



**World Meteorological Organization**  
Working together in weather, climate and water

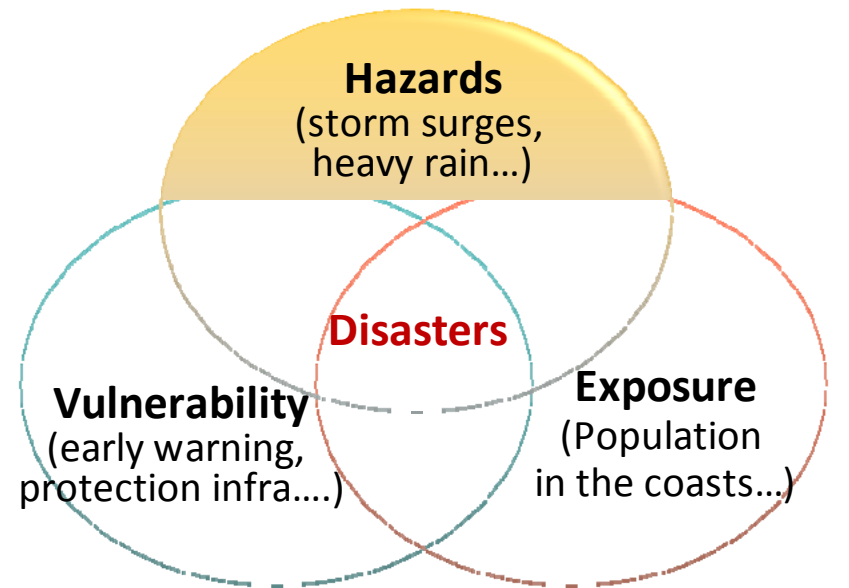
# Coastal Inundation Forecasting Demonstration Project (CIFDP)

WMO Technical Commission for Oceanography and Marine Meteorology (JCOMM)  
WMO Technical Commission for Hydrology (CHy)



# Exposure to coastal inundation is large and growing

- Population is attracted to coasts by an abundance of local resources
  - Growing coastal population
  - Urbanising coastal zone
  - Tourism, recreation, retirement...
- In many parts of the world, the population is directly exposed to the coastal hazards and this will increase with Climate Change and Sea Level Rise.
- A reactive approach to adaptation increase the vulnerability.

