MOBILISE PROJECT LAUNCH REPORT

Creating a **M**ulti-Agency C**o**lla**b**orat**i**on Platform for Bui**l**d**i**ng Re**s**ilient Communiti**e**s (**MOBILISE**) in Sri Lanka, Malaysia and Pakistan
Launch Event: 21 and 22 August 2017

Prepared by:
Komal Aryal, Carla Kocsis, Henneke van Dijk and Terrence Fernando
THINKlab, University of Salford,
7th floor Maxwell Building, Salford, UK
M5 4WT, UK

CONTENTS

1. INTRODUCTION

This report summarises the outcomes from the MOBILISE project launch event which took place at MediaCityUK in Salford (UK) on the 21st August 2017 and from the technical workshop which took place on the 22nd August 2017 in the THINKlab at the University of Salford. The list of participants who attended the events can be found in Appendix 7.3.

2. BACKGROUND

The THINKlab at the University of Salford received research funding (£1.2m) from the Global Challenge Research Fund (GCRF) and the Engineering and Physical Sciences Research Council (EPSRC) to develop a Collaborative Multi-Agency Platform that can be used for building resilient communities in disaster-prone areas in the Low and Middle Income Countries (LMICs). The project entitled "A Collaborative Multi-agency Platform for Building Resilient Communities (MOBILISE)" focuses on disaster risk reduction and the development challenges faced by three low- and middle-income countries, namely, Malaysia, Pakistan and Sri Lanka.

The key academic and industry partners within the project are:

1. THINKlab, University of Salford, United Kingdom
2. The Centre for Disaster Resilience, University of Salford, United Kingdom
3. The Department of Sociology, University of Colombo, Sri Lanka
4. The Department of Civil Engineering, University of Moratuwa, Sri Lanka
5. Disaster Management Centre, Ministry of Disaster Management, Sri Lanka
6. KANZU Research Centre, Universiti Tun Hussein Onn Malaysia, Malaysia
7. The Centre for Disaster Preparedness and Management, University of Peshawar, Pakistan
8. The Civil Contingencies Secretariat, United Kingdom
9. The Civil Contingency and Resilience Unit, Greater Manchester, United Kingdom
10. The Rockefeller Foundation – 100 Resilient Cities
11. The Environment Agency, United Kingdom
12. Secure Information Assurance Ltd, United Kingdom
13. Satellite Applications Catapult Ltd, United Kingdom
14. Telespazio Vega Ltd, United Kingdom
15. Asian Disaster Preparedness Center (ADPC), Thailand
16. The Federation of Sri Lankan Government Authorities, Sri Lanka

17. The Centre of Governance Innovations, Sri Lanka
18. National Disaster Management Agency, Malaysia
19. Melaka Historical City Council, Malaysia
20. The Construction Research Institute of Malaysia, Malaysia
21. Khyber Pakhtunkhwa Provincial Disaster Management Authority, Pakistan
22. Jehanghira Union Council, Pakistan
23. Nowshera Rural Development Foundation, Pakistan
24. Inaratech, Pakistan

3. AIMS AND OBJECTIVES OF THE MOBILISE RESEARCH PROJECT

MOBILISE uses digital technology to create a collaborative environment to enable various agencies (responsible for managing localised disaster) and communities to act collectively to reduce the impact of disasters. The main objectives of this project are to:

- Promote South –South multi-agency disaster risk and emergency governance collaboration through advanced digital technologies.
- Create a web–based collaboration platform for supporting collective vulnerability assessment, mitigation and resilience.
- Develop system dynamics for modelling the cascading effects of disasters involving ambulance, police and fire services.
- Develop a web-based platform for gathering instantaneous intelligence of a disaster through remote sensing and social media.
- Construct virtual disaster events using real-time Earth Observation / Satellite data for planning future disaster responses.

The end goal of the MOBILISE project is to develop an advanced digital platform that aids risk and resilience governance capabilities linked to the priority number two (strengthening disaster risk governance to manage disaster risk) of the Sendai Framework for Disaster Risk Reduction (2015-2030) in partnership with government agencies, non-government agencies and industries based in the United Kingdom.

4. PROGRAMME

Day One:
Venue: University of Salford Campus, MediaCityUK, Salford Quays.
Rooms 3.07 & 3.08
Date: 21st August 2017

9.00am	Coffee & Arrival
9.30am	Welcome (Prof. Karl Dayson, Dean of Research)
9.40am	Introduction to the MOBILISE project (Terrence Fernando, Director of the THINKlab)
10.10am	UK Approach for Managing Disaster Resilience (Luana Avagliano, Resilience Direct, Cabinet Office)
10.40am	Multi-agency approach for Creating Resilience City: Manchester Approach (Kathy Oldham, Head of Civil Contingencies and Resilience Unit, Greater Manchester)
11.10am	Interactive Demonstration of Collaborative Virtual Emergency Response Training Platform and Coffee Break
11.30am	Introduction to UK Steering Committee: - Satellite Application Catapult - Telespazio - Secure AI / UK Fast - Environment Agency
11.50am	Challenges in developing disaster resilience through multi-agency collaboration: Sri Lankan Perspective: Siri Hettige, Hemanthi Goonasekera, Rankotge Srimal Priyantha Samansiri and Chandana Siriwardana.
12.20pm	Challenges in developing disaster resilience through multi-agency collaboration: Malaysian Perspective: Norah Sulaiman and Weishe Teo.
12.50pm	Challenges in developing disaster resilience through multi-agency collaboration: Pakistan Perspective: Mohammed Khalid and Mustaq Ahmad Jan
1.20pm	Discussion & Final Remarks
1.30pm	Lunch & Networking (Interactive Demonstration of Collaborative Virtual Emergency Response Training Platform)

Project Team Meeting (Academic Partners & Steering Committee Members Only)
Salford Campus at MediaCityUK, Room 3.07

2.30 pm	Partner Introduction (Sri Lanka, Pakistan, Malaysia)
3.15 pm	Technical Work package description and partner roles (Prof. Terrence Fernando)
5.00 pm	Close
7.30 pm	Dinner

Day Two:
Venue: THINKlab visit and MOBILISE Technical Workshop
THINKlab, Room 712 (Level 7), Maxwell Building,
University of Salford
Date: 22nd August 2017

9.00am	Coffee & Arrival
9.30am	Welcome (THINKlab, Terrence Fernando)
9.35am	Resilience Frameworks & System Dynamics • Different Resilience Framework (Centre for Disaster Resilience, Chaminda Pathirage & Komal Aryal) • System Dynamics (THINKlab, Hisham Tariq)
10.25am	Modelling Vulnerability & Crowd sourcing • City Data Explorer (THINKlab, Terrence Fernando) • Crowd Sourcing (THINKlab, Shamaila Iram)
11.15am	Coffee Break
11.30am	Demonstration of the concept of near real-time disaster visualisation environment (THINKlab Team)
12.00 pm	Satellite technologies for disaster response • Advances in Satellite Technology: Daniel Wicks and Elena Lobo, Satellite Application Centre. • Use of Satellite Technologies for Monitoring & Disaster Response: Thomas Beaton, Telespazio.
1.10pm	Lunch & Networking
2.00pm	Existing Technology capabilities for disaster management in partner countries • Sri Lanka Position: Srimal Samansiri, Disaster Management Centre • Pakistan Team Position: Noor Jehan, Centre for Disaster Preparedness and Management, University of Peshawar. • Malaysian Team Position: Mohd Ariff Bin Baharom, National Disaster Management Agency (NADMA) • Asian Disaster Preparedness Center Position: Senaka Basnayaka • New Zealand Experience: A Case Study from OPUS International: Jonathan Hill, Opus International
4.30 pm	Close

5. PROJECT LAUNCH EVENT

On the occasion of World Humanitarian Day 2017 (21 August 2017), the THINKlab at the University of Salford launched a project funded by the GCRF and EPSRC. The workshop opened with an address by *Prof. Karl Dayson*, Dean of Research at the University of Salford, who officially welcomed the dignitaries and participants (photo 1). *Prof. Dayson* started his remarks by thanking the EPSRC, GCRF and the government of the United Kingdom. He introduced the University of Salford's research-led, industries-centred teaching strategies and its commitment to reducing local and global disaster impacts through the University's research centres such as the THINKlab and the Centre for Disaster Resilience (CDR). *Prof. Dayson* assured full support of the MOBILISE project from the executive team of the University of Salford.

