

It is required to determine the area to be protected, the goals of coastal protection such as the protection level against coastal disasters, and the details of the measures to be implemented to achieve these goals.

3)Items related to the management, maintenance and conservation of the coastal environment.

It is required to determine the detail of the measures that are to be implemented for the conservation of the coastal environment, and, if necessary,

4)Items related to proper public utilization of the coast.

It is required to determine the details of the measures that are to be implemented to promote proper coastal utilization by public.

1.2 Basic items concerning the development of Coastal Facilities

1)Items related to new development or improvement of coastal facilities.

a. The area in which coastal facilities are to be newly constructed or improved shall be determined.

b. The type, size, and layout of coastal facilities in each area determined in (a) shall be determined.

c. It is required to show the beneficiary areas through the new construction or improvement of coastal facilities.

2)Items concerning the maintenance or repair of coastal facilities.

a. The area in which existing coastal facilities are subject to maintenance or repair shall be determined.

b. The type, size, and layout of existing coastal facilities in each area determined in (a) shall be determined.

c. The method of maintenance or repair of each type of coastal facilities that identified in (b) shall be determined.

2. Important items to be considered in the Basic Coastal Management Plan

2.1 Ensuring consistency with relevant development plans

Basic Coastal Management Plan shall be in line with the relevant plans such as national land use plan, plans on environmental conservation, etc.

2.2 Cooperation and coordination with relevant administrative agencies

Adequate cooperation and close coordination with relevant administrative agencies related to the coast shall be conducted.

Local risks, including climate changes, land subsidence, etc. shall be shared with hose involved in community development.

2.3 Participation of residents and information disclosure

Participation of local residents shall be facilitated.

Disclosure of information related to the coast shall be carried out in order to enhance the transparency of the project,

2.4 Review of plan and revision properly

Basic Coastal Management Plan is basically reviewed approximately every five years to assess the need for updates, and it is revised as necessary.

Basic Coastal Management Plan and the development plan of coastal facilities stated in the Basic Coastal Management Plan shall be revised in response to changes in local condition, socio-economic condition, and the effect of climate change.

Dokumen Pelengkap 2

Konsep Rencana Dansar Pengelolaan Pantai

Guideline for Procedure for Preparation of Basic Coastal Management Plan

July 2024

JICA Study Team

-Preface-

- This Guideline provides general procedure for preparing the Basic Coastal Management Plan for the purpose of expanding this concept to other coastal area in Indonesia.

- This Guideline also provides consideration points, study items and study method, which are the knowhow obtained through the Project preparing the draft of the Basic Plan in three pilot sites.

Preparation Flow of Basic Coastal Management Plan

Step 1. Selection of "Areas" for "Basic Coastal Management Plan"

Identification of coastal universal characteristics in area

Step 2. Division from "Area" to **"Zones"**

Considering Topographic/oceanographic conditions (Similar to "One Sediment Cell")

Study on coastal process & its mechanism for each Zone

Step 3. Division from "Zone" to **"Sections"**

Considering utilization at hinterland, discontinuity of littoral drift by natural and artificial boundary, expected initiative agencies

Step 4. Setting of **"Ideal coastal situation"** in each Section

To clarify mid-term principle for coastal protection/conservation at each section

Step-5 Categorization of basic direction for required function on coastal management

"To categorize from 4 options from viewpoint of "Protection", "Environment" and "Utilization"

Setting Target Level

Step- 6 Selection of direction for required action for coastal management

To select the concrete action on coastal management from 4 options

Step-7 Selection of protection measures from several options

Considering effectiveness, cost/benefit, etc.

Step-8 Layout Plan for Coastal Management Plan (as final output)

To describe the proposed layout plan of coastal protection/conservation plan (M/P) in each area

Supplementary Explanation:

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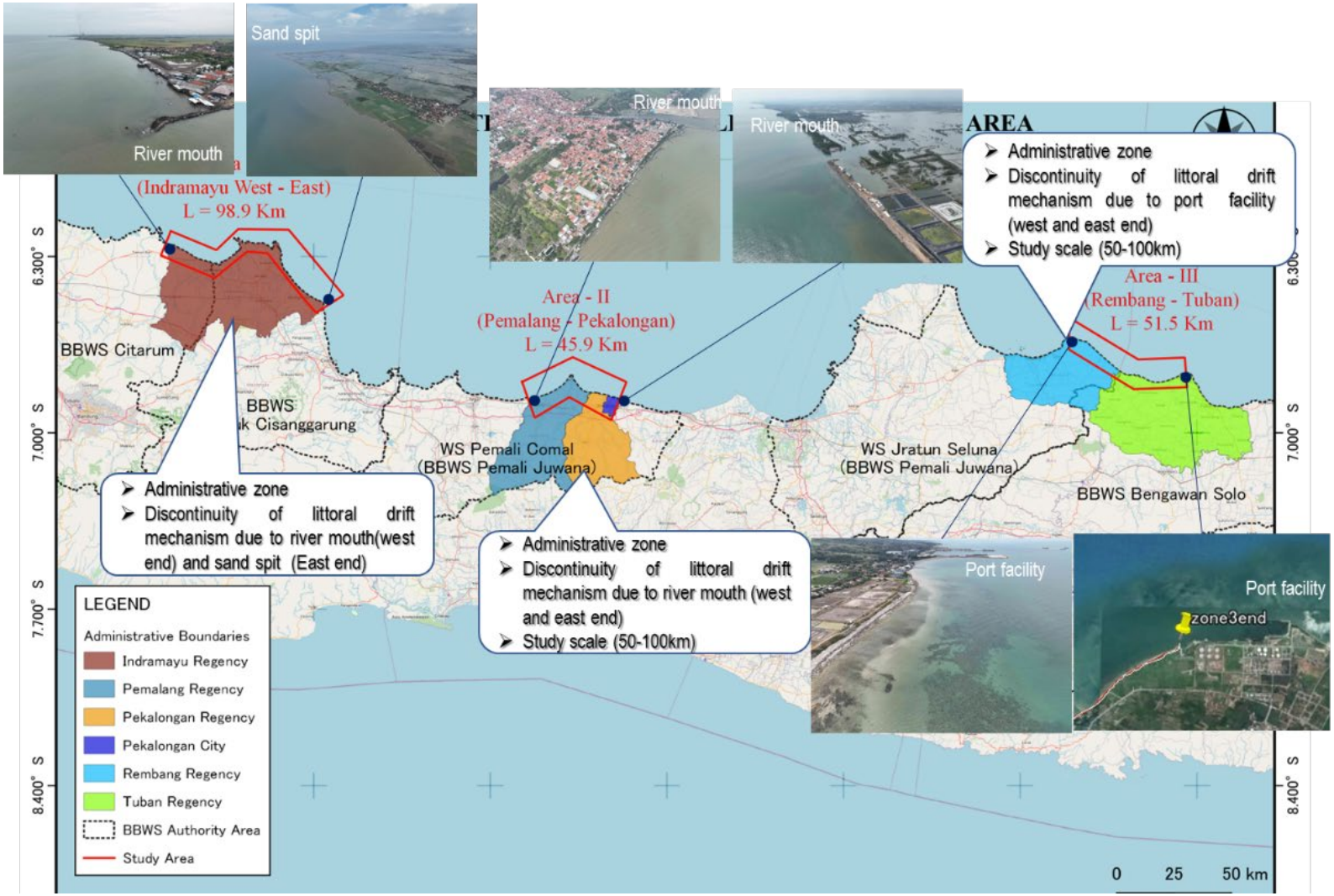
Supplementary Explanation:

- Considering Topographic/oceanographic conditions (Similar to "One Sediment Cell")
- Considering utilization at hinterland, discontinuity of littoral drift by natural and artificial boundary, expected initiative agencies
- To clarify mid-term principle for coastal protection/conservation at each section
- "To categorize from 4 options from viewpoint of "Protection", "Environment" and "Utilization"
- To select the concrete action on coastal management from 4 options
- Considering effectiveness, cost/benefit, etc.
- To describe the proposed layout plan of coastal protection/conservation plan (M/P) in each area

Step 1. Selection of "Areas" for "Basic Coastal Management Plan"

Outline: Area for Basic Coastal Management Plan is determined considering the follows:

- 1) Boundary between administrative (Province, Regency, City, etc.)
- 2) Continuity of littoral drift,
- 3) Appropriate scale (50-100 km for one area)



Step 2. Division from “Area” to “Zones”

Outline:

- “Area” is divided into “Zone” based on the direction of shoreline angle to reflect the topographic/oceanographic conditions (Similar to “One Sediment Cell”)

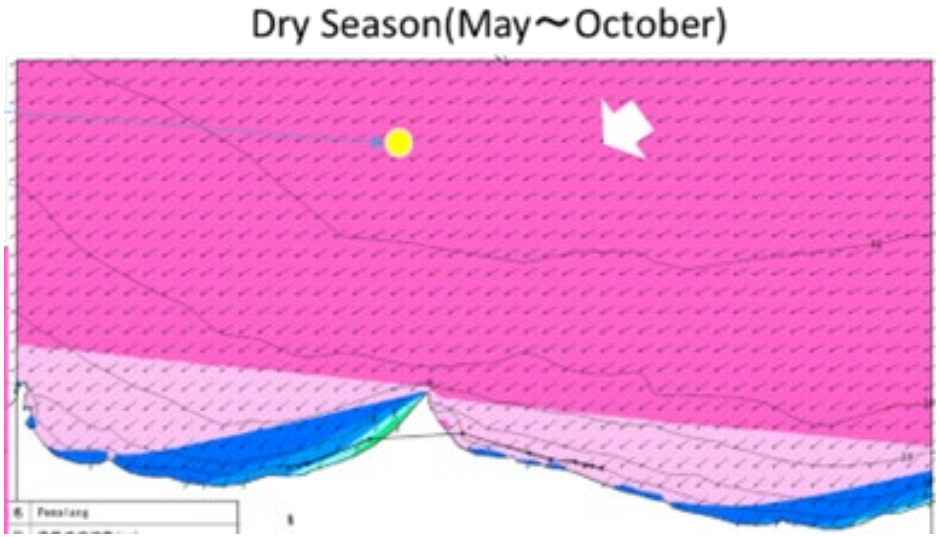
How to divide the Area into Zone:

- Checking the shoreline angle from satellite images, when the shoreline changes drastically, the coast is divided as one Zone.
- Coastal length of Zone is approximately several tens of kilometers.