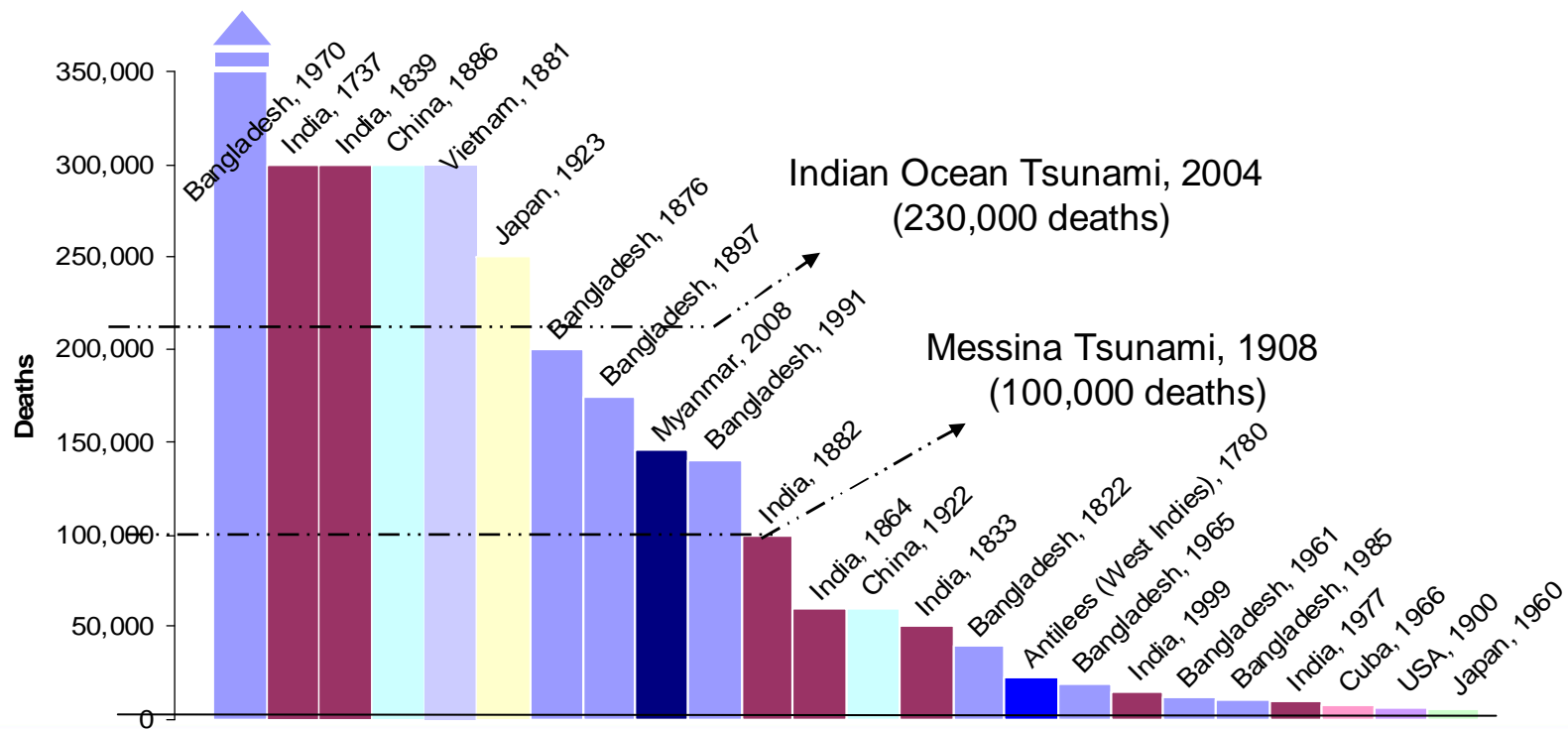


**Disasters are more likely when Hazards and exposed population overlap with Vulnerability.**



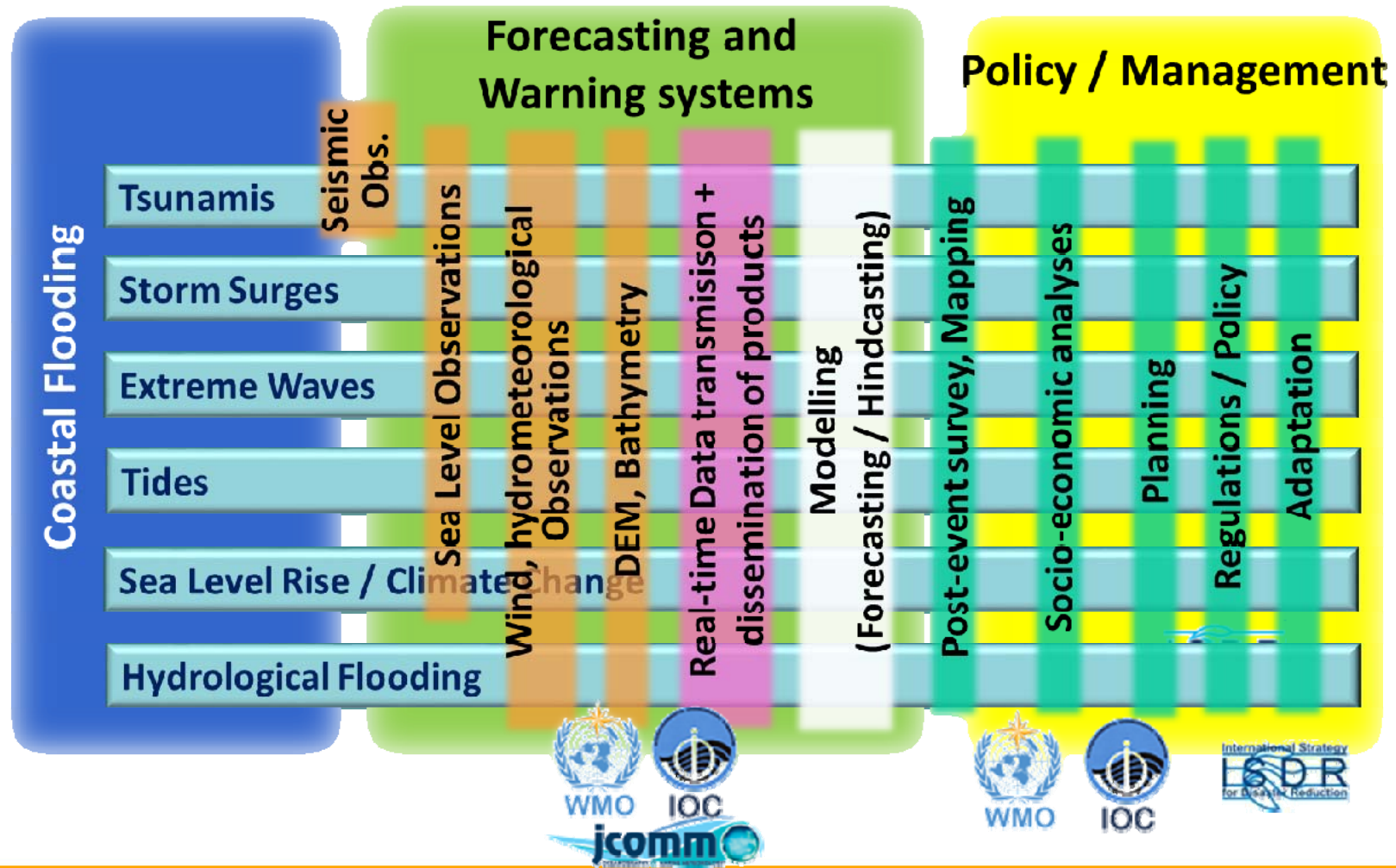
# Casualties by Cyclones and Storm Surges

- Deaths in tropical cyclones in each year, for highest ranks in the history (with indication of relative level of casualties by major tsunami events). Most fatalities in tropical storms are due to storm surges. All casualty figures are estimates and vary widely according to sources (Dube, 2007).