1

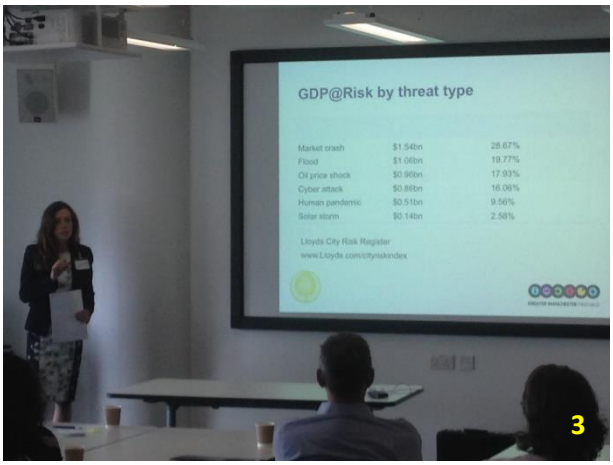
Following the welcome speech by *Prof. Dayson,* the Director of the THINKlab and Principal Investigator of the MOBILISE project *Prof. Terrence Fernando* began his presentation by sharing the overall disaster-risk governance challenges within Asia and the Pacific region. *Professor Fernando* spoke on the activities that had been carried out by the THINKlab over the past ten years and presented the MOBILISE project concept.

Prof. Fernando highlighted that, in recent years, every government (particularly in the LMICs) has had to cope with the effects of a substantial number of disaster incidents exposing the vulnerability of their populations. *Prof. Fernando* further shared that disasters (including those caused by climate change) can affect a population in two ways: slow onset impacts (drought, prolonged wet periods); and sudden, rapid impacts (typhoons, floods, heavy snow, long dry or wet spells, glacial lake overflow, landslides). Often, the sudden and rapid impacts of disaster will come without warning leaving the population with little or no time to react. *Prof. Fernando* emphasised that experience of previous incidents has shown that such events are rarely straightforward and often leave victims in a vulnerable state. He further highlighted that government departments at all levels are then faced with complex situations. *Prof. Fernando* presented details on the MOBILISE project plans to develop

digital infrastructures capabilities to facilitate multi – agency collaboration to strengthen local risk governance in Malaysia, Pakistan and Sri Lanka.

The first special guest speaker *Ms. Luana Avagliano* (Head of Resilience Direct, Civil Contingency Secretariat, Cabinet Office, United Kingdom) shared information on disaster risk governance at the national level in the United Kingdom (photo 2). During her presentation, *Ms. Avagliano* provided detailed information on how multi-agency collaboration works in the UK to reduce disaster risk and strengthen disaster resilience.

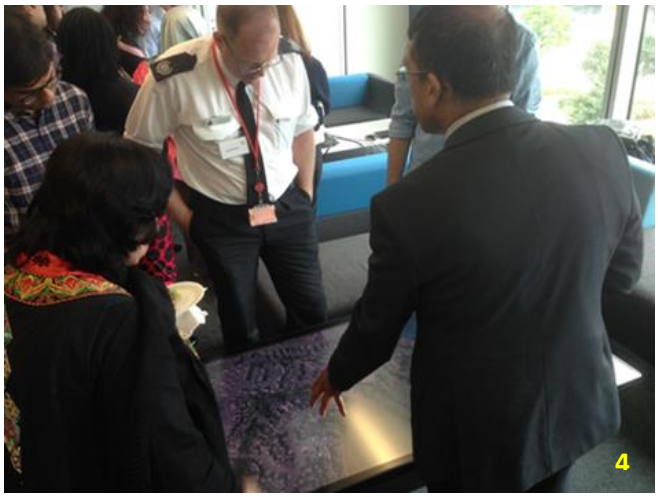
In a similar vein, *Dr. Kathy Oldham* (Head, Civil Contingencies and Resilience Unit of Greater Manchester Authority) presented on how local risk and resilience is governed at the sub-regional and local level in the UK (photo 3). *Dr Oldham* also shared information on the activities she is conducting as part of her work with the Rockefeller Foundation funded "100 Resilient Cities" programme and the United Nations Office for Disaster Risk Reduction (UNISDR) coordinated "Making Cities Resilient Campaign".



Following the keynote presentations from *Ms. Avagliano* and *Dr. Oldham*, the project partners from the UK, namely, *Mr. Nick Mercer* (Team Leader, Environment Agency), *Mr. Martin Knapp*, (Managing Director, Secure Information Assurance Ltd), *Mr. Daniel Wicks* (Senior Earth Observation Specialist & Cities Lead Satellite Applications Catapult Ltd), *Dr. Elena Lobo* (Senior Space Innovation Facilitator at Satellite Applications Catapult) and *Thomas Beaton* (Senior Earth Observation Engineer, Telespazio Vega Ltd) presented their core areas of expertise and how they plan to support the MOBILISE project.

Subsequently, the project partners from Sri Lanka, Malaysia and Pakistan presented on the challenges in developing disaster resilience through multi-agency collaboration in their respective countries. These presentations were followed by lunch.

5.1 Interactive Demonstration on the Collaborative Virtual Emergency Response Training Platform


4

During the lunch break, attendees were given an opportunity to interact with a Collaborative Virtual Emergency Response Training Platform (prototype) developed by the THINKlab (photo 4). Dr. Simon Campion and Michal Cieciura from the THINKlab presented the basic concepts of the prototype to the attendees.

5.2 MOBILISE Project Management Meeting

The project meeting was chaired by *Prof. Terrence Fernando* (photo 5). In his opening address *Prof. Fernando* briefed all present on the main aims and objectives of the workshop and presented the project's governance structures, the project's work packages and the year one activities' schedule. *Prof. Fernando* shared the expected outcomes and out-puts of the project. *Prof. Fernando* then handed over to the project finance representatives from the University of Salford to brief the project team on the rules and regulations of the Global Challenge Research Fund GCRF and EPSRC.


5


6

Subsequently, each participant was then given the opportunity to introduce him/ her and their organisation. This was followed by an open discussion on how best to strengthen project activities by linking with influential stakeholders in each country.

Follow up activities:

The participants agreed on *Prof. Fernando's* two proposals, which were:

1. The MOBILISE project team will have Skype meeting at 09:00 (GMT) on the first Monday of every month from October 2017 till August 2020.
2. The project website will be launched by the end of September 2017.

A conference dinner was hosted by the THINKlab providing further opportunities to get for the project partners to get to know each other more closely.

6. MOBILISE TECHNICAL WORKSHOP

The technical workshop (22 August 2017) was hosted at the THINKlab. At the beginning of the workshop *Prof. Fernando* revisited day one's activities and introduced the day two's programme. The first half of day two featured a series of presentations aligned to the project work packages and covered the theoretical definitions of hazards, risks, vulnerability, system dynamics, and the use of earth observation-based technologies for monitoring, analysing and managing disasters and emergencies. *Dr. Chaminda Pathirage* and *Dr. Komal Aryal* presented Disaster Risk and Resilience Governance and *Mr. Hisham Tariq* presented the potential of system dynamics for modelling resilience.

Following the presentation *Dr. Shamaila Iram* shared her work on crowd sourcing for disaster responses. *Prof. Fernando* introduced activities carried out by the City Data Explorer. His presentation reported on a study undertaken by the THINKlab which was looking at city data management in the UK.

After the coffee break, *Prof. Fernando* and *Dr. Arturo García Jiménez* gave a demonstration on the concept of a near real-time disaster visualisation environment to the participants. This was followed by a presentation from *Mr. Thomas Beaton* (Senior Earth Observation Engineer, Telespazio) on the "Use of Satellite Technologies for Monitoring and Responding to Disasters". His presentation gave a few examples of how Earth Observations can be used to monitor and reduce geo-disasters. Subsequently, *Mr. Daniel Wicks* (Senior Earth Observation Specialist) and *Dr. Elena Lobo* (Senior Space Innovation Facilitator) from the

Satellite Applications Catapult jointly shared information on advances in satellite technology and Satellite Applications Catapult's international work.