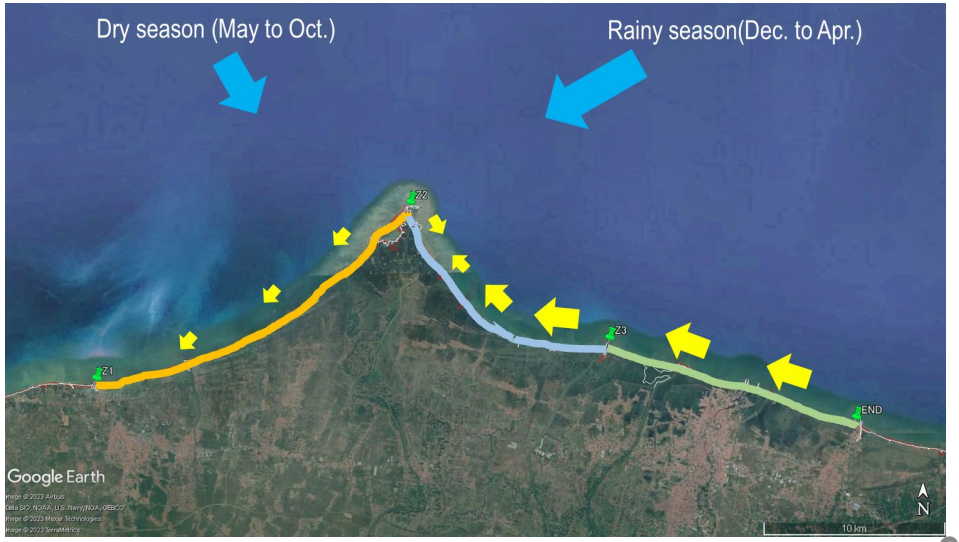
Input information:

- Satellite Images (e.g., Google Earth)
- Wave transformation calculation (As necessary)
- Consideration of Littoral Drift (As necessary)

❑ **Wave transformation calculation**

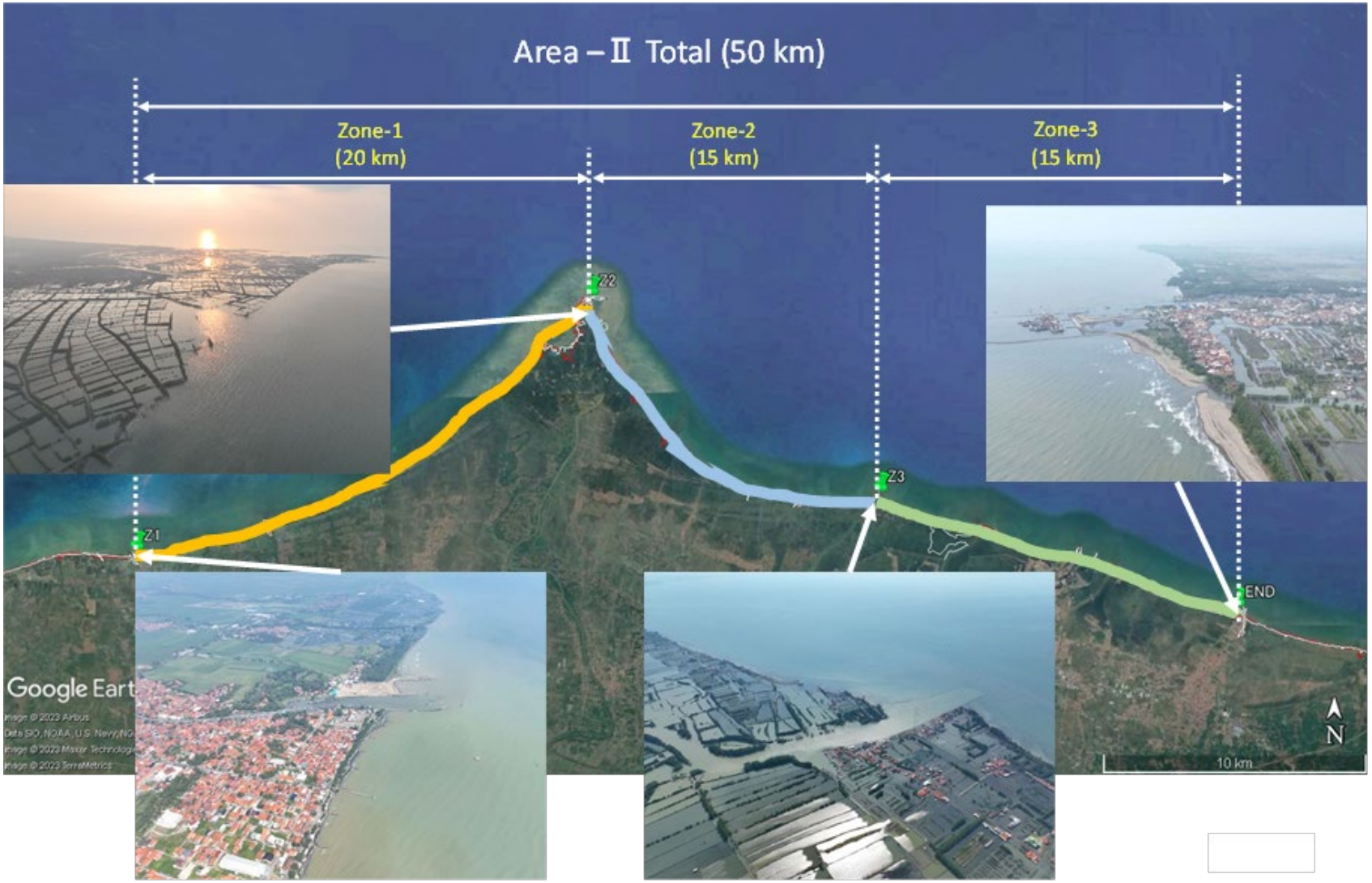


❑ **Consideration of littoral drift system**



Step 2. Division from “Area” to “Zones”

- Output image of Step 2. Division from “Area” to “Zones”
  (e.g.) **Area-II Pemalang-Pekalongan**



Step 3. Division from "Zone" to "Sections"

Outline:

- "Zone" is divided into "Section" based on utilization at hinterland, discontinuity of littoral drift by natural and artificial boundary, to consider initiative agencies, and one segment for coastal management.

How to divide Zone into Section:

- Checking the difference in utilization condition of hinterland and coastal area, Zone is divided into Section.
- When dividing Zone, appropriate boundaries shall be taken as natural or artificial boundary.
- Initiative agencies mainly responsible for coastal management in the Section are determined by the hinterland utilization and are listed in the Section (as a proposal).

Input information:

- Satellite Images (e.g., Google Earth)
- Map of hinterland and coastal utilization (e.g, map illustrated manually based on the satellite imagery)

Example of Hinterland Use

Recreation/Marine sports

Example of Coastal Use

Boat landing

Mangrove planting

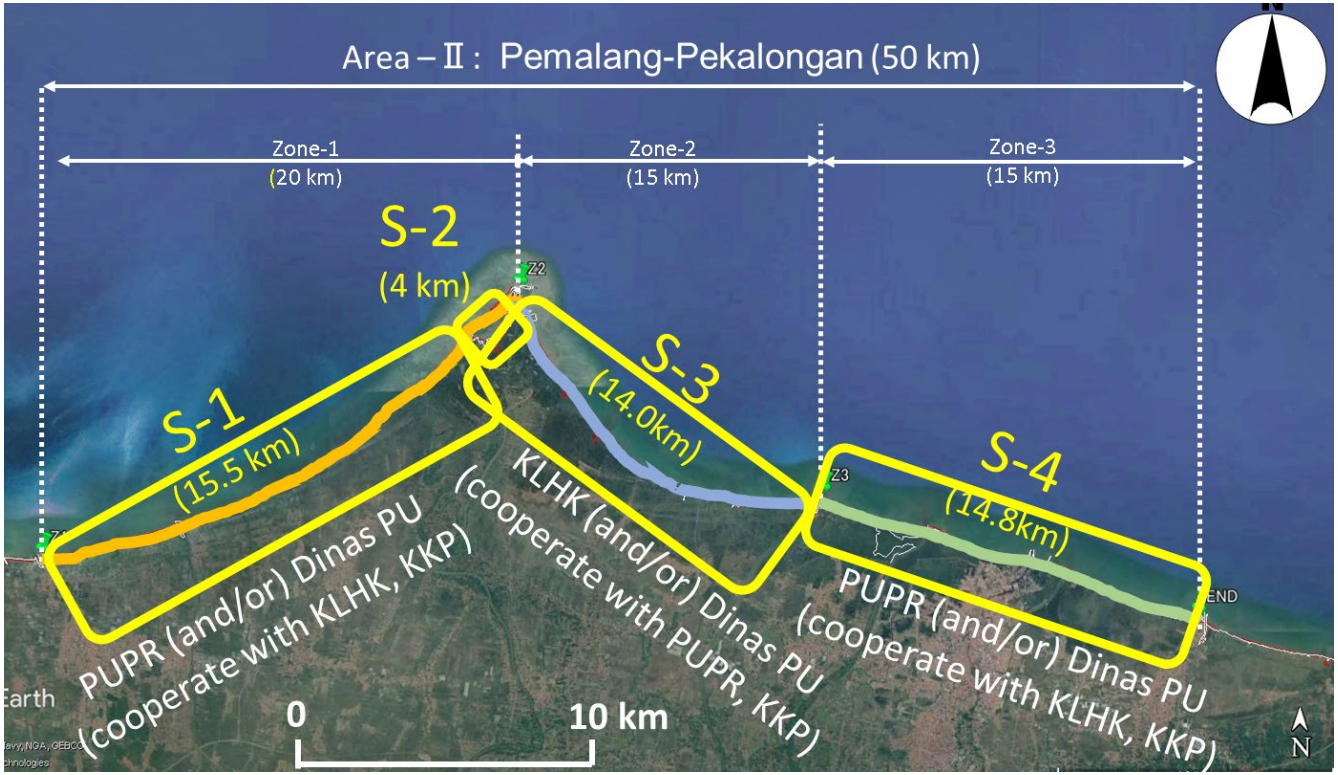
Step 3. Division from “Zone” to “Sections”