# End-to-end Coastal Inundation Management





# Demonstration Project: CIFDP

<http://www.jcomm.info/CIFDP>

To meet challenges of coastal communities' safety and to support sustainable development through enhancing coastal inundation forecasting and warning systems at the regional scale.

*: building improved operational forecasts and warnings capability for coastal inundation, that can be sustained by the responsible national agencies*

- Identify and support end-user needs;
  - Encourage full engagement of the stakeholders and partners in the CIFDP from early stages, for the successful development and implementation of this project;
  - Transfer technology to the adopting countries;
  - Facilitate the development and implementation of warning services;
  - Support coastal risk assessment, vulnerability and risk mapping;
  - Assist improved and informed decision-making for coastal inundation management
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## CIFDP: Organizational Initiation

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- Consensus and Deliberation on Scientific/Technical Basis at 1<sup>st</sup> JCOMM Symposium on Storm Surges (Seoul, October 2007)  
: <http://www.surgesymposium.org>
  - WMO EC-LX (2008):  
*“...The Council requested JCOMM, CAS and CHy, in close cooperation with other relevant UNESCO/IOC subsidiary bodies, to implement the scientific/technical recommendations from the First JCOMM Scientific and Technical Symposium on Storm Surges (Seoul, October 2007), including **coastal inundation and linkages to storm surge forecast and warning operations** in all relevant regions...”*
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## Through CIFDP, countries will...

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- Demonstrate feasibility to implement an operational system for integrated coastal inundation forecasting and warning, providing objective basis for coastal disaster (flooding) management;
  - be provided with valuable input to the assessment and awareness of the issues of coastal inundation management within its governments.
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- integrated forecasting and warning services
  - contribution to saving lives, reducing loss of livelihood and property, and enhancing resilience and sustainability in coastal communities.
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# Strategy for CIFDP implementation

<http://www.jcomm.info/CIFDP>

- CIFDP is implemented through **national sub-projects**, launched for a country that meets the essential requirement: national agreement
  - CIFDP sub-projects are designed based on **users' perspectives and requirements**, considering existing and available open source techniques. Final products of the Demonstration Project should be operated and maintained by national operational agencies which have the responsibility/authority for coastal inundation warnings;
  - The procedures/best practices developed through sub-projects should be applicable to other (neighbouring) countries with common issues and interests, and should be closely linked to and cooperating with related projects and activities.
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# CIFDP: National commitment

<http://www.jcomm.info/CIFDP>

- Lead / Participation of **operational forecast agency(ies)**
    - Mandates/responsibilities for coastal inundation forecasting /warning services;
    - Availability of qualified staff to run the system in 24/7 mode, with appropriate infrastructure for operational services;
    - Commitment to sharing all data and information relevant to the inundation forecast process.
  - **National Agreement** among responsible national agencies
    - To be basis of Definitive National Agreement (DNA);
    - Key/leading role of National Meteorological and Hydrological Services (NMHSs);
    - Close cooperation/collaboration with national authorities for coastal disasters risk and emergency management ;
    - Establishment of National Coordination Team (NCT), to ensure sustainable operation by national agencies as well as continuous engagement of “USERS” of forecasting services.
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# CIFDP Implementation: Key Players

<http://www.jcomm.info/CIFDP>





# CIFDP: Scope and Implementation

The main focus of the CIFDP will be to facilitate the development of efficient forecasting and warning systems for coastal inundation based on robust science and observations:





# CIFDP: Technical foundation

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## Applying available techniques for integrated operational forecasting/warning

- Assessment of the regional coastal inundation forecasting/warning **capacities**
- Identify **gaps**
- Provide an **overview on the technical aspects** for definition

Each Sub-Project Plan and following documentation will include:

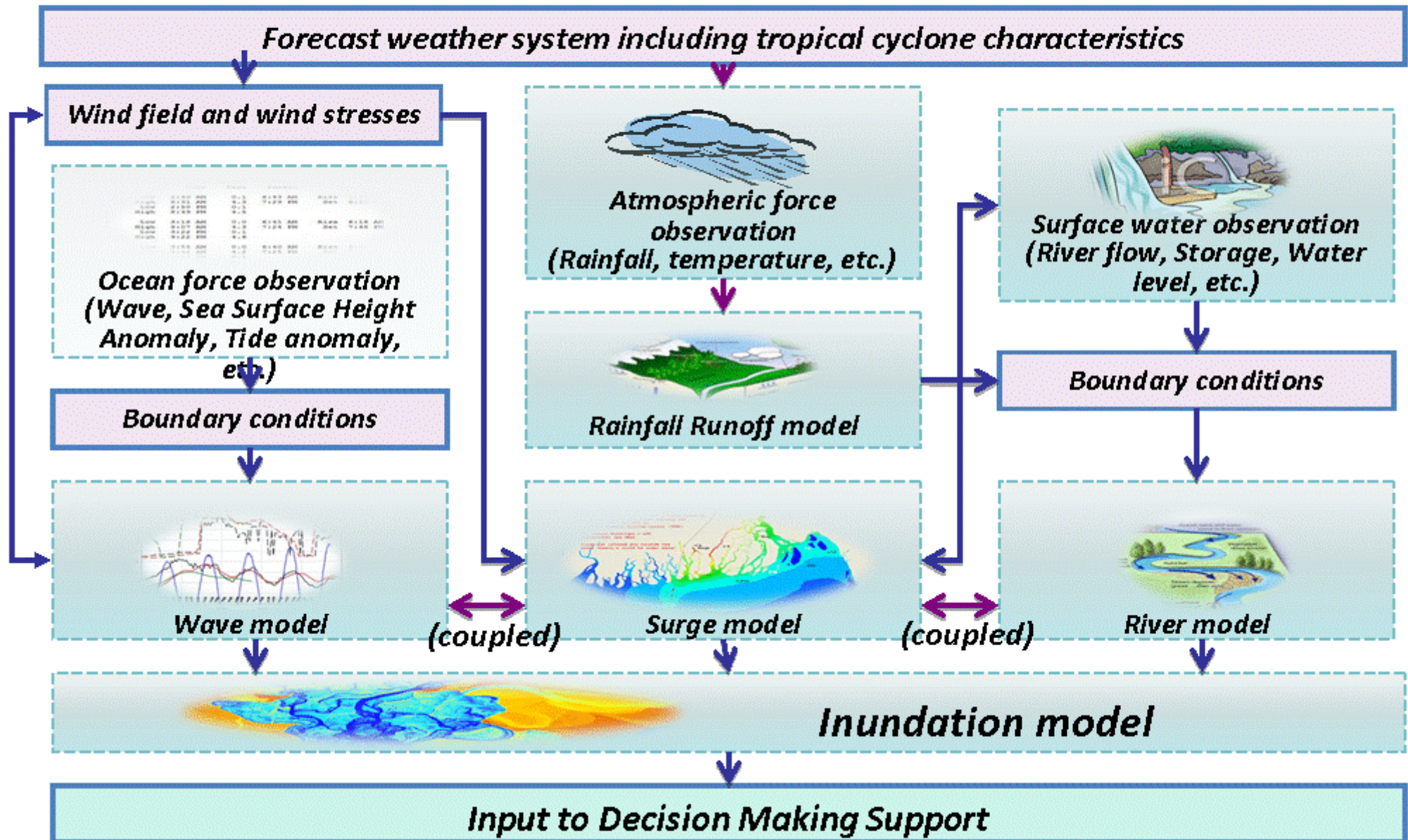
- Existing models and modeling capabilities
- Communication / access to real-time data and quantitative forecast data
- Boundary (Bathymetry, DEM...), GIS Data and data for Validation
- Organizational aspects

The project will focus on integrating the forecasting models already in operational use as 'plug-and-play' modules. The modelling components will be developed and adapted to fit in an **open, flexible and easily extendable forecasting system**: the future CIFDP system.

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# CIFDP: Technical Development for Coastal Inundation Forecasting/Warning