After lunch, a series of presentations were delivered by the overseas partners. *Dr. Senaka Basnayake* (Director – Climate Resilience, Asian Disaster Preparedness Center, Thailand) gave a comparative presentation highlighting the key achievements and experiences of the ADPC on "Digital technology for disaster risk management in Asia" including best practice approaches and lessons learnt from Asian countries. *Dr. Basnayake* shared the following project activities in his presentation:

- End-to-End Early Warning Systems for Cyclones, Storm Surges and Floods in Bangladesh, Vietnam, China and Lao PDR
- Connecting Space to Villages in the Lower Mekong Region (SERVIR-Mekong)
- Drought Susceptibility Mapping in Nepal
- Myanmar Disaster Risk Decision Support System (DSS)
- Sri Lanka early warning activities funded by the UNESCAP Trust Fund for Tsunami (TTF)
- City-level hazard, vulnerability and risk assessment in Lao PDR
- Regional Drought and Crop Yield Information System (RDCYIS)
- Rakhine State Disaster Early Warning and Shelter Information Portal

Mr. Srimal Samansiri (Assistant Director, Research and Development, Disaster Management Centre, Sri Lanka) delivered a detailed presentation that focused on the use of geoinformatics in Sri Lanka. He introduced the disaster management approach in Sri Lanka and identified the current issues and future challenges based on past and current disaster risk assessment projects in the country.

Prof. Noor Jehan (Centre for Disaster Preparedness and Management, University of Peshawar) highlighted disaster management technical capabilities in Pakistan with the example of an Integrated Flood Analysis System (IFAS).

Mr. Mohd Ariff Bin Baharom (Deputy Director General, Planning and Policy Sector) shared the chronology of disaster events in Malaysia and the key challenges faced by the National Disaster Management Agency (NaDMA) in the context of using modern technologies to deal with disaster risks at local and national levels. *Mr. Baharom* gave a presentation entitled "Technology capabilities toward disaster risk reduction in Malaysia" and discussed the

National Flood Forecasting Centre and Forest Monitoring activities and the lessons learnt from recent flooding events in Malaysia. During the presentation, *Mr. Baharom* also shared information on the activities of the Forest Monitoring System using Remote Sensing (FMRS) developed by the Malaysian Remote Sensing Agency (MRSA).

Mr. Jon Hill (OPUS International) spoke on what happens to critical infrastructure during an emergency and stressed how important it is to monitor such infrastructures for the business continuity. Sharing the example of SMART (Seismic Monitoring Assessment Tool) to provide rapid asset assessment following significant seismic events in the years 2010, 2015 and 2016 in New Zealand, *Mr. Hill* highlighted how effectively OPUS's assessment tool, SMART, enabled owners to make quick decisions on the continued use of a building. He also briefly shared how OPUS is using sensor-based technologies to monitor bridges in remote locations.

At the end of the workshop, *Prof. Fernando* thanked all the project partners and the industry collaborators for their contribution and time.

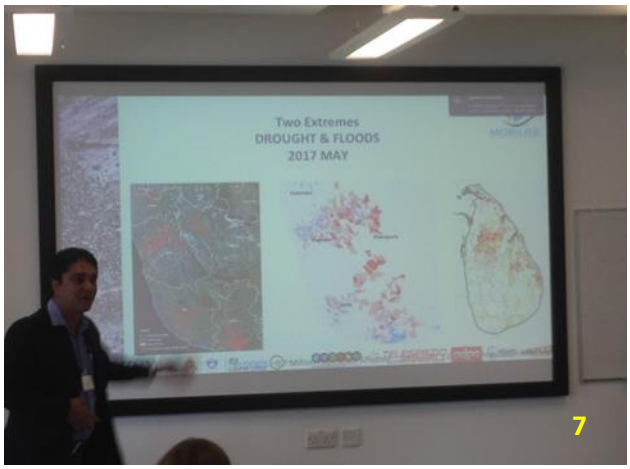
7. LIST OF APPENDICES

Appendix 7.1: Photos

Appendix 7.2: Key Conference Presentations

Appendix 7.3: List of Participants

Appendix 7.1: Photos



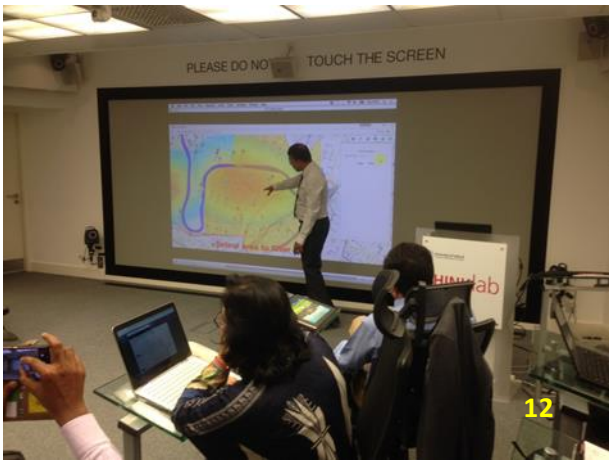
7

8


9

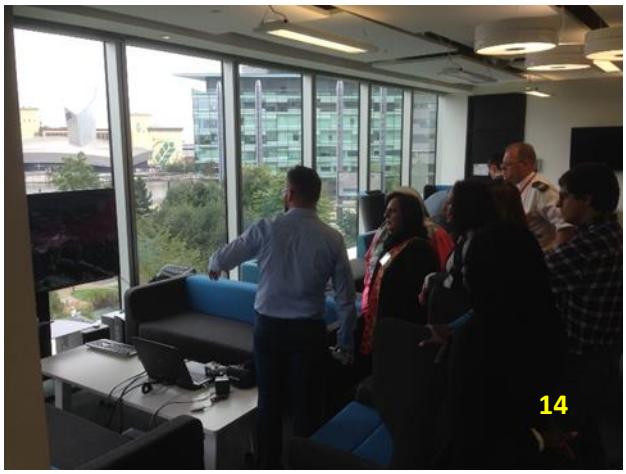
10

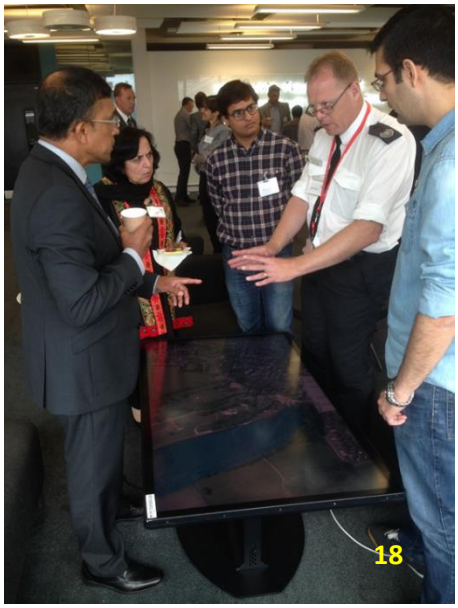
11

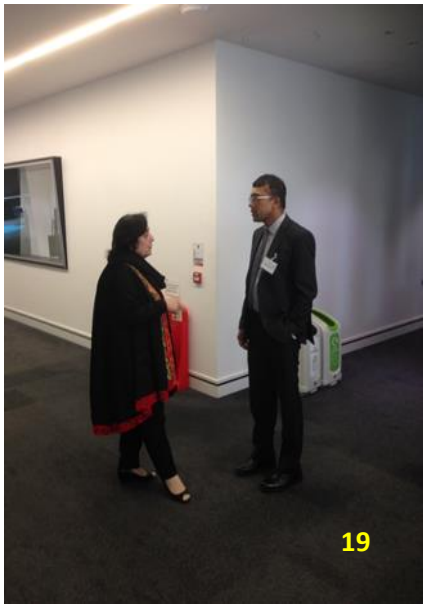


12

7, 8, 10, 11 and 12 – Presentations during the workshop and the opening session
9- MOBILISE Project Management Meeting
12 – The Technical workshop







13, 14, 18 – Participants interacting with the Virtual Reality Platform developed by the THINKlab
15, 16, 17, 19 – Networking