❑ **Proposed initiative agencies by hinterland**

Agencies mainly tasked with management plan	Type of land utilization at hinterland
PUPR, (DINAS PU)	①Tourism area, ②Residential area, ③Algaculture area (farm)
KKP	①Fishery port area, ②Agricultural area (salt farm, fishpond)
KLHK	①Natural forest protection area, ②Mangrove restoration area
Private, Pelindo, etc.	①Industrial and/or commercial port area

❑ **Output image of Step 3. Division from “Zone” to “Sections”**

(e.g.) Area-II Pemalang-Pekalongan



Preparation Flow of Basic Coastal Management Plan

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Setting Target Level

Step- 6 Selection of direction for required action for coastal management

Step-7 Selection of protection measures from several options

Step-8 Layout Plan for Coastal Management Plan (as final output)

Supplementary Explanation:

- Considering Topographic/oceanographic conditions (Similar to "One Sediment Cell")
- Considering utilization at hinterland, discontinuity of littoral drift by natural and artificial boundary, expected initiative agencies
- To clarify mid-term principle for coastal protection/conservation at each section
- "To categorize from 4 options from viewpoint of "Protection", "Environment" and "Utilization"
- To select the concrete action on coastal management from 4 options
- Considering effectiveness, cost/benefit, etc.
- To describe the proposed layout plan of coastal protection/conservation plan (M/P) in each area

Step 4. Setting of Ideal coastal situation in each Section

Outline:

- To clarify mid-term principle for coastal protection/conservation at each section, Ideal coastal situation for Section is determined.

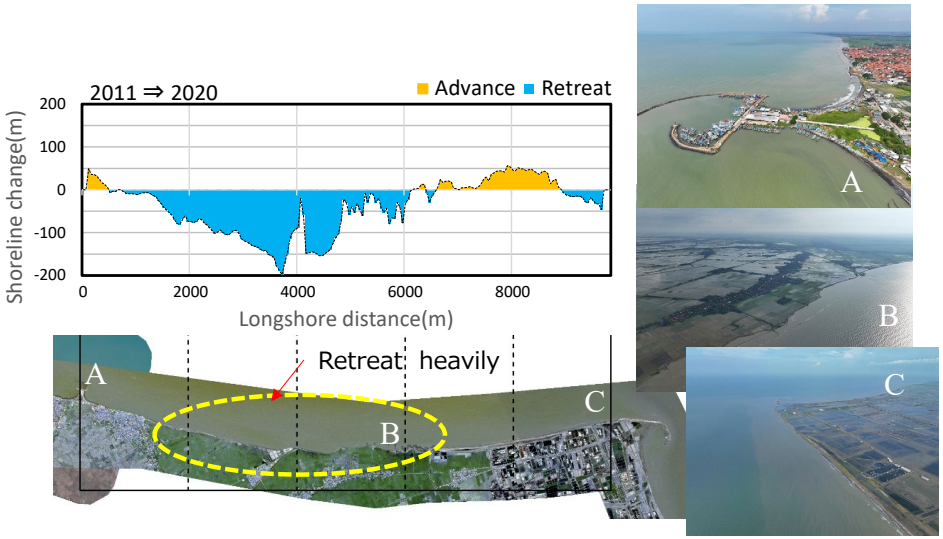
How to set Ideal Coastal Situation:

- Correct coastal conditions are assessed through the following information:
  (1) Coastal disaster risk analysis (e.g., coastal erosion, tidal flood, land subsidence),
  (2) Hinterland utilization and coastal utilization,
  (3) Existing coastal facilities.
- Coastal problems and issues are extracted and clarified.
- Mid-term principle for coastal protection and conservation at each section is clarified.

Input information:

- (1)Coastal risk analysis
  (ex. coastal hazard considered in North Java Coast Project):
  - Coastal erosion risks: shoreline change analysis
  - Tidal flood: DEM data and external forces (wave / water levels)
  - land subsidence: monitoring data or literature reviews
- (2)Hinterland utilization and coastal utilization
- (3)Existing coastal facilities

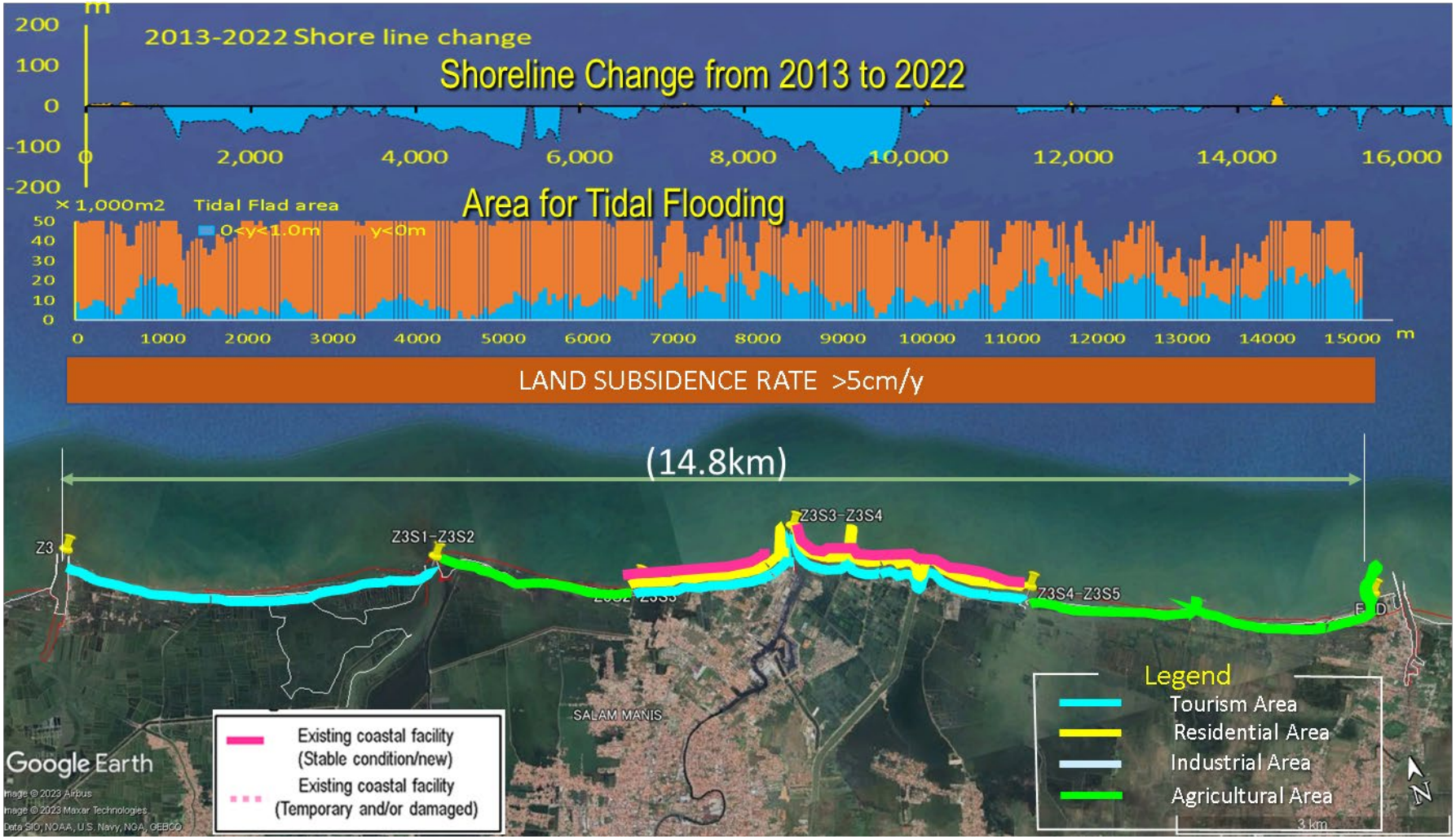
❑ **Example of shoreline change analysis**