## CIFDP linkages with related programmes and projects

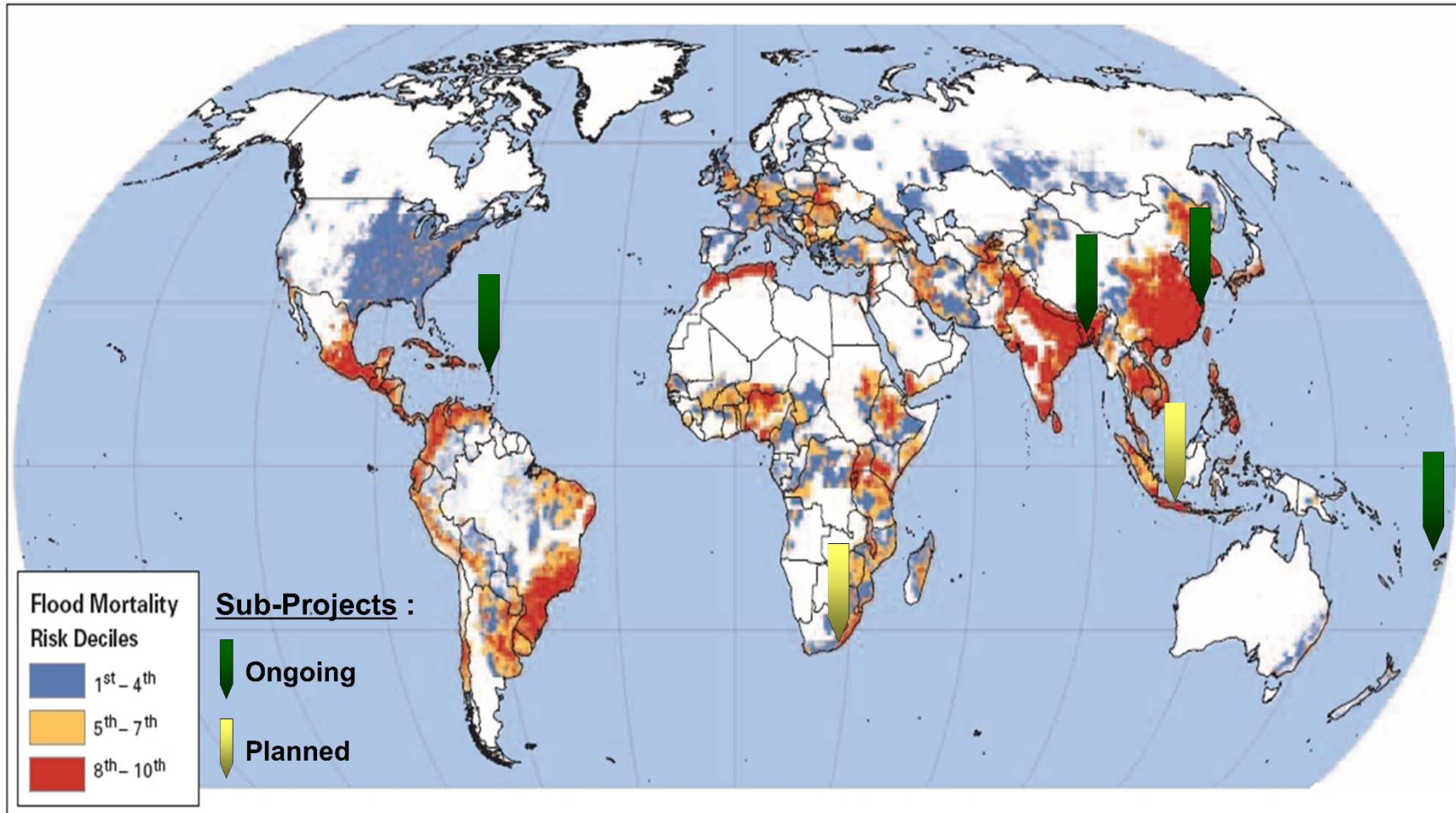
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- Storm Surge Watch Scheme (SSWS)
  - Severe Weather Forecast Demonstration Project (SWFDP)
  - ESA eSurge project (<http://www.storm-surge.info>)
  - UNESCO NIO Project (<http://www.jcomm.info/SSIndia>)
  - Shanghai Multi-Hazard Early Warnings System pilot project
  - SPREP EU-funded Waves and Coast Project (WACOP)
  - SPC proposal Operational Wave Forecasting for Early Warning Systems
  - WMO Working Group on Societal and Economic Research Applications (SERA)
  - JCOMM Expert Team on Waves and Coastal Hazard Forecasting Systems (ETWCH)
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# CIFDP Implementation