Appendix 7.2: Key Conference Presentations

Cabinet Office

ResilienceDirect

Manchester Arena

@RD_GOV #ResilienceDirect 1113

Cabinet Office

ResilienceDirect

London Bridge

@RD_GOV #ResilienceDirect 1114

Cabinet Office

ResilienceDirect

Grenfell Tower

@RD_GOV #ResilienceDirect 1115

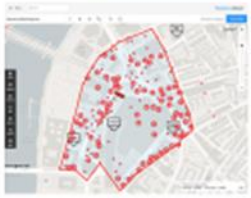
Cabinet Office

ResilienceDirect

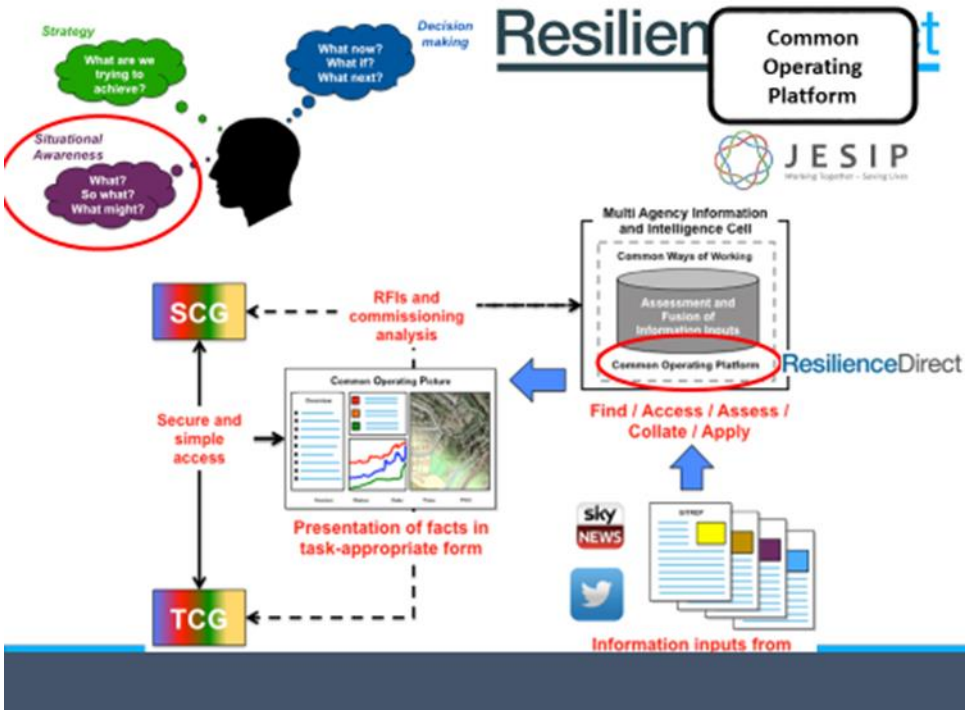
Your Resilience Platform

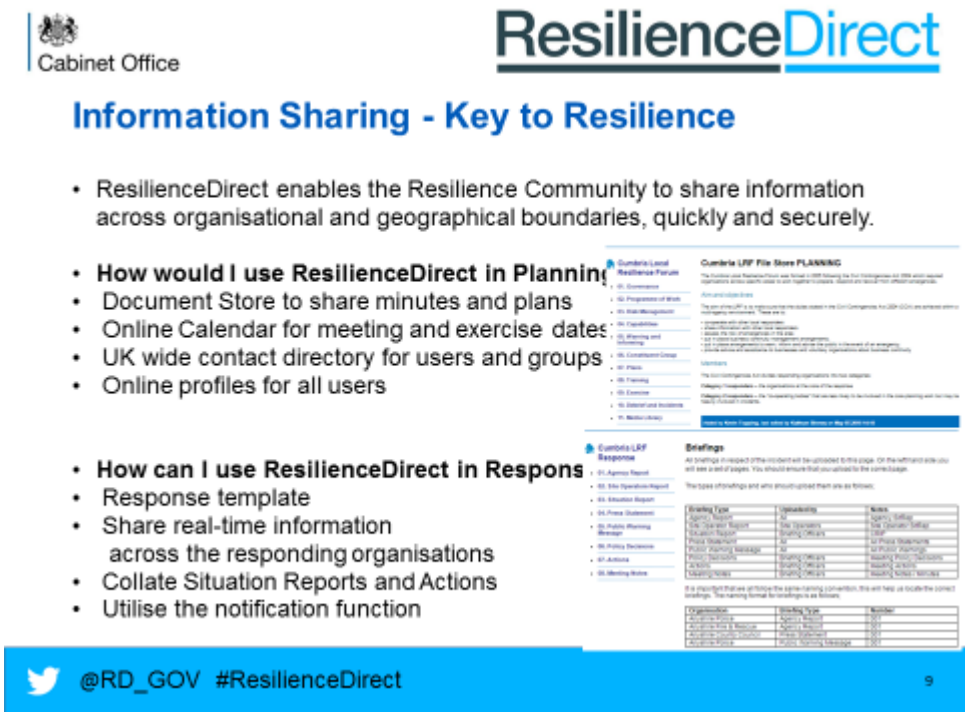
Device neutral access from any location. Planning & response Collaborative tool and Mapping provides situational awareness for informing strategic decisions

Alerting and Notification



@RD_GOV #ResilienceDirect


Strategy
What are we trying to achieve?
Decision making
What now? What if? What next?
Situational Awareness
What? So what? What might?
Resilien
Common Operating Platform
JESIP
Multi Agency Information and Intelligence Cell
Common Ways of Working
Assessment and Fusion of Information Inputs
Common Operating Platform
ResilienceDirect
SCG
RFIs and commissioning analysis
Common Operating Picture
Secure and simple access
Find / Access / Assess / Collate / Apply
Presentation of facts in task-appropriate form
sky NEWS
TCG
Information inputs from


Cabinet Office
ResilienceDirect
Information Sharing - Key to Resilience
• ResilienceDirect enables the Resilience Community to share information across organisational and geographical boundaries, quickly and securely.
• How would I use ResilienceDirect in Planning
• Document Store to share minutes and plans
• Online Calendar for meeting and exercise dates
• UK wide contact directory for users and groups
• Online profiles for all users
• How can I use ResilienceDirect in Respons
• Response template
• Share real-time information across the responding organisations
• Collate Situation Reports and Actions
• Utilise the notification function
Cumbria LRF File Store PLANNING
Briefings
@RD_GOV #ResilienceDirect
9

Cabinet Office

ResilienceDirect

Joint Emergency Services Principles (JESIP)

ResilienceDirect – A Common Platform for Shared Situational Awareness

JESIP Joint Doctrine

1.4.2 The precise form of a Common Platform will reflect local requirements and existing capabilities, but users are referred to *ResilienceDirect* for a widely-used and secure platform with a range of functions that support joint working

@RD_GOV #ResilienceDirect 8

Cabinet Office

ResilienceDirect

Mapping

ResilienceDirect enables the Resilience Community to access Ordnance Survey basemaps and overlay their local data. In addition they can utilise the drawing tools provided within the application.

How would I use Mapping in Planning?

- Overlay your own data
- Provide accurate exports for your plans
- Define management zones

How would I use Mapping in Response?

- Create a response map
- Use the drawing tools to define cordons, control points and access routes
- Overlay local data to inform the TCG/SCG

ResilienceDirect 10

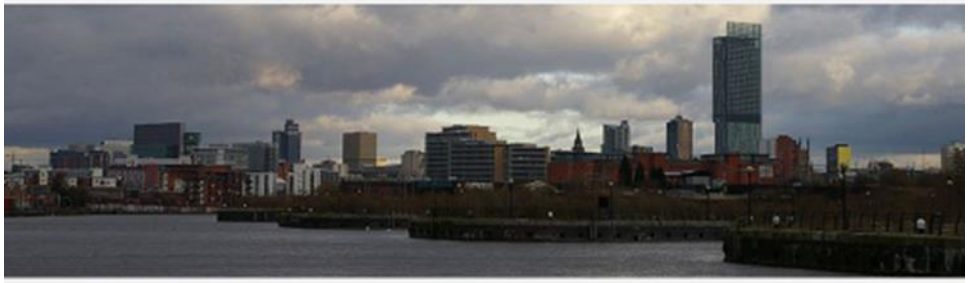
Cabinet Office

ResilienceDirect

@RD_GOV #ResilienceDirect 11

CREATING A RESILIENT CITY: GREATER MANCHESTER

Dr Kathy Oldham OBE
Chief Resilience Officer



GMCA BOLTON BURY MANCHESTER OLDHAM ROCHDALE SALFORD STOCKPORT TAMESIDE TRAFFORD WIGAN

Contents

- Building urban resilience
- Building political leadership
- Capitalising on technology