Step 4. Setting of Ideal coastal situation in each Section

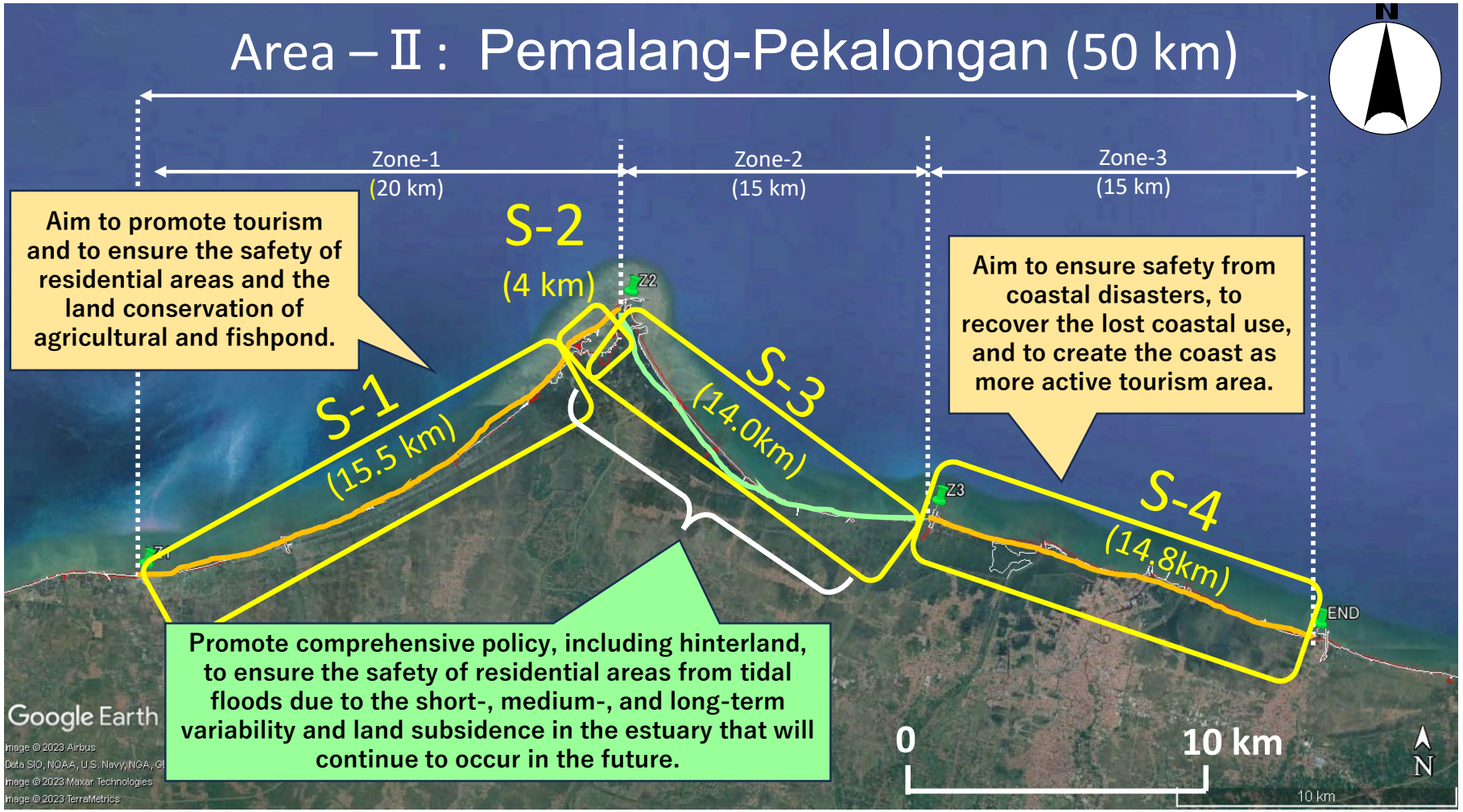
- Assessment of Current Coastal Conditions

  (e.g.) **Area-II Pemalang-Pekalongan**



Step 4. Setting of Ideal coastal situation in each Section

❑ Output image of Step 4. Setting of Ideal coastal situation in each Section
(e.g.) Area-II Pemalang-Pekalongan



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Step-5 Categorization of basic direction for required function on coastal management

"To categorize from 4 options from viewpoint of "Protection", "Environment" and "Utilization"

Setting Target Level

Step- 6 Selection of direction for required action for coastal management

To select the concrete action on coastal management from 4 options

Step-7 Selection of protection measures from several options

Considering effectiveness, cost/benefit, etc.

Step-8 Layout Plan for Coastal Management Plan (as final output)

To describe the proposed layout plan of coastal protection/conservation plan (M/P) in each area

Supplementary Explanation:

Detail Procedure of Step5 - Step 7

Step-5: Categorization of basic direction for required function on coastal management

Input
Situation of coastal hinterland, and coastal utilization

Categorization for required functions on each coast from three perspectives of Protection, Environment and Utilization

Categorization of required functions

Category- 1	Category-2	Category- 3	Category- 4
Protection	Protection + Environment	Protection + Utilization	Protection + Environemnt + Utilization

Input
1) existing coastal facilities
2) existing development plan of coastal facilities

Step-6: Selection of direction for required action for coastal management

Implementation

- Action-1[a]: No action
- Action-2[b]: Observation (Monitoring)
- Action-3: Improvement of existing coastal facilities
- Action-4: New coastal facilities

Step-7: Selection of protection measures from several options

a) Action-1: No action

Ex1) No issues on the coast
Ex2) No need for new development
Since existing facilities satisfying the function

b) Action-2: Observation (Monitoring)

Ex1) Coast that has no present risks, but has future risks of coastal disaster
EX2) Coast that doesn't meet the required function, but has been recently developed or has existing development plan

Step-5 Categorization of basic direction for required function on coastal management

Outline:

- To identify the required function on coastal management from viewpoint of “Protection”, “Environment” and “Utilization” , each coast is categorized into four options. .

How to set Required Coastal Function:

- All coasts principally require a protection function; however, this does not mean all coasts require a coastal protection project (see Step-6).
- It requires an environment function when the hinterland and coastal areas are designated as environmental protection areas.
- It requires a utilization function when the coast is currently used for coastal activities or future demand of coastal utilization is anticipated.
- If satisfies both, such as I the case of Eco-tourism area of coastal mangrove forest, it falls into Category-4.

Input information:

- Coastal disaster risk assessment (see Step-4)
- Hinterland utilization and coastal utilization
- Map of designated environmental protected area.

❑ Categorization of Required Coastal Functions

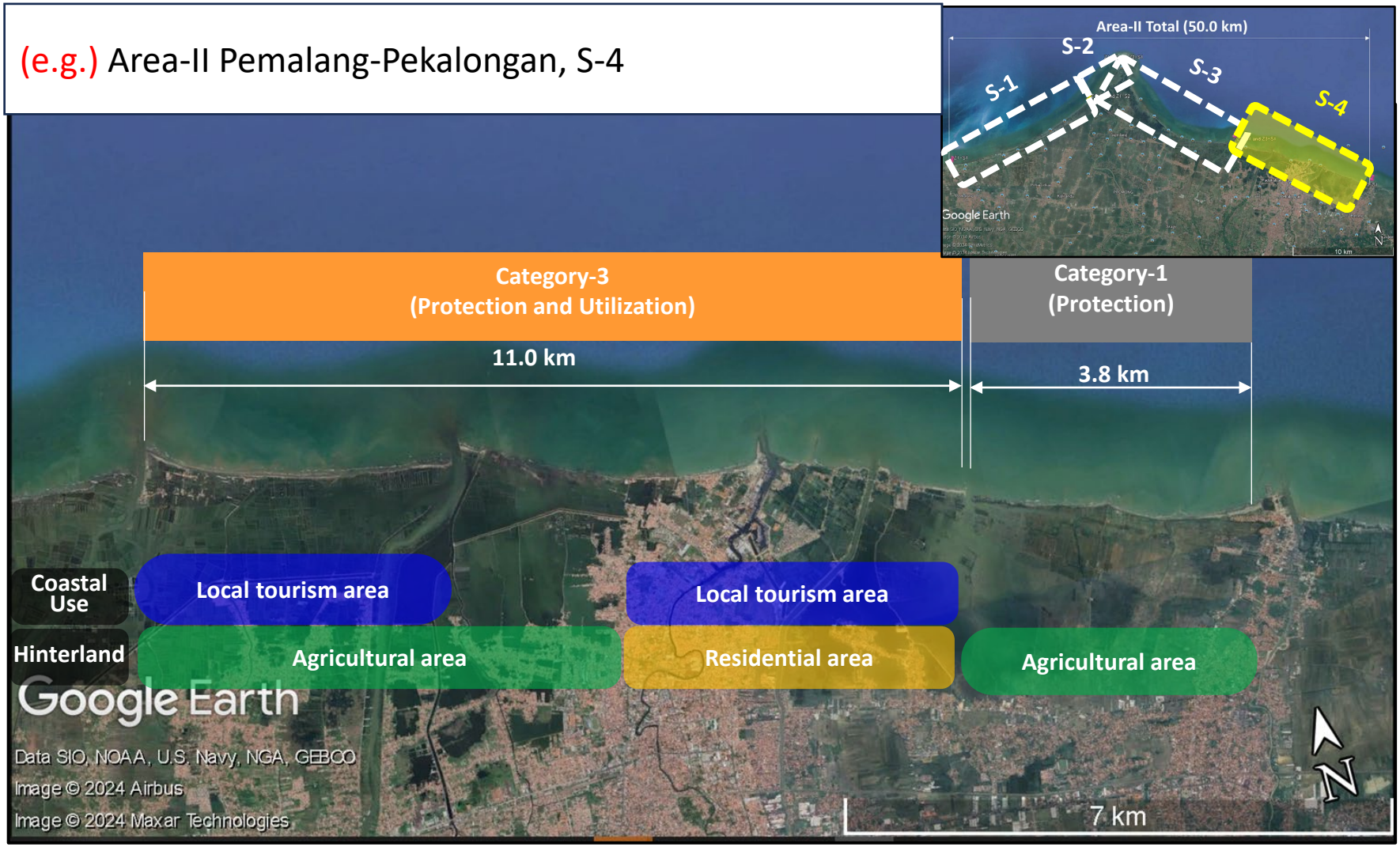
Category- 1	Category-2	Category- 3	Category- 4
Protection	Protection + Environment	Protection + Utilization	Protection + Environemnt + Utilization

❑ Coasts where each function is required

	Coasts where each function is required	Examples
Protection	Coast with high risks of coastal disaster	(ex.) high risk of coastal erosion and/or coastal flooding
Environment	Coast with environmental protection area	-
	Coast with good ecosystem and landscape	(ex.) Coast that requires conservation of sandy beach, mangrove forest, coral reefs
Utilization	Coast with current demand of coastal utilization	(ex.) Coast that is used as local tourism area
	Coast with potential demand of coastal utilization	(ex.) Coast where future coastal demand is anticipated due to the use of the hinterland such as coastal areas of urban area

Step-5 Categorization of basic direction for required function on coastal management

❑ Output image of Step 5. Categorization of basic direction for required function on coastal management



Setting Target Level

- **Example of Target levels set for North Coast of Java Island, in which main coastal hazard is coastal erosion and tidal flood.**