<http://www.jcomm.info/CIFDP>



Natural Disaster Hotspots: A Global Risk Analysis. World Bank, 2005



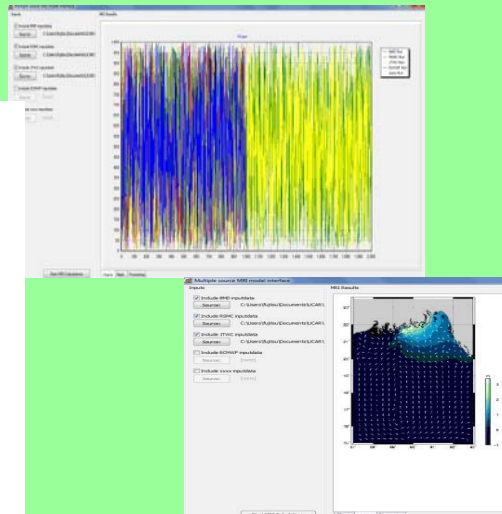
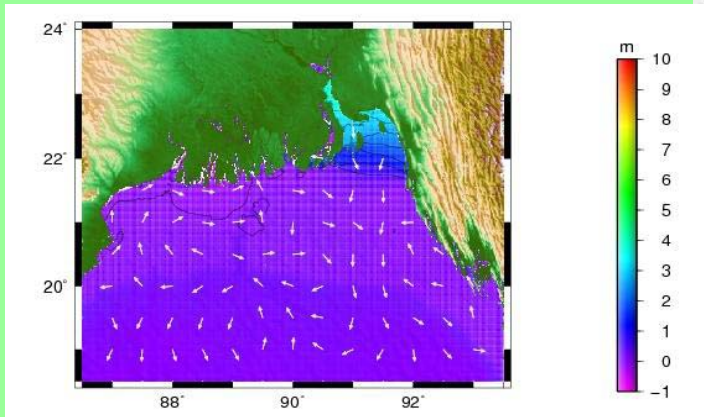
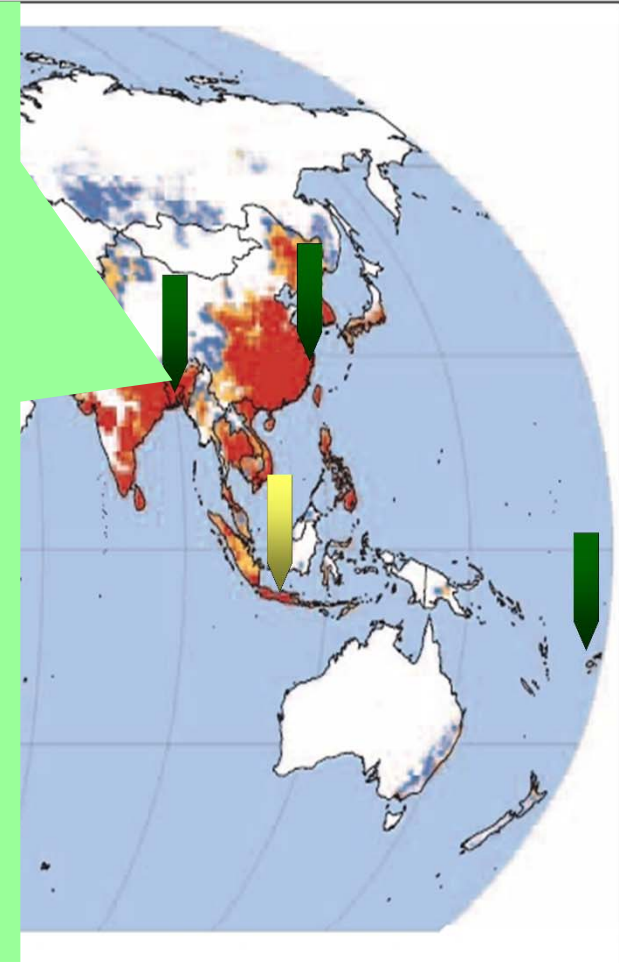
# CIFDP Implementation

<http://www.jcomm.info/CIFDP>

## CIFDP-B (Bangladesh): Phase 2



- Oct'11 Initial National Agreement
- Dec'11 National Stakeholders Workshop – Phase 1
- Feb'13 Definitive National Agreement
- May'13 Phase 2 (system implementation) launched







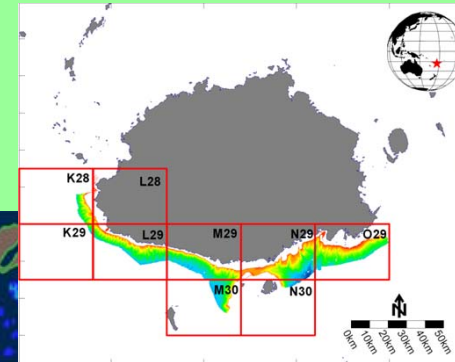
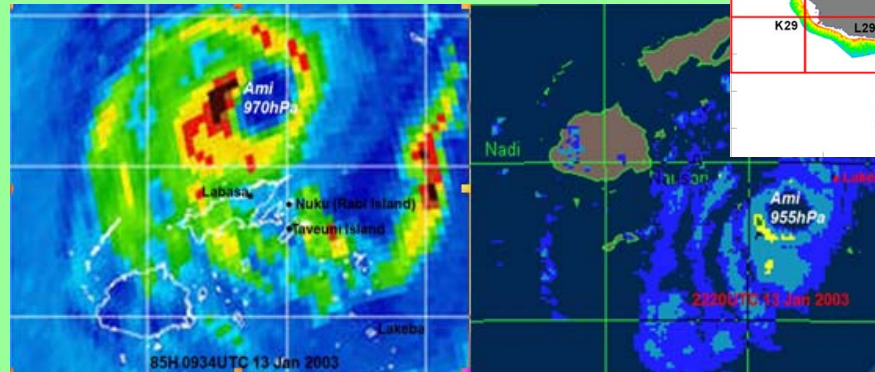
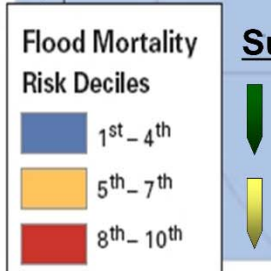
# CIFDP Implementation