… three global challenges suggested UN ESCAP

… as addressed in Greater Manchester through multi-agency partnerships

GMCA BOLTON BURY MANCHESTER OLDHAM ROCHDALE SALFORD STOCKPORT TAMESIDE TRAFFORD WIGAN

GREATER MANCHESTER

GREATER MANCHESTER
population: 2,756,200

60 miles of canal

274 schools

20 univerisites within one hours drive

23.1 million passengers per year

62 police stations

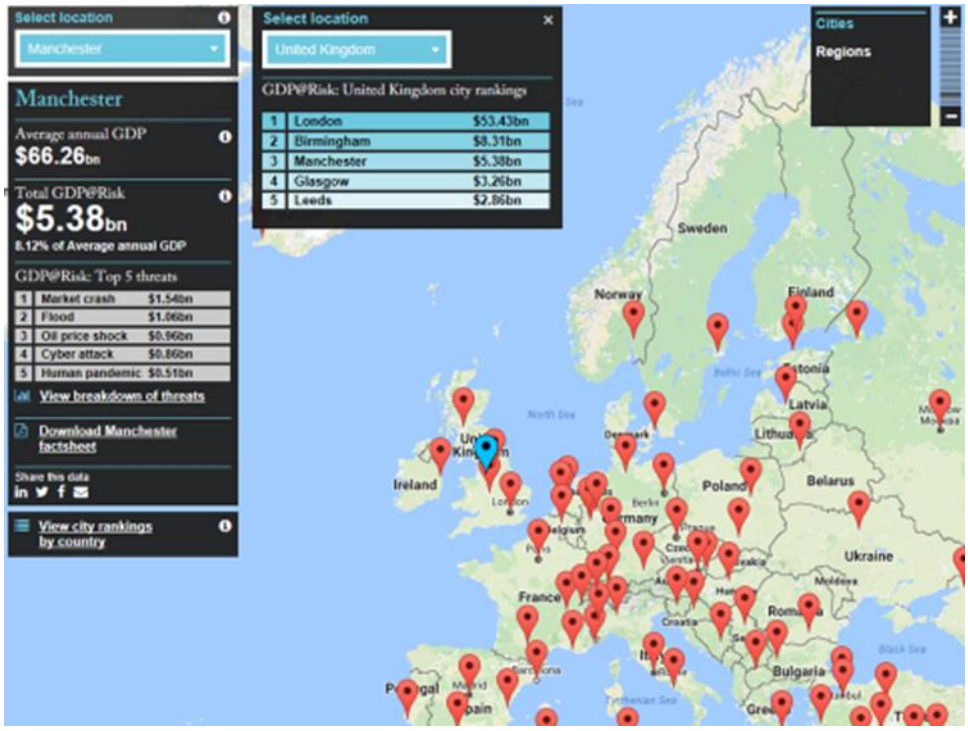
11 hospitals

7 million people live within one hours drive of Manchester city centre

85 miles of motorway


BACKGROUND: GREATER MANCHESTER
2.7 MILLION RESIDENTS
10 AUTHORITIES WORKING TOGETHER WITH BUSINESS
THE HEART OF THE NORTH
1st UK COMBINED AUTHORITY & DEVOLUTION DEAL
CENTRE OF INNOVATION, EDUCATION, INDUSTRY & CULTURE
ECONOMIC POTENTIAL EXCEEDS ALL OTHER UK CITY REGIONS


The Greater Manchester economy in context
2.7m people
1.14m jobs
93,000 businesses
Source: ONS
Source: ONS, GVA estimates 2012
GM ECONOMY, 2011
£48.2bn
BIGGER THAN
WALES ECONOMY, 2011
£47.3bn
NORTH EAST ECONOMY, 2011
£41.6bn
NORTHERN IRELAND ECONOMY, 2011
£29.9bn
ROLE MODEL CITY
GREATER MANCHESTER PREPARED



GDP@Risk by threat type

Threat	GDP @ Risk	Share of Total GDP @ Risk
Market crash	$1.54bn	28.67%
Flood	$1.06bn	19.77%
Oil price shock	$0.96bn	17.93%
Cyber attack	$0.86bn	16.06%
Human pandemic	$0.51bn	9.56%
Solar storm	$0.14bn	2.58%

Lloyds City Risk Register
www.Lloyds.com/cityriskindex

Urban Resilience

GMCA BOLTON BURY MANCHESTER OLDHAM ROCHDALE SALFORD STOCKPORT TAMESIDE TRAFFORD WIGAN

Resilience is not new

- Booming cotton industry in 1800s
- Large scale de-industrialisation from 1960s
- 1980s onwards – growth, reform and regeneration
- Multiple sectors including financial, sports, digital, manufacturing
- Current opportunities through Devolution & Northern Powerhouse

GMCA BOLTON BURY MANCHESTER OLDHAM ROCHDALE SALFORD STOCKPORT TAMESIDE TRAFFORD WIGAN

GM has a long heritage and clear identity ….

"….It's got everything except a beach" Ian Brown, lead singer, The Stone Roses

Birthplace of the Computer. Based on the work of mathematician and cryptographer Alan Turing

"The area has witnessed a great many stirring episodes, especially of a political character. Generally speaking, its citizens have been liberal in their sentiments, defenders of free speech and liberty of opinion"
Emmeline Pankhurst, British political activist

"the capital, in every sense, of the North of England, where the modern world was born. The people know their geography is without equal. Their history is their response to it"
Brian Redhead 20th century broadcaster and social commentator

Birthplace of Robert Peel, founder of the 1st professional public Police Force in the world

"…They do things differently here"
Tony Wilson

"….the belly and guts of the Nation"
George Orwell

Manchester and its towns became the largest and most productive cotton spinning centre in the world in 1871, 32% of global cotton production

GMCA BOLTON BURY MANCHESTER OLDHAM ROCHDALE SALFORD STOCKPORT TAMESIDE TRAFFORD WIGAN

Operation Newtown

Emergency Planning

Civil Contingencies Act 2004

The Council has a statutory responsibility under the Civil Contingencies Act 2004 to:

- Conduct regular assessments of c. 65 risks ranging from flooding to cyber resilience and Anti-Microbial Resistance
- Develop generic and specific plans, policies and procedures for identified risks
- Promote community resilience
- Deliver training and exercising
- To maintain sufficient capacity and capabilities to respond to the common consequences of major incidents

Making Cities Disaster Resilient

Supporting 3630 cities globally

Covering **700 Million** People

73 Capital Cities

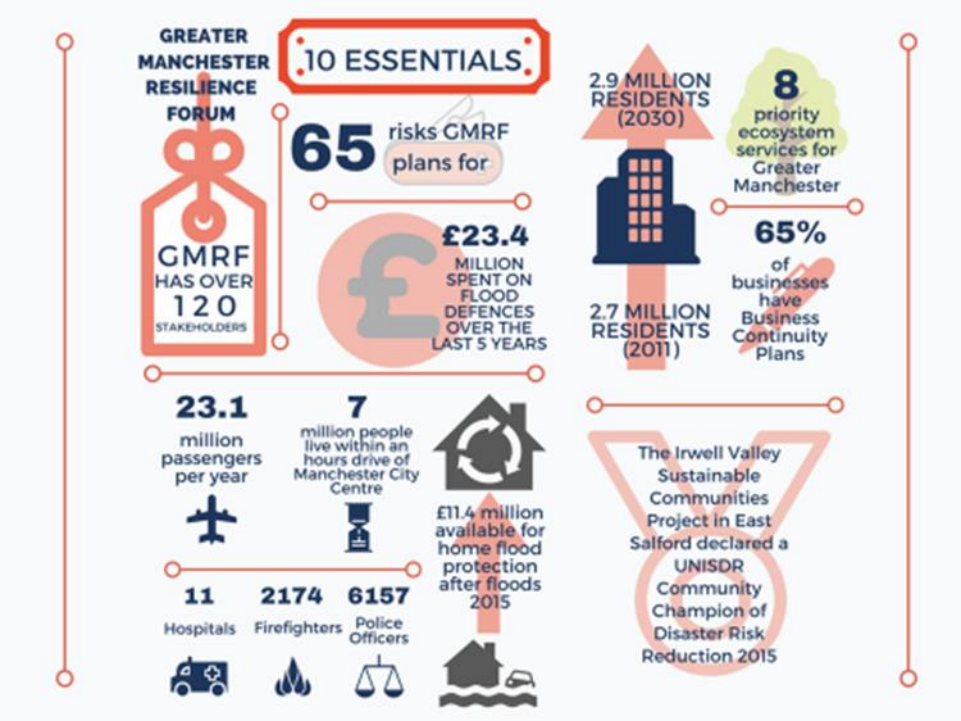
100 Cities w/ Million Pop

98 Countries

TEN Essentials for Making Cities Resilient

- operational framework built on Sendai Framework for cities
- supported by a multi-layered reporting tool
- developed for Mayors, city managers and planners to develop and implement urban resilience strategies
- plan future investments and track progress
- generates feedback to national governments
- developed by 40 global partners
- basis for insurers to assess level of risk