Categorization	Functions	The target level for each function
Category-1	Protection	Coasts with residential areas or critical infrastructures in the hinterland: the target level of protection function is to prevent damage to human lives, human activities, and economic activities caused by high waves and/or storm surge inundation and coastal erosion. Against coastal erosion, the minimum target level is to prevent further shoreline recession (maintaining the present shoreline position). When coastal erosion progresses and hinterland protection cannot be achieved through maintaining the present shoreline position, the target level to restore the shoreline position is determined as necessary.
		Coasts with primary industry in the hinterland such as agricultural and aquacultural areas: To allow wave intrusion under extreme oceanographic conditions but prevent further shoreline recession (maintaining the present shoreline).
Category-2	Protection	To allow wave intrusion under extreme oceanographic conditions but prevent further shoreline recession (maintaining the present shoreline).
	Environment	On coasts with well-preserved natural coastal environments, the target level is to maintain and protect it. Conversely, when natural coastal environments formed by mangrove forests or sandy beaches have deteriorated or disappeared due to coastal development or coastal erosion etc., resulting in declines in protection, environmental quality, and usage, the target level is to restore and rehabilitate the original coastal environments.
Category-3	Protection	Coasts with residential areas or critical infrastructures in the hinterland: the target level of protection function is to prevent damage to human lives, human activities, and economic activities caused by high waves and/or storm surge inundation and coastal erosion. Against coastal erosion, the minimum target level is to prevent further shoreline recession (maintaining the present shoreline position). When coastal erosion progresses and hinterland protection cannot be achieved through maintaining the present shoreline position, the target level to restore the shoreline position is determined as necessary.
	Utilization	For the target level of utilization function, according to the type of coastal utilization (such as fishing activities or local tourism areas), the minimum goal is to maintain the current coastal utilization without degradation. Additionally, the target level is to enhance and promote further coastal utilization through coastal facility development, thereby contributing to improved economic benefits.
Category-4	Protection	（Same as Category-3）
	Environment	（Same as Category-2）
	Utilization	（Same as Category-3）

Step- 6 Selection of the direction for required action for coastal management

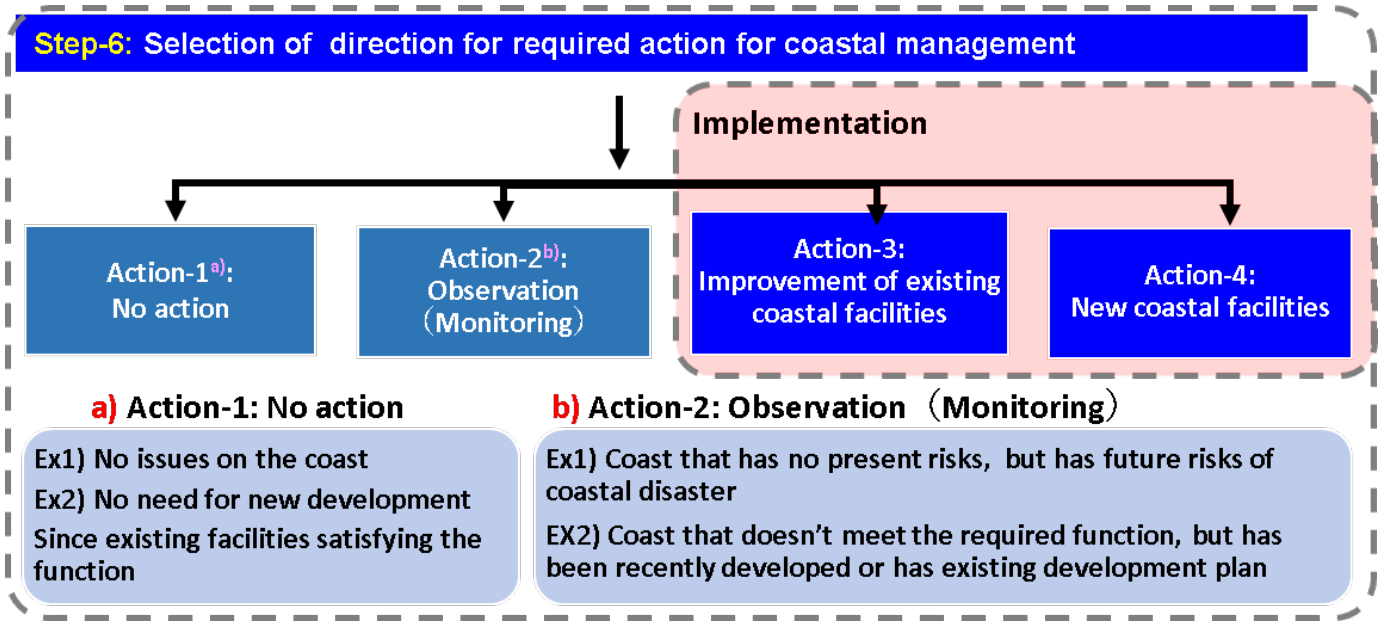
Outline:

- Considering existing coastal facilities and existing development plan of coastal facilities, the concrete action on coastal management are selected from 4 actions.

How to select the direction for required action for coastal management:

- It falls under Action-1 when there are no coastal issues or when existing facilities adequately meet the required functions.
- It falls under Action-2 when current conditions are no problematic, but future risks are anticipated.
- It falls under Action-3 when only improvements without adding new functions are needed.
- It falls under Action-4 when the addition of new functions from protection, utilization, or environment is required.

Input information: Existing coastal facilities and current condition on required function



Step- 6 Selection of the direction for required action for coastal management

❑ Output image of Step 6. Selection of direction for required action for coastal management

(e.g.) Area-II Pemalang-Pekalongan, S-4

Step-7 Selection of protection measures from several options

Outline:

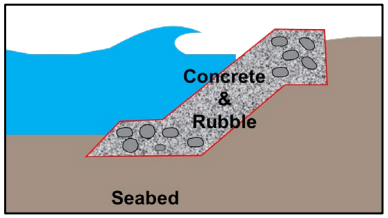
- Protection measures were determined from several options based on 1) Function, 2) Effectiveness, 3) Cost/benefit, etc.

How to select protection/conservation measures:

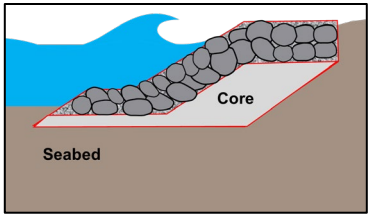
- Coastal measures on each coast are determined from the comparison of several options in the following aspects:
- Effectiveness of coastal measures considering coastal characteristics, coastal issues, the target level(refer to Collection Examples on Coastal Protection Measures).
- Coastal functions provided by each coastal measure (see Slide-21)
- Cost-effectiveness of each coastal measure (see Slide-22)

❑ **Various coastal measures from hard, soft, green type of facilities**

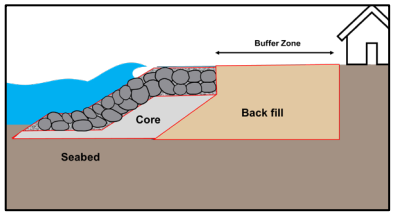
Impermeable revetment



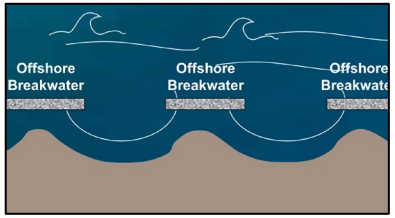
Rubble mound revetment



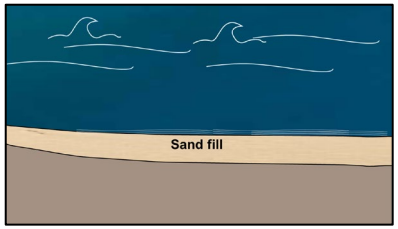
Revetment with backfill



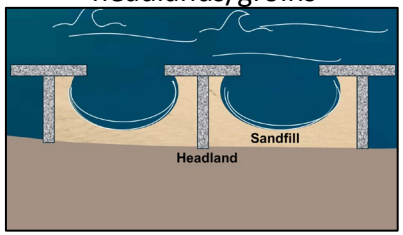
Offshore breakwaters



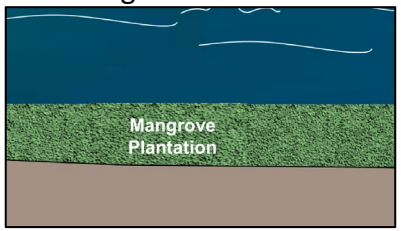
Beach nourishment



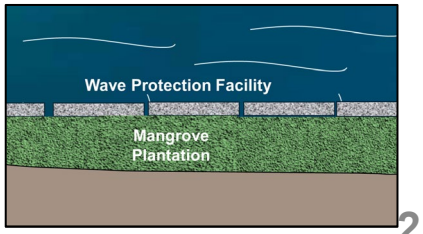
Beach nourishment with headlands/groins



Mangrove Plantation



Mangrove plantation with hard structures



Step-7 Selection of protection measures from several options

❑ **Representative applicable categories for coastal measures**

	coastal measure	Cat.1 Protection	Cat.2 Protection Environment	Cat.3 Protection Utilization	Cat.4 Protection Utilization Environment
1	**Hard (Structure) measure** (Revetment, groin)	■			
2	**Green measure** (Mangrove plantation, Coral transplantation)	■	■		
3	**Soft measure** (Beach nourishment)			■	■
4	**Combination** (hard, soft, green, gray measures)		■	■	■