<http://www.jcomm.info/CIFDP>

## CIFDP-F (Fiji): Phase 1

**KOICA** 한국국제협력단  
KOREA INTERNATIONAL COOPERATION AGENCY

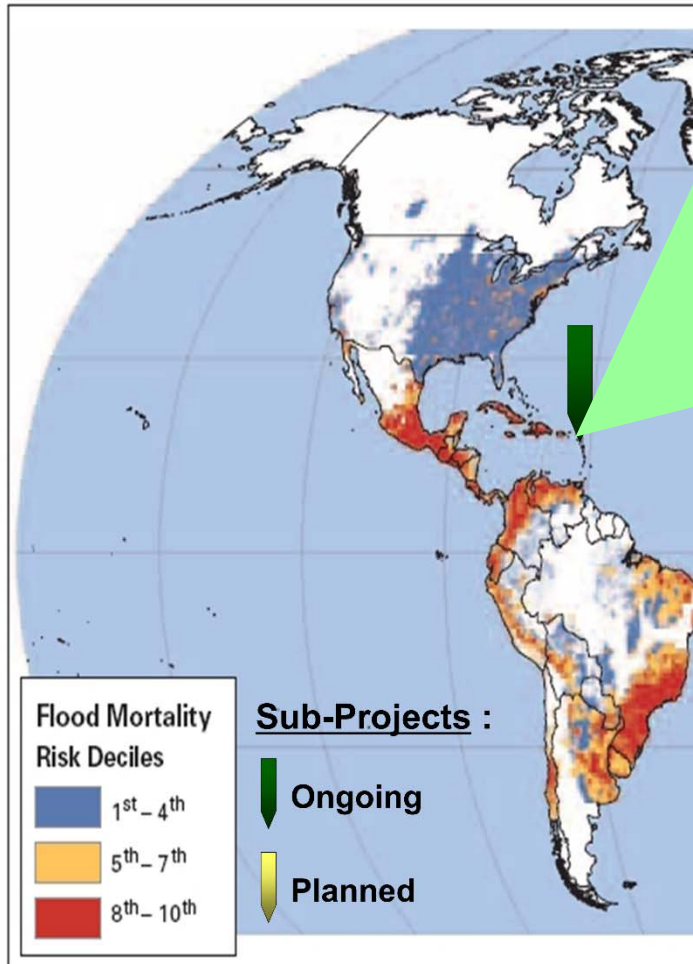
- Mar'12 Initiation at the request by Fiji Government
- Feb'13 National Stakeholders Workshop – Phase 1
- June'13 Definitive National Agreement
- Oct'13 Phase 1 review