UNISDR

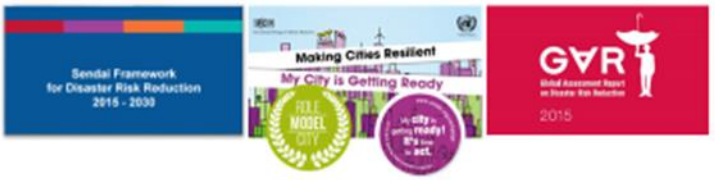


Benefits of joining the Making Cities Resilient Campaign

- Political ownership: 10 political leaders have signed up to the Campaign
- Visibility of the Disaster Risk Reduction agenda
- Influence: nationally, internationally
- Broader understanding of resilience: completion of LGSAT
- Opportunities to learn from others
- Opportunities to share Greater Manchester's story

GMCA BOLTON BURY MANCHESTER OLDHAM ROCHDALE SALFORD STOCKPORT TAMESIDE TRAFFORD WIGAN

Global to local



CREAM Project, Stockport

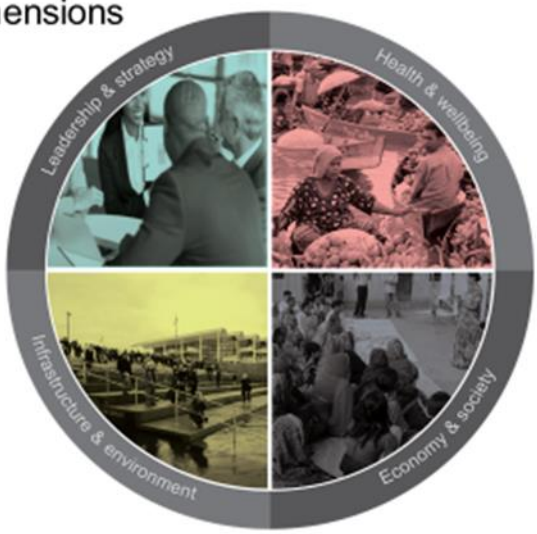
Training and Community Safety Facility, Bury

Community Flood Preparation, Salford


Business start-ups 2nd
Ave. house price 3rd
Gross Value Added 1st
Strengths
Ave. weekly workplace wage 3rd
High level Qualifications 2nd
Jobs, private to public sector ratio 1st
Employment 3rd
centreforcities


Patents per 100k pop. 4th
CO2 emissions 5th
Private sector jobs change 7th
Challenges
JSA claimant count 4th
Manufacturing jobs 5th
Change in real wages 4th
Public service jobs 7th
centreforcities

City resilience has 4 key dimensions



100 RESILIENT CITIES

100RC provides cities 4 types of support to address these problems

TO HELP COMPLEX URBAN SYSTEMS ORGANISE AND INTEGRATE AROUND RESILIENCE

TO SCALE SOLUTIONS EFFICIENTLY

1. Funding to hire a **Chief Resilience Officer (CRO)**

2. Support to Develop a City **Resilience Strategy**

3. A **Platform of Services** to support strategy implementation

4. Membership in the 100RC **Network**

100 RESILIENT CITIES

Benefits of joining 100RC

- Political ownership: GM Mayor as our resilience champion
- Resilience in a much broader context with a wide cross-sectoral reach
- International networking and learning
- Support for a comprehensive strategy, underpinned by an evidence base and citizen perceptions
- Opportunity to innovate and leverage new resources into Greater Manchester

GMCA BOLTON BURY MANCHESTER OLDHAM ROCHDALE SALFORD STOCKPORT TAMESIDE TRAFFORD WIGAN

Building on existing work

- Resilience strategy: based on completion of Disaster Resilience Scorecard
- Development of international city-to-city peer review tool

GMCA BOLTON BURY MANCHESTER OLDHAM ROCHDALE SALFORD STOCKPORT TAMESIDE TRAFFORD WIGAN


WHY IS A DRR STRATEGY IMPORTANT?
LOCALITY
international policy translating into local action on the ground
VISION
agreed collective goals amongst stakeholders with different priorities
TIMING
speaking to moments of transition and transformation
SUSTAINABILITY
continued focus through measuring progress


HOW
DO WE MEASURE
SUCCESS?
Review risks (track exposure & vulnerability)
Regulatory inspections and investigations
Debriefs of incidents and exercises
Dialogue with the community
Democratic accountability
Self assessment & audits
Peer reviews

Political Leadership

GMCA BOLTON BURY MANCHESTER OLDHAM ROCHDALE SALFORD STOCKPORT TAMESIDE TRAFFORD WIGAN

A moment in history

- Greater Manchester: a devolved city region
- Reshaping services
- Local decisions made by local people to reflect local needs and opportunities

… resilience can be at the heart of this

GMCA BOLTON BURY MANCHESTER OLDHAM ROCHDALE SALFORD STOCKPORT TAMESIDE TRAFFORD WIGAN

Origins of devolution

- UK is the most centralised country in Western Europe
- MIER (Manchester Independent Economic Review) confirms the economic case for devolution in 2009
- The Localism Act allows for the creation of combined authorities (CA), pooling resources and working across a region
- In 2011, the GMCA is created – the first combined authority

GMCA BOLTON BURY MANCHESTER OLDHAM ROCHDALE SALFORD STOCKPORT TAMESIDE TRAFFORD WIGAN

Why Greater Manchester?

History

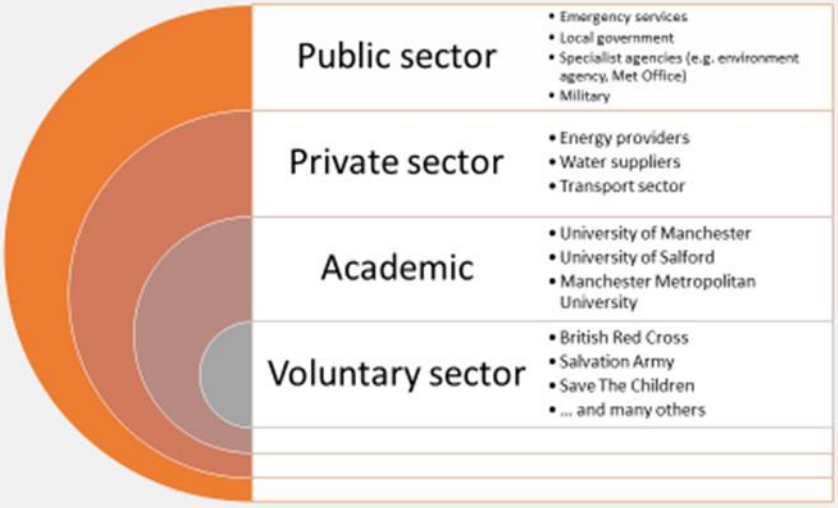
- Close collaboration in the form of AGMA
- Strong economic geography (in comparison to other regions)
- Strong interconnectivity through regional bodies – GMFRS, GMPTE etc.
- Strong civic leadership

GMCA BOLTON BURY MANCHESTER OLDHAM ROCHDALE SALFORD STOCKPORT TAMESIDE TRAFFORD WIGAN


Mayor
Wigan
Bolton
Trafford
Bury
GMCA
Tameside
Manchester
Stockport
Oldham
Salford
Rochdale


Greater Manchester's governance is a story of partnership
2 cities and 8 districts working in collaboration
GMCA and 10 Metropolitan Borough Councils
Partnership governance
Local Enterprise Partnership (chair: private sector)
Infrastructure Advisory Group (chair: private sector)
Greater Manchester Resilience Forum (chair: public sector)
Natural Capital Group (chair: NGO)
Making a difference on the ground
Resilience Development Group
Local Health Resilience Partnership
Chief Officers Group
GMCA
BOLTON
BURY
MANCHESTER
OLDHAM
ROCHDALE
SALFORD
STOCKPORT
TAMESIDE
TRAFFORD
WIGAN