1. Hard measure

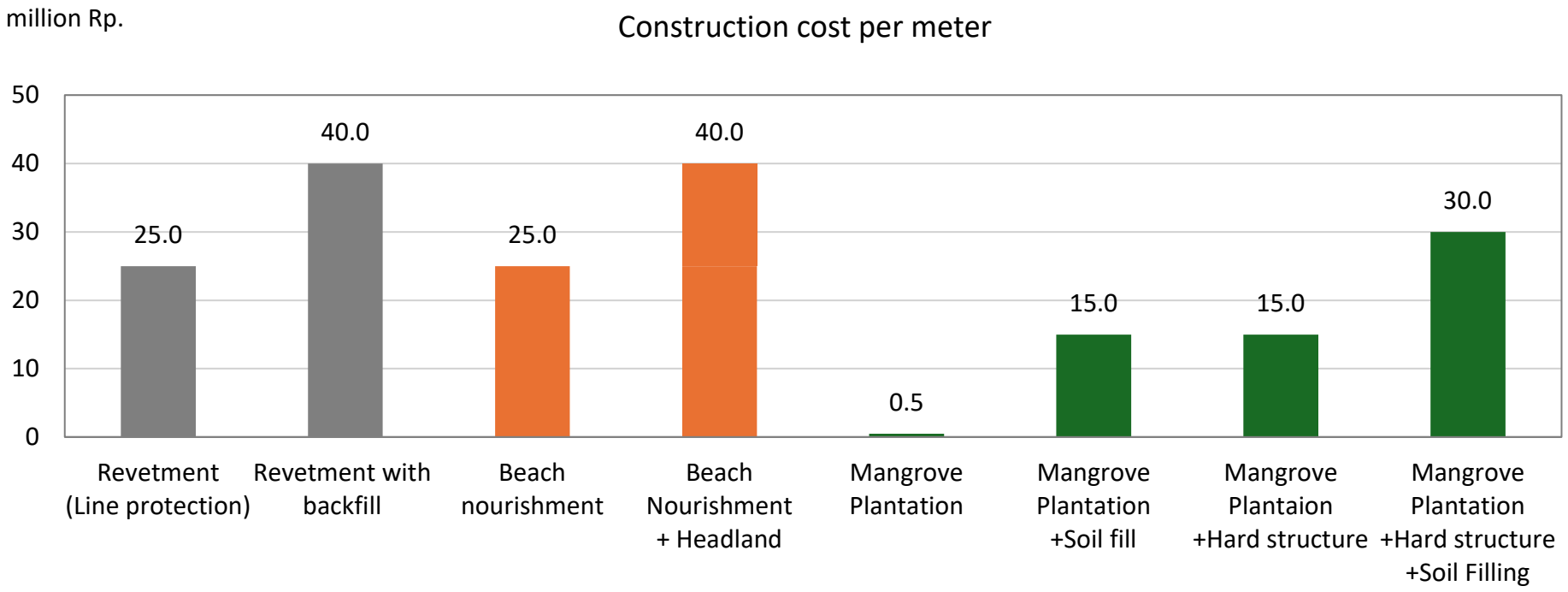
2. Green measure

3. Soft measure

4. Combination

Step-7 Selection of protection measures from several options

❑ **Comparison of construction cost per meter under assuming project coasts of North Coast of Java Island.**

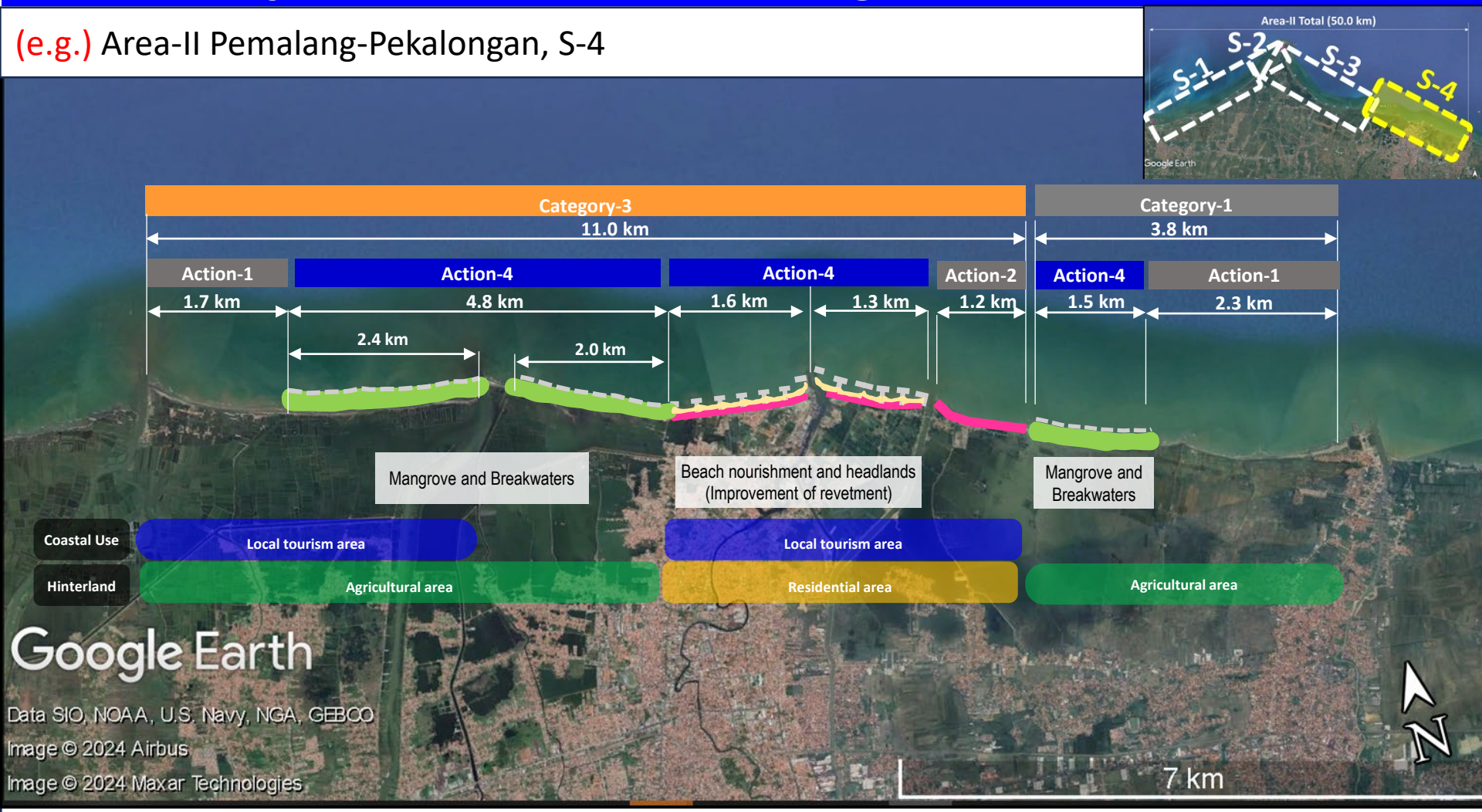


Assumption:

- Revetment with backfill is revetment with Ave. 20 m of backfill
- Beach nourishment assumes Ave. 30 m of beach width
- Beach nourishment with headland/groin is the above + headland (250 m interval)
- Mangrove plantation is assumed 150 m width.
- Mangrove plantation + soil fill is the above + soil fill with 1 m thickness
- Mangrove plantation + hard structure + soil fill is the above + rock breakwaters

Step-8 Layout Plan for Coastal Management

(e.g.) Area-II Pemalang-Pekalongan, S-4



Spatial Plan

Marine Spatial Plan	Fishing Port	Fisheries Area	Fishing Port	Mangrove	Tourism Zone	Fishing Port	Fisheries Area	General Port
Land Spatial Plan	Fisheries Area			Residential Area				

Legend

Existing coastal facility (Stable condition/new)

Existing coastal facility (Temporary and/or damaged)

Category 1	Category 2	Category 3	Category 4
Only "Protection" function is considered	"Protection" and "Environment" functions are considered	"Protection" and "Utilization" functions are considered	"Protection", "Utilization" and "Environment" functions

Action-1: No action	Action-2: Observation (Monitoring)	Action-3: Improvement of existing coastal facilities	Action-4: New coastal facilities

Dokumen Pelengkap 3

Rencana Fasukutas Pantai

Collection Examples on Coastal Protection Measures

July 2024

JICA Study Team

- Preface -

- This collection provides general examples of coastal protection measures mainly by means of hard, soft, and green infrastructure facilities.

- Various protection measures have been proposed and applied in Japan and other countries based on their own requirement, coastal characteristics, material procurement condition, economic condition, etc. However, this collection example focuses on those measures that are highly applicable and realistic on implementation in Indonesia.

- Outline for each protection measures, which are function, effect as well as consideration point on planning, design and implementation are briefly described.

Table of Contents

Seawall

Source: JICA Study Team

Source: JICA Study Team

Source: JICA Study Team

Function, Effect

- Impermeable structures using pre-cast concrete, in-situ concrete, concrete Sheet-pile, etc, to secure required crown height against wave overtopping and inundation due to storm surge.

Consideration on Planning, Design & Implementation

- Toe protection using rubble, rock etc. is important to consider to release the scouring due to reflection wave.
- Selection of appropriate structure type(pre-cast sheet pile, in-situ concrete, etc.) is important considering topographical condition on each site.
- Important to secure the crown height under the condition of subsidence (especially at north coast of Java Island).
- This facility can not be controlled littoral drift, so the erosion may continue to occur at the down-drift coast (and in front of seawall) at littoral coasts.
- Appropriate design and construction method is required to minimize the life-cycle cost considering not only initial cost but also maintenance cost to secure the required crown height, especially at the area where land subsidence and settlement of facilities due to seabed condition are anticipated.

Revetment 1 (Impermeable type)

Source: JICA Study Team

Source: Nippon Koei BBCP2

Source: Nippon Koei BBCP2

Function, Effect

- Impermeable structures using in-situ concrete casing, concrete block, concrete casing, stone masonry, etc. to reduce wave overtopping and inundation due to storm surge, and to stop retreat of land by forming solid boundary between water and land area.

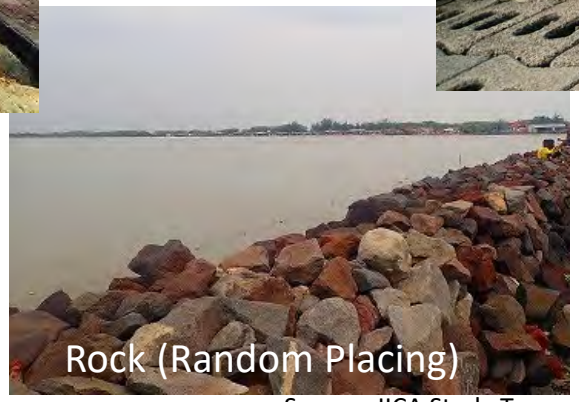
Consideration on Planning, Design & Implementation

- Toe protection using rubble, rock etc. is important to consider to release the scouring due to reflection wave.
- Selection of appropriate structure type(pre-cast sheet pile, in-situ concrete, etc.) is important considering topographical condition on each site.
- Important to secure the crown height under the condition of subsidence (especially at north coast of Java Island).
- This facility can not be controlled littoral drift, so the erosion may continue to occur at the down-drift coast (and in front of revetment) at littoral coasts.
- Appropriate design and construction method is required to minimize the life-cycle cost considering not only initial cost but also maintenance cost to secure the required crown height, especially at the area where land subsidence and settlement of facilities due to seabed condition are anticipated.

Revetment 2 (Permeable type)

Source: Nippon Koei BBCP2

Source: Open Source on WEB



Source: JICA Study Team

Source: JICA Study Team

Function, Effect

- Permeable structures using rock (rubble), concrete block, etc. to reduce wave overtopping and inundation due to storm surge, and to stop retreat of land by forming solid boundary between water and land area.
- Ruble revetment is commonly applied in Indonesia as coastal protection against coastal erosion.

Consideration on Planning, Design & Implementation

- In case that seabed condition consists of mud or fine sand, settlement of facility may occur due to consolidation and liquefaction. Consideration to minimize such adverse effect shall be considered on design and construction. Also, maintenance to add material to secure the required crown height is required.
- Two types of placing method which are “random placing” and “regular placing” are applied considering stability and utilization.
- This facility can not be controlled littoral drift, so the erosion may continue to occur at the down-drift coast (and in front of revetment) at littoral coasts.
- Appropriate design and construction method is required to minimize the life-cycle cost considering not only initial cost but also maintenance cost to secure the required crown height, especially at the area where land subsidence and settlement of facilities due to seabed condition are anticipated.
- Selection of material (concrete or rock) shall be well-considered considering procurement condition to the site.

Revetment 3 (Soft Material type)

Source: Nippon Koei

Source: Nippon Koei BBCP2

Source: Open Source on WEB site

Function, Effect

- Soft type structure to protect land against coastal erosion, also sometimes to apply as foundation part of coastal structures, as breakwater to reduce wave actions, etc.
- Due to durability of the material, basically this type of revetment is *"as temporary protection*".

Consideration on Planning, Design & Implementation

- This type of revetment is "*as temporary protection*" and the durability for long period as other hard-structure type is not highly expected.
- The structure is made by geotextile materials with filling sand/soil inside, which reduces the pressure of the own weight acting the seabed and reduces subsidence.
- Even though this is "soft-type" revetment, the impact to wave action is same as hard-structure type revetment. This means scoring due to wave reflection occurs as same as hard-structure type revetment.
- It is common to apply the filled soil/sand from the site, and construction method is simple. Because of this, the construction cost and period can be reduced comparing to other hard-structure protection.
- Due to simple construction method and reducing of construction period, the construction cost can be also reduced comparing to hard-structure type. However, this is just "temporary measures", so the total cost shall be well-considered when the purpose is as "permanent protection" considering required maintenance and possibility for combination of soft and other measures.

Revetment 4

(Amenity Oriented Revetment)

Source: Nippon Koei

Source: Open Source on WEB site

Source: Nippon Koei

Function, Effect

- The revetment with mild-slope (1:3 or more) to enhance the amenity and access to the water area on beach utilization and to suppress reflection waves.

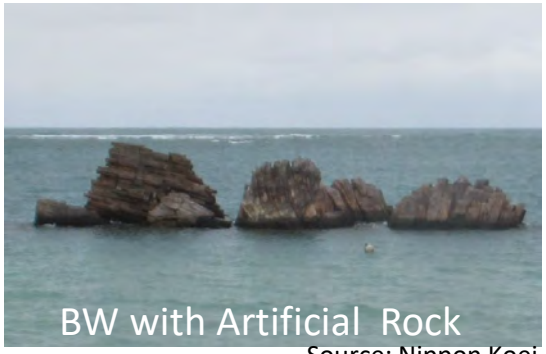
Consideration on Planning, Design & Implementation

- Generally, wave run-up become high due to making mild slope. Thus, appropriate setting of crown height is important to avoid wave run-up to hinterland.
- Beach access become easier than conventional revetment with steep slope. On the other hand, sufficient beach width is required to apply. If this type of revetment is constructed at eroded beach with narrow foreshore width, further acceleration of erosion will occur due to backwash on slope part. Also, coastal erosion at down drift side will occur in case of littoral coast.
- More costly than conventional revetment with steep slope.

Offshore Breakwater (BW)

Source: JICA Study Team

Source: JICA Study Team



Source: Nippon Koei

Source: JICA Study Team

Source: Open Source on WEB site

Source: Nippon Koei BBCP2

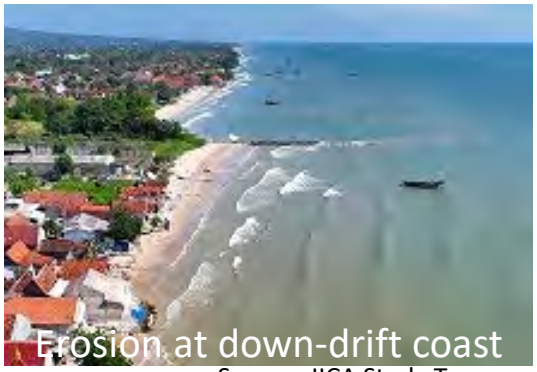
Function, Effect

- In case that the offshore breakwater is applied as erosion prevention measures, expected function is to form and maintain sandy area behind due to forming tombolo.
- As other purpose, the breakwater is to expect wave reduction behind.
- Generally, multiple offshore breakwaters are installed at regular intervals alongshore.

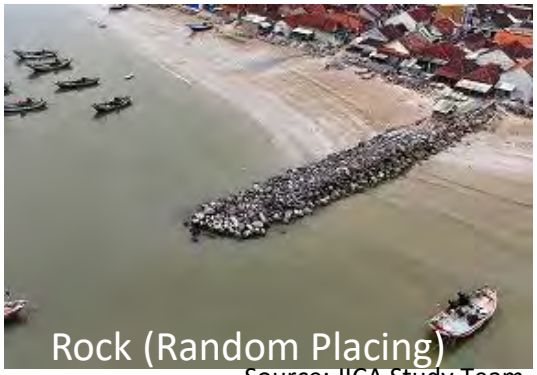
Consideration on Planning, Design & Implementation

- Appropriate layout design is required such as length, on-offshore distance, interval, etc. to obtain expect function for forming tombolo.
- The coastal area behind breakwaters is expected to protect well. On the other hand, the further erosion will anticipate at down-drift coast. Thus, integrated planning and layout design is important with wide-viewpoint considering existence of sediment cell.
- Settlement of block, armor rock after the construction due to consolidation, liquefaction commonly occur. Necessary to consider to secure the required crown height into design and maintenance work.
- Necessary to consider the life-cycle cost not only initial construction but also maintenance to secure the required crown height.

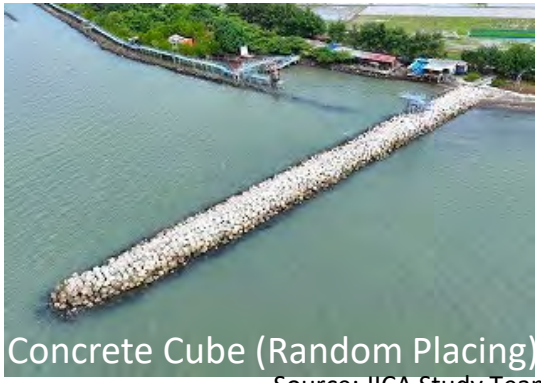
Groin



Source: JICA Study Team

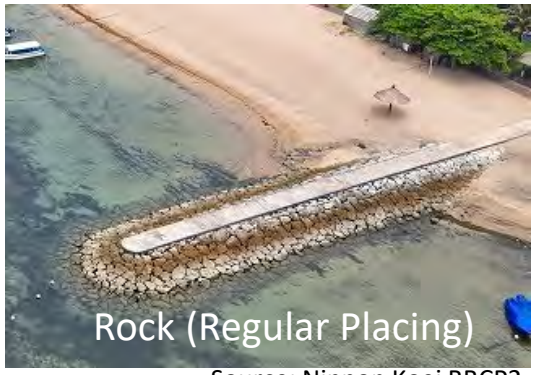


Source: JICA Study Team



Source: JICA Study Team

Source: Nippon Koei BBCP2



Source: Nippon Koei BBCP2

Source: Nippon Koei

Function, Effect

- Purpose is to maintain sandy beach due to control of littoral sand as one of countermeasures against coastal erosion.
- Several materials are applied for structure, such as rock, concrete block, etc. In case that it is difficulty to procure rock material, concrete block is commonly utilized.
- Basically, there are two placing methods, “random placing” and “regular placing” considering mainly usage of groin by visitors.
- Generally, multiple groins are installed with proper intervals alongshore.

Consideration on Planning, Design & Implementation

- As the function of groin is to interrupt the littoral sand, up-drift side is accumulated, however, down-drift side is retreat. Therefore, integrated layout planning in certain area of sediment cell is important considering each littoral characteristics and existence of sediment cell on site.
- Construction of just one groin is very risky to down-drift coast as shown in upper left side photo.
- Determination of length and crown height is important on structure design to fulfill the required function for control of littoral sand. Crown height can be adjustable in accordance with existing foreshore slope (as shown in down left side photo).
- Proper selection of material for structure considering procurement and transportation condition is important on cost estimate.