# CIFDP Implementation

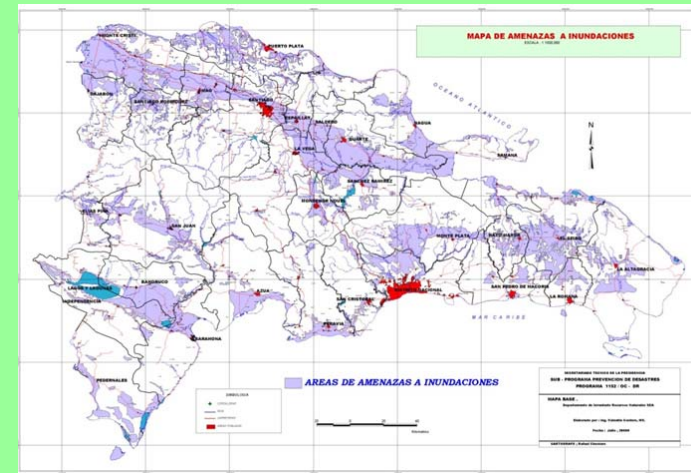
<http://www.jcomm.info/CIFDP>



## CIFDP-DR (Dominican Republic): Phase 1

Nov'11 National Stakeholders Workshop – Phase 1

Feb'13 Definitive National Agreement



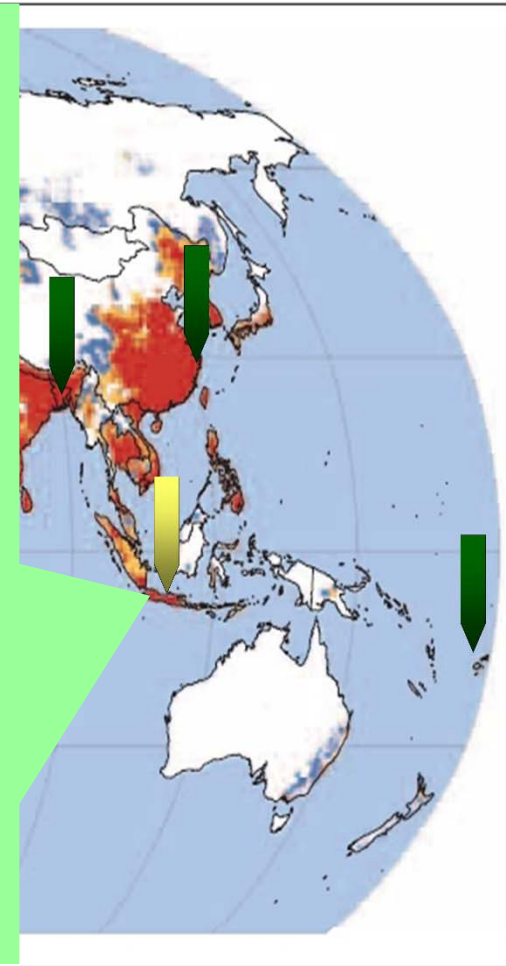


# CIFDP Implementation

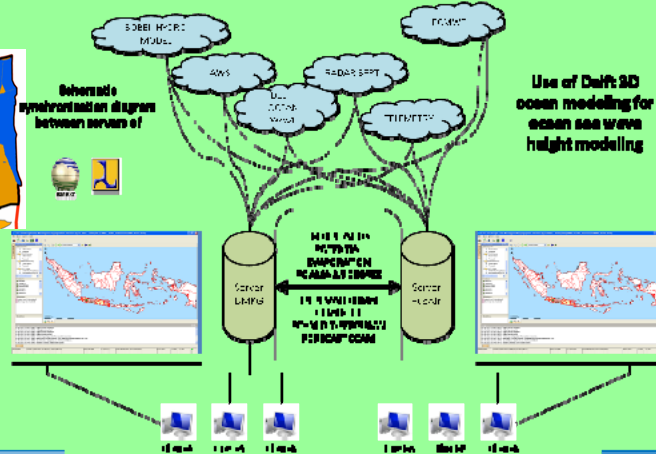
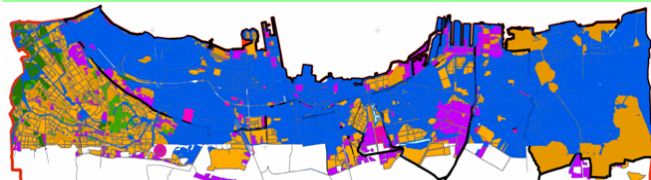
<http://www.jcomm.info/CIFDP>

## CIFDP-I (Indonesia): Phase 0/1

- May'11 Initiated National Focus Group Discussion
- Apr'13 Initial National Agreement / Request WMO to launch CIFDP-I
- Dec'13 National Stakeholders Workshop – Phase 1



Jakarta Flood Early Warning System (FEWS)



SLR: 1.00 cm/year with land subsidence



*For more detailed information:* Please refer to  
CIFDP Implementation Plan ([JCOMM Technical Report No.64](#))  
Project web site: <http://www.jcomm.info/CIFDP>



Photo courtesy of Don Resio



# CIFDP Project Steering Group (PSG)

<http://www.jcomm.info/CIFDP>

The **PSG** will work with the **WMO Secretariat** in:

- regular review and update of the Project Concept and Implementation Plan;
- initiation of national sub-projects, by reviewing the initial requirements and providing advice to WMO Technical Commissions (JCOMM and CHy);
- reviewing progress of national sub-projects in each phase, and provide recommendations to relevant WMO Technical Commissions (JCOMM and CHy) regarding the following steps of the project implementation;

The **PSG** will work closely with each **Sub-project National Coordination Team (NCT)**, in:

- selecting technical solutions for the storm surge, wave and hydrological forecasting and operation, which meet the national and regional capabilities and requirements;
  - providing guidance to the development and implementation of Sub-project Plan, including technical development as well as stakeholder interactions and consultations;
  - developing modalities for interactions with, and input from, associated projects;
  - issuing the final review report on the national Sub-project and preparing recommendations to be transmitted to the relevant bodies.
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## CIFDP: Project Steering Group (PSG)

<http://www.jcomm.info/CIFDP>

- Val Swail, Co-chair – Metocean modeling & forecasting expert
- Don Resio, Co-chair – Metocean modeling & forecasting expert
- Linda Anderson-Berry - Social science expert
- Shishir Dube - Metocean modeling & forecasting expert
- Jamie Rhome - Metocean modeling & forecasting expert
- Paula Etala - Metocean modeling & forecasting expert
- Monika Donner – Hydrological modeling & forecasting expert
- Deepak Vatvani - Hydrological modeling & forecasting expert
- Dr. S.H. Fakhruddin - Hydrological Modelling and Forecasting Expert

The PSG will work closely with the WMO Working Group on Societal and Economic Research Applications (SERA) to address social and economic aspects.

The Project Steering Group (PSG) is supported by WMO/JCOMM Secretariat.

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