GM's resilience partnership



GMCA BOLTON BURY MANCHESTER OLDHAM ROCHDALE SALFORD STOCKPORT TAMESIDE TRAFFORD WIGAN

Collaboration in Adversity

- The Manchester Arena Attack
  - Media focus on the Mayor
  - Additional capacity
    - GM Civil Contingencies Unit
    - CA comms function
  - Agile political decision making
  - Strategic coordinating group and command structures
  - Commissioning services
  - Community Recovery Group
    - Immediate Tensions/Hate Crime Monitoring
    - Commission on Counter Extremism and Cohesion

GMCA BOLTON BURY MANCHESTER OLDHAM ROCHDALE SALFORD STOCKPORT TAMESIDE TRAFFORD WIGAN

Resilience as a cross cutting theme

- Greater Manchester Strategy
- Greater Manchester Spatial Framework
- Independent Review into preparedness for and response to Manchester Arena Attack
- Commission reviewing approaches to community cohesion
- Tower block task force
- Digital summit
- Green summit

… all require political leadership

GMCA BOLTON BURY MANCHESTER OLDHAM ROCHDALE SALFORD STOCKPORT TAMESIDE TRAFFORD WIGAN

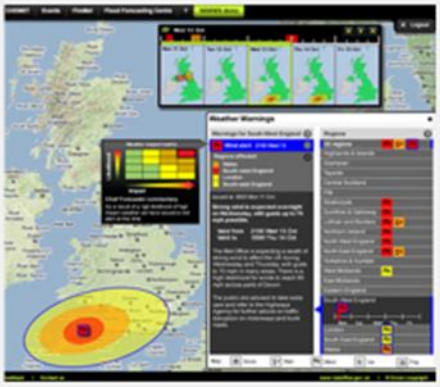
REFLECTIONS ON GOVERNANCE

- an evolving, iterative process
- importance of political ownership
- horizontal connection to shape and influence cross-cutting themes
- vertical connection to enable traction on the ground whilst also linking to national mechanisms.
- ensuring resilience is not delivered as a 'top-down' approach but through a network of interconnected activity at various spatial levels
- fostering ownership and participation across sectors
- need to retain a specific focus on DRR whilst also ensuring DRR is everyone's business

Capitalising on Technology

GMCA BOLTON BURY MANCHESTER OLDHAM ROCHDALE SALFORD STOCKPORT TAMESIDE TRAFFORD WIGAN

Partners benefit, single agency ownership



GMCA BOLTON BURY MANCHESTER OLDHAM ROCHDALE SALFORD STOCKPORT TAMESIDE TRAFFORD WIGAN

Reflections for MOBILISE

- Partnership is at the heart of preparedness, response, recovery and city resilience
- The city as a system of systems helps understand resilience but solutions tend to apply to one system or part acting independently
- Collaboration vs integration
- Risks as causes vs generic consequences

GMCA BOLTON BURY MANCHESTER OLDHAM ROCHDALE SALFORD STOCKPORT TAMESIDE TRAFFORD WIGAN

Kathy Oldham: k.oldham@manchester.gov.uk
@GM_prepared
www.gmemergencyplanning.org.uk

GMCA BOLTON BURY MANCHESTER OLDHAM ROCHDALE SALFORD STOCKPORT TAMESIDE TRAFFORD WIGAN


Reconstructing 3D Environments in Near-Real time with Satellite Data
Thomas Beaton
Senior Earth Observation Engineer
21/08/2017
TELESPAZIO
a LEONARDO and THALES company


TELESPAZIO
a LEONARDO and THALES company
Company Overview
A major 'space company' with more than 40 years heritage
• Space communications
• Space control operations services
• Space EO and GNSS consultancy studies
• Geospatial Information Services
UK footprint
• Located within Leonardo facility at Luton
• 150 staff
• £35 mill annual turnover

Networks & Connectivity

- **Networks & Connectivity**
  E.g. Fixed & Mobile satellite broadband and Oil & Gas and Maritime telecommunication

- **Satellite System Design and Integration**
  Ground Segment design, development & implementation and Launch Services

- **Satellite Operations**
  E.g. In orbit control of satellites and constellations & Control of complex ground station infrastructures

Geospatial Information

Geospatial applications and services

- **Land management**
  - Forestry, waste crime, harvest prediction
- **Maritime surveillance and vessel detection**
  - Oil spill response, illegal fishing, piracy
- **Infrastructure stability monitoring**
  - Power stations, bridges, dams, rigs, industrial plant
- **Flood Risk mapping**
  - Near real-time flood monitoring across the UK

Value added products

- Cartographic mapping
- Orthoimagery and 3D Digital Terrain Models
- Thematic mapping (agriculture, geology)

Satellite Imagery services

- Radar – mainly COSMO-SkyMed data
- Optical – third party resales
- Ground Station tasking and reception

COSMO-SkyMed constellation

COSMO-SkyMed constellation

Telespazio VEGA capabilities

S-SHM

- Motion monitoring system based on GNSS technology designed to deliver high accuracy 3D motion monitoring in real time.
- Optimised for fixed man-made structures like dams, bridges, buildings and natural features such as landslides, volcanoes or ground subsidence.

Project Flyer

InSAR : LondonMap

- High density PS InSARwith identifies surface movement with millimetric precision
- Detects how much each major underground infrastructure is affecting London's ground surface, including movement interaction between different major underground infrastructures to clarify liabilities.

Satellite derived surface movement (InSAR) over Charing Cross Station 2015

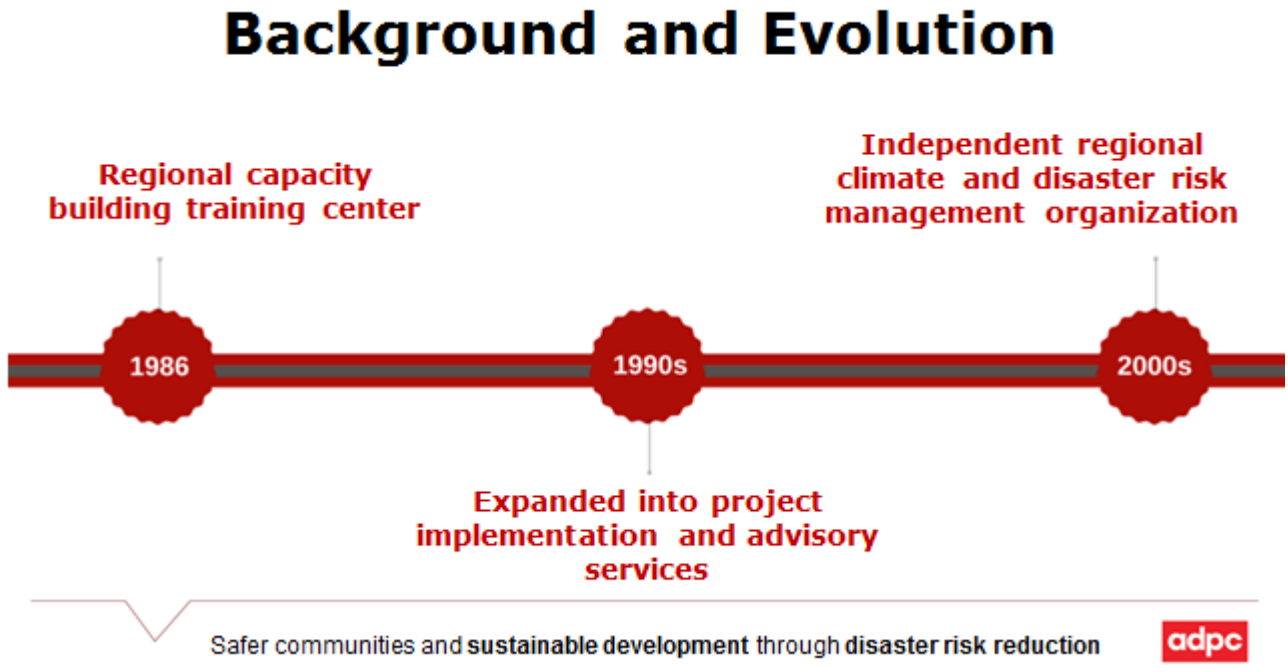
Contribution, Roadmap and Exploitation

To provide advice & support in terms of:

- Satellite data acquisition
- Satellite data processing
- Project roadmap
- Facilitating innovation


Thomas Beaton
Senior Earth Observation Engineer – thomas.beaton@telespazio.com
THANK YOU FOR YOUR ATTENTION
TELESPAZIO
a LEONARDO and THALES company


Digital technologies for disaster risk management in Asia
- ADPC experience -
Senaka Basnayake
Director - Climate Resilience, Asian Disaster Preparedness Center, Thailand
adpc


Background and Evolution
Regional capacity building training center
1986
1990s
Expanded into project implementation and advisory services
Independent regional climate and disaster risk management organization
2000s
Safer communities and sustainable development through disaster risk reduction
adpc

Our Locations

Offices and representations:

- **Bangkok**, Thailand
- **Dhaka**, Bangladesh
- **Yangon**, Myanmar
- **Colombo**, Sri Lanka
- **Phnom Penh**, Cambodia
- **Jakarta**, Indonesia
- **Bihar State**, India
- **Kathmandu**, Nepal
- **Manila**, Philippines

adpc

Partnerships

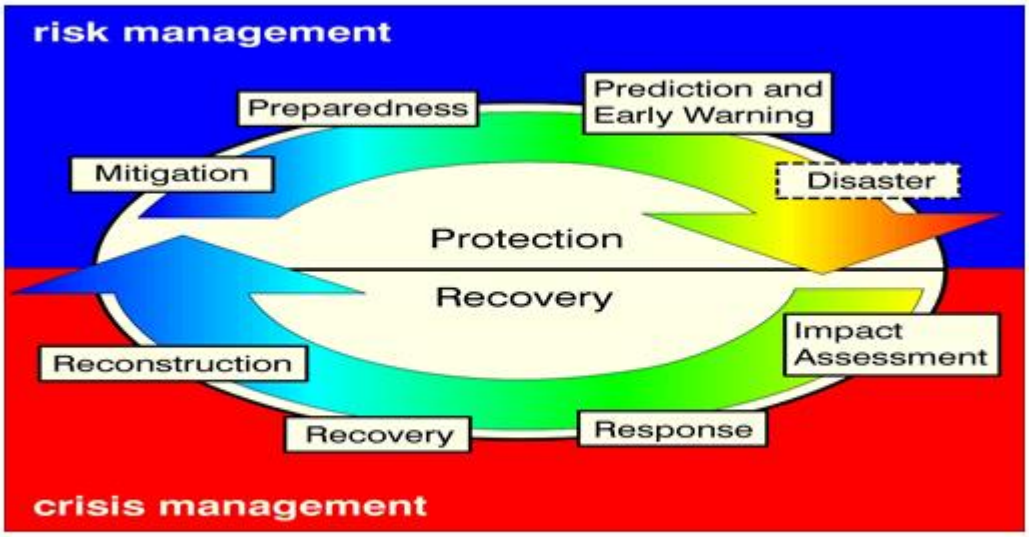
adpc

Core Principles

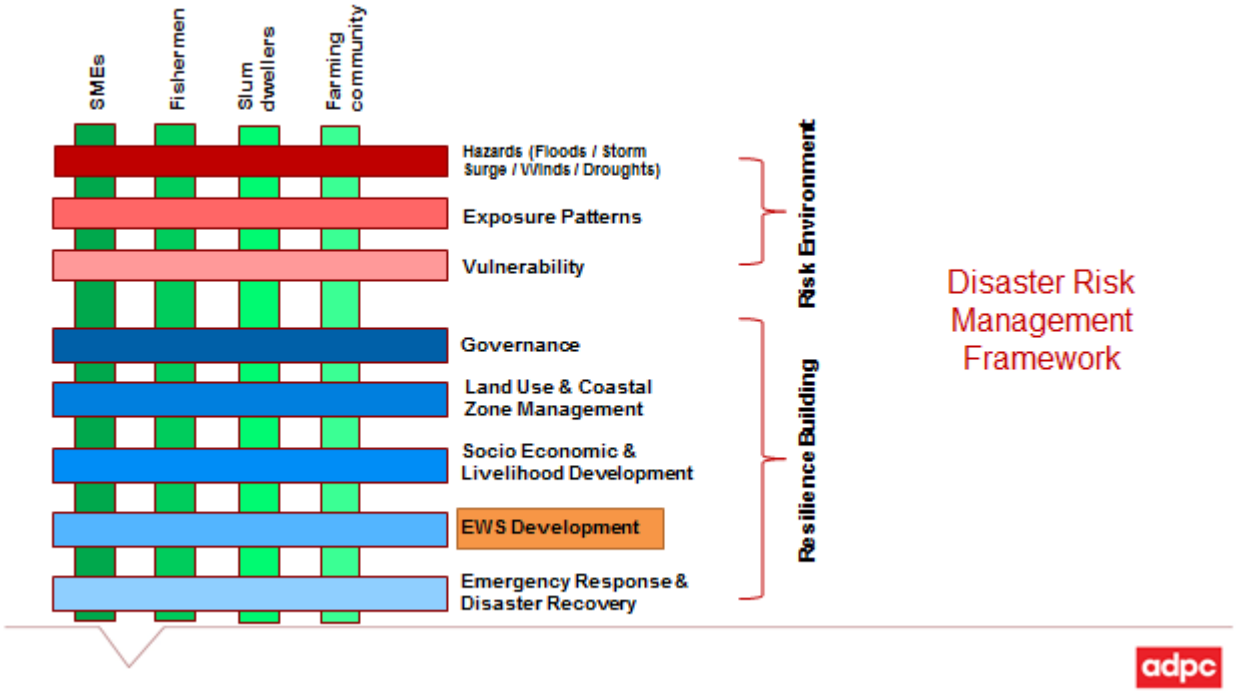
- Science
- Systems
- Applications

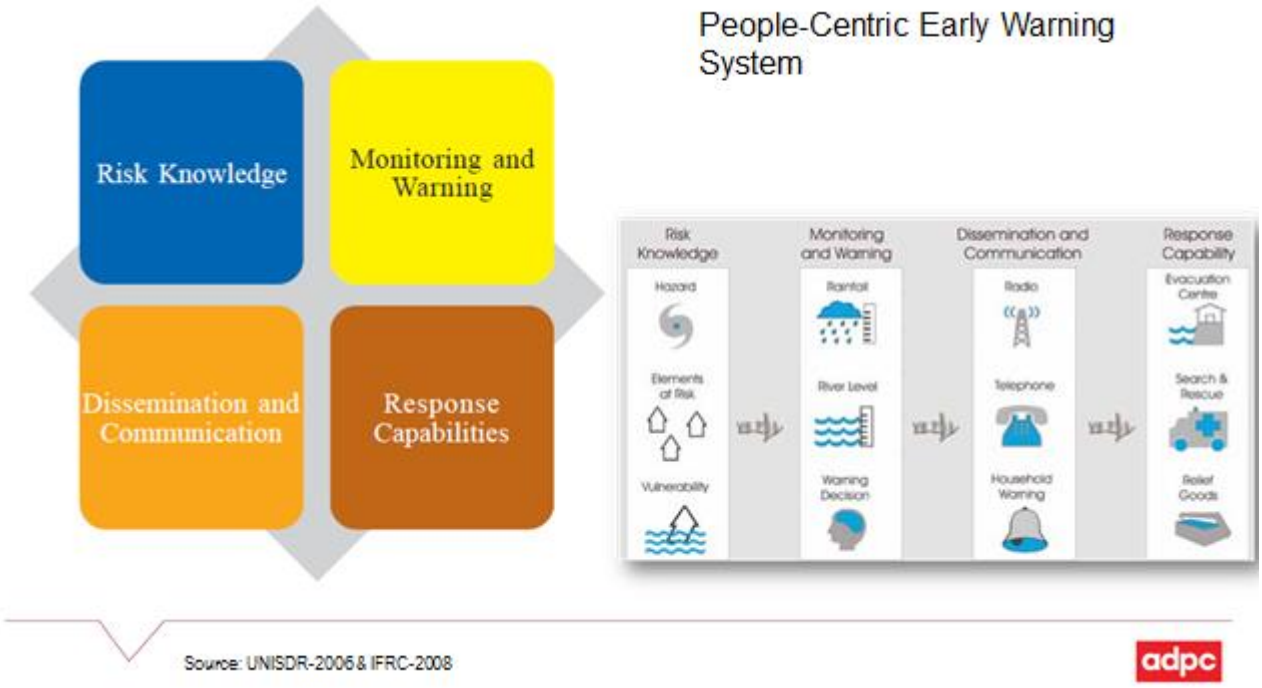
adpc