Headland

Source: Nippon Koei BBCP2

Source: edited by JICA Study Team on Google Earth

Chiba Coast in Chiba Pref. Japan

Source: Open Source on WEB site

Nusa Dua Beach in Bali, Indonesia

Source: Nippon Koei BBCP2

Function, Effect

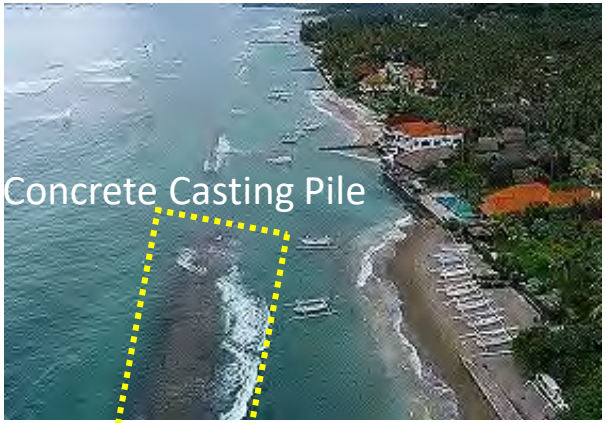
- Concept of headland comes from the natural pocket beach which is enclosed by two natural peninsula/island.
- Headland is to expect to form the static stable beach at eclosed area by artificially constructed facilities (headland).
- Basically, the function is same as groin, which is to control littoral sand. Difference on structure from groin is the existence of head part together with groin part.
- Due to this, multiple construction of headlands is common as same as groin system. Also, headland system is comply applied in combination with beach nourishment to recover sandy beach statically.

Consideration on Planning, Design & Implementation

- Beach shape is influenced by the layout of headland and its dimension (interval of each headland, length of groin and head part, etc.) . Therefore, appropriate planning and design are required to predict future beach shape considering coastal characteristics, beach utilization condition, etc. based on several approaches of mathematical formula, numerical analysis, etc.
- Proper selection of material for structure considering procurement and transportation condition is important on cost estimate.

Artificial Reef
(Submerged Breakwater)

Candidasa Beach in Bali, Indonesia



Source: Nippon Koei BBCP2

Kuta Beach in Bali, Indonesia

Source: edited by JICA Study Team on Google Earth

Agarie Beach in Okinawa Pref. Japan

Source: edited by JICA Study Team on Google Earth

Function, Effect

- Function is to protect the land side against coastal erosion, wave overtopping and run-up to reduce wave energy due to acceleration of wave breaking on artificial reef.
- There is an advantage not to disturb landscape due to submerged facility.
- Sufficient crown height, crown width and length is required to obtain expected function.
- Rock, concrete armor block, concrete interlocking block are commonly utilized.

Consideration on Planning, Design & Implementation

- As the main function is to accelerate wave breaking on top, tide condition shall be well-considered in planning and design (if tide change is big, sufficient effect due to wave breaking is difficult to obtain).
- Strong offshore-ward current may occur at the space between each artificial reef.
- As the underwater and offshore work shall be required, it is common to become high cost comparing to other coastal facilities such as groin, breakwater, etc.

Beach Nourishment 1 (statically stable sandy beach)

Sanur Beach in Bali, Indonesia

Source: Nippon Koei BBCP1

Sanur Beach in Bali, Indonesia

Source: Nippon Koei BBCP1

Function, Effect

- To recover or newly form sandy beach artificially by filling sand with supplementary hard structures such as groins, headlands etc. in order to maintain filled sand statically.
- Beach nourishment is the soft-measure (not hard structure measure) against coastal erosion considering harmonization of "protection", "environment" and "utilization". This harmonization is the most advantage of beach nourishment which cannot be fulfilled by other hard-structure measures.
- Due to above mentioned reason, beach nourishment is commonly applied to the beach in which tourism activity is active.
- Proper beach management (adaptive management) including additional sand fill as maintenance work is required to maintain nourished beach sustainably.

Consideration on Planning, Design & Implementation

- Layout planning and design is very important considering littoral characteristics, sediment cell, etc.
- Study on prediction of future condition (prediction of beach change, expected sand loss, etc.) is important based on comprehensive study with site investigation and survey, numerical approach, long term shoreline change and its cause, etc.
- Most important point on implementation is selection of proper sand borrow site considering cost impact.
- As the nourished beach will be changed by wave and tide condition, continuous monitoring and planning of adaptive measure based on monitoring result is important as the item of adaptive management.
- Public cooperation and involvement on monitoring and maintenance is also important to maintain sandy beach sustainably.

Beach Nourishment 2 (dynamically stable sandy beach)

Kuta Beach in Bali, Indonesia

Source: Nippon Koei BBCP1&2

Miami Beach in Florida, USA

Source: Open Source on WEB Site

Function, Effect

- To recover and maintain sandy beach by filling sand without any supplementary hard structures.
- Difference from “statically stable beach” described before is to expect stable beach dynamically (this means to maintain littoral movement of sand) in order to retain original natural scenery and beach utilization as natural sandy beach.
- In order to maintain sandy beach under the existence of littoral movement of sand, periodical refill of sand as maintenance work is required in every several years.

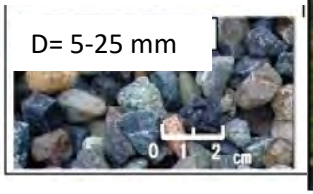
Consideration on Planning, Design & Implementation

- Feasibility to apply this measure shall be carefully examined considering both effectiveness and economical viewpoints.
- Study on prediction of future condition (prediction of beach change, expected sand loss, and maintenance plan based on the analysis, etc.) is very important based on comprehensive study with site investigation and survey, numerical approach, long term shoreline change and its cause, etc.
- Construction method itself is rather simple (just transport sand and fill on site). On the other hand, quantity of sand is usually lager than statically stable beach considering sand movement freely. Thus, important point on implementation is selection of proper sand borrow site considering cost impact.
- Continuous monitoring and planning of maintenance as adaptive measure based on monitoring result is important.

Beach Nourishment 3 (gravel beach)

Grand Sable in Mauritius

Source: Nippon Koei



Akiya Coast in Kanagawa Pref. Japan

Source: WEB Site of Kanagawa Pref. in Japan

Function, Effect

- To recover or newly form the gravel beach artificially by filling natural or crushed gravel.
- Grave beach is the soft-measure (not hard structure measure) to prevent coastal erosion, wave overtopping and run-up to hinterland considering harmonization of “protection”, “environment” and “utilization”. This harmonization is the most advantage of beach nourishment which cannot be fulfilled by other hard-structure measures.
- Advantage of gravel beach comparing to sand beach nourishment is to expect further stability of filled material due to heavy weight comparing to sand.
- Due to above mentioned reason, gravel beach is commonly applied where the wave condition is severer than the site for sand beach nourishment.
- Proper beach management (adaptive management) is required as same as sand beach nourishment. However, it is expected to reduce the maintenance work comparing to sand beach nourishment due to high stability of gravel.

Consideration on Planning, Design & Implementation

- Layout planning and design is very important considering littoral characteristics, sediment cell, etc.
- Study on prediction of future condition (prediction of beach change, expected sand loss, etc.) is important based on comprehensive study with site investigation and survey, numerical approach, long term shoreline change and its cause, etc.
- Selection of gravel size is important considering beach use by visitors and procurement condition.

Mangrove Plantation (North Coast of Java in Indonesia)

Source: JICA Study Team

Source: JICA Study Team

Source: https://www.shutterstock.com/image-photo/bamboo-walls-slow-down-sea-waves-1645047739

Source: JICA Study Team

Function, Effect

- Planting mangrove forest over a wide area can protect hinterland against high wave inundation and erosion by reducing waves and capturing drift sand.
- It contributes to water purification and improvement of marine life environment, and also to climate change measures through blue carbon effects.
- The above effects are expected to promote tourism resources as an ecotourism area, and fishing activities through improved fishing environment.

Consideration on Planning, Design & Implementation

- The protective effect of it is influenced by various conditions and has many uncertainties, so it is necessary to assume that the protective effect against the hinterland is limited.
- Until mangroves grow up to a suitable size, supported facilities are needed as require to reduce waves and ensure soil stability in the planted area. There are several materials to be applied (rock, concrete block, bamboo called “Hydraulic Engineering”, etc.)
- The supported facilities must be designed to take into consideration external forces such as waves at the site and other factors that affect mangrove seeds, and soil injection, if necessary, must be carried out to ensure a water depth suitable for growth.
- Although mangrove seedlings are low cost, the support facilities and soil input required can make them expensive.

Coral Transplantation

Bali Beach Conservation Project (Phase-1)

- Kuta -

Growth of Coral Colony after Transplantation

Source: Nippon Koei BBCP1

Newly formed coral farm

Source: Nippon Koei BBCP1

Function, Effect

- The restoration of coral reefs, which have declined or disappeared due to human activities such as coastal development and coral mining, as well as natural factors like high seawater temperatures and deteriorating water quality, aims to restore the health of coral and marine ecosystems, including fish and other marine life. The methods of transplantation are divided into two categories: asexual reproduction and sexual reproduction.
- The growth of transplanted corals and the restoration of coral reefs will have the effect of reducing wave energy reaching the shore.
- Coral reef coasts are composed of coral sand and other materials that contribute to the long-term supply of sand to the beach.

Consideration on Planning, Design & Implementation

- Appropriate transplant sites should be selected considering water temperature, light intensity, water quality, depth, selection of coral species, and transplanting method , etc..
- Coral survival and growth after transplantation should be monitored regularly, and maintenance work such as refurbishment and removal should be performed as necessary during the growth process.
- A sustainable management system needs to be established by engaging local people and stakeholders in a more active role.
- Before this implementation, it is recommended that a field demonstration test be conducted to confirm adaptability, and the cost of such a test is necessary.
- Asexual reproduction requires a substrate for establishing transplanted corals and the cost of fabrication and installation work.
- In terms of benefits, it is expected to develop as eco-tourism.