COASTAL INUNDATION FORECASTING DEMONSTRATION PROJECT FOR INDONESIA (CIFDP-I)

NATIONAL CAPACITY ASSESSMENT (NCA)
Scope of CIFDP-Indonesia
Current Capability
Proposed Design System of CFDP-I
Assessment of Capacity Gaps (discussion)
CIFDP-Indonesia will be conducted in Jakarta and Semarang.

Identification causes of coastal inundation in Jakarta and Semarang.
- The major causes: High tide + high waves (wind sea)
- Swell from South China Sea (??)
- Riverine Flooding associated with heavy rainfall
- The land subsidence also an aspect that must be considered

The specific CIFDP-I forecasting systems is resolved two aspect:
- The increase of Sea level height due to high tide and high waves;
- The increase of River level height due to heavy rainfall.
In order to design the CIFDP-I System, it must be considered the technical elements, these include:

- Observation Data
- Tidal Prediction
- Wind Forcing,
- Wave Model
- Hydrodynamic model,
- River Model
- Inundation Model
- Bathymetry & DEM
- Field Survey Data
- Infrastructure: computing capacity technical assistance, Training
BIG has 114 location of tide monitoring sites throughout Indonesia
Jakarta: 1 location
Semarang: 2 location

Current status: BMKG as NCT still not have an access for Jakarta and Semarang station
Wave Measurement

BMKG has two AWS (Automatic and Weather Station) and wave measurement stations in RIG offshore, are located in Kepuluan Seribu waters (Western of Java Sea) and Indramayu waters (Central of Java Sea).

The data form the stations include:
Significant Wave Height and Periods, Tide, Wind and Speed Direction, Rainfall, Pressure, Temperature, and Humidity.
Ministry of Public Works Indonesia has a network of steam flow measurement for monitoring the water level of the main rivers in Jakarta. (source: Jakarta – FEWS)

Current status:
There is no information for stream flow measurement in Semarang.
Current Capability – Observation Data

Surface Meteorological and Precipitation Measurements

Jakarta: 4 Manual synoptic station; 8 AWS; 1 AWOS; 4 Manual Rain gauge;
Semarang: 3 manual synoptic station; 3 AWS; 1 AWOS; 8 Manual Rain gauge

The data form the stations include:
- Temperature, Wind Speed and Direction, Rainfall, Evaporation
- Sunshine Duration, Pressure, Dewpoint
BMKG has operate 27 C-Band weather radars throughout Indonesia, with the two of them are located in Jakarta and Semarang.

This information is provided freely to the public through the BMKG official website on real time basis at http://radar.bmkg.go.id
BMKG has 3 satellite receiving stations for access to satellite imagery:

- Multi-functional Transport Satellites (MTSAT),
- National Oceanic and Atmospheric Administration (NOAA) MODIS
- FENGYUN Satellite from China Meteorology Agency.

The satellite images can be accessed on a real-time basis at http://satelit.bmkg.go.id
Current Capability – Tidal Prediction

- Tidal prediction is the most important aspect since it is the major cause of coastal inundation in Jakarta and Semarang.
- Currently BMKG use tidal prediction from the Navy and BIG as guidance in tidal prediction.
- The product is not in grid format, it was not possible to use as model input.

CIFDP-I project is expected to provide the gridded tidal prediction model such as: Ocean Tidal Inverse Solution (OTIS) or Tidal Moderator Driver (TMD).
Coastal inundation characteristic in Jakarta and Semarang is strongly influenced by locally generated wind waves instead of the swell.

Need of high-resolution wind prediction as the input wave model and hydrodynamic models.

BMKG has operational the Mesoscale NWP (WRF):
- Domain 1: 30 Km for Southeast Asia Domain
- Domain 2: 10 Km for Indonesia Domain
- Domain 3: 3 Km for Java island
BMKG has operational Wavewatch III and SWAN wave model.

The models are still not nested each other.

Wavewatch III has two domains:
- Global Domain (0.75° x 0.75°)
- Indonesia domain (0.125° x 0.125°).

SWAN is currently implemented in several shallow waters, including Jakarta and Semarang with 1 km Resolution.

The product is accessible through http://peta-maritim.bmkg.go.id.

Next year, BMKG plan to implement the nesting of WW3 + SWAN,

The CIFDP-I expected can provide technical assistance for the implementation of the nesting.
INFORMASI Dalam Situs Ini

Peta informasi yang ditampilkan ini merupakan hasil kumpulan numerik yang dilarikan secara otomatis. Peta ini dipakai untuk memprediksi data ke arah dan gelombang. Untuk informasi lebih lanjut, silakan kunjungi laman www.marin bmkg.go.id
The hydrodynamic model could provide sea level prediction that can be used to simulate coastal inundation.

BMKG Research and Center Development have simulated the coastal inundation by using MIKE21 which has good result to analysis the coastal inundation event in Semarang on 13 June 2009.

CIFDP-I can provide a hydrodynamic model for the Jakarta and Semarang waters.

The models such as Delf3D, MIKE21 and ADCIRC are considering to be implemented in CIFDP-I.
Jakarta-FEWS (J-FEWS) developed by PUSAIR (Ministry of Public Work), BMKG, KNMI and Deltares.

- This system provides weather and drought forecast.
- Input data obtained from AWS, synoptic observation, and TRMM satellite.
- The data processed by using hydrologic calculation and combined with radar data.
- The output then processed by SOBEK River Model to obtain water inundation historic and forecast.
- J-FEWS system only generates the inundation predictions caused by the overflowing of the river, not taking sea level into the calculation.
Batimetry and DEM data is available for Jakarta and Semarang, with 10 m resolution for Batymethry and 2 m resolution for the DEM (Digital Elevation Model).
Form the current capability, the proposed design system of CIFDP-I:

- FEWS will be implemented as the platform for integrating all the data (observation and models) and perform the coupling process of river model and hydrodynamic model to produce coastal inundation forecasting.

- The hydrodynamic models such as Delf3D, MIKE21 and ADCIRC are considering to be implemented in CIFDP-I for sea level height predictions.

- The implementation of nested Wavewatch III+SWAN for Jakarta and Semarang Waters.

- Providing the gridded tidal prediction model such as Ocean Tidal Inverse Solution (OTIS) or Tidal Model Driver (TMD).
System Design – CIFDP-Indonesia

- **FEWS**
  - Data feeds
  - Import
  - Import
  - Validation
  - Transformation / interpolation
  - Data hierarchy
  - General adapter
  - Export / report
  - Administration (data, forecasts)
  - Viewing (data, forecasts)
  - Archiving

- **Models**
  - WRF Model
  - River Model
  - Tide Model
  - Wave Model
  - Hydrodynamic Model

- **Information System**
  - Tide & Wave Measurement
  - PI
  - Export & dissemination
During the implementation phase, BMKG need technical assistance and training:

- Setup, configuration and operational for FEWS system include the coupling process between river model and hydrodynamic model.
- Setup, configuration and running for SOBEK River Models
- Setup, configuration and running for hydrodynamic model (Delf3D)
- Nested Wavewatch III and SWAN model for Jakarta and Semarang Waters
THE PARTNERSHIPS
Assessment of Capacity Gaps (discussion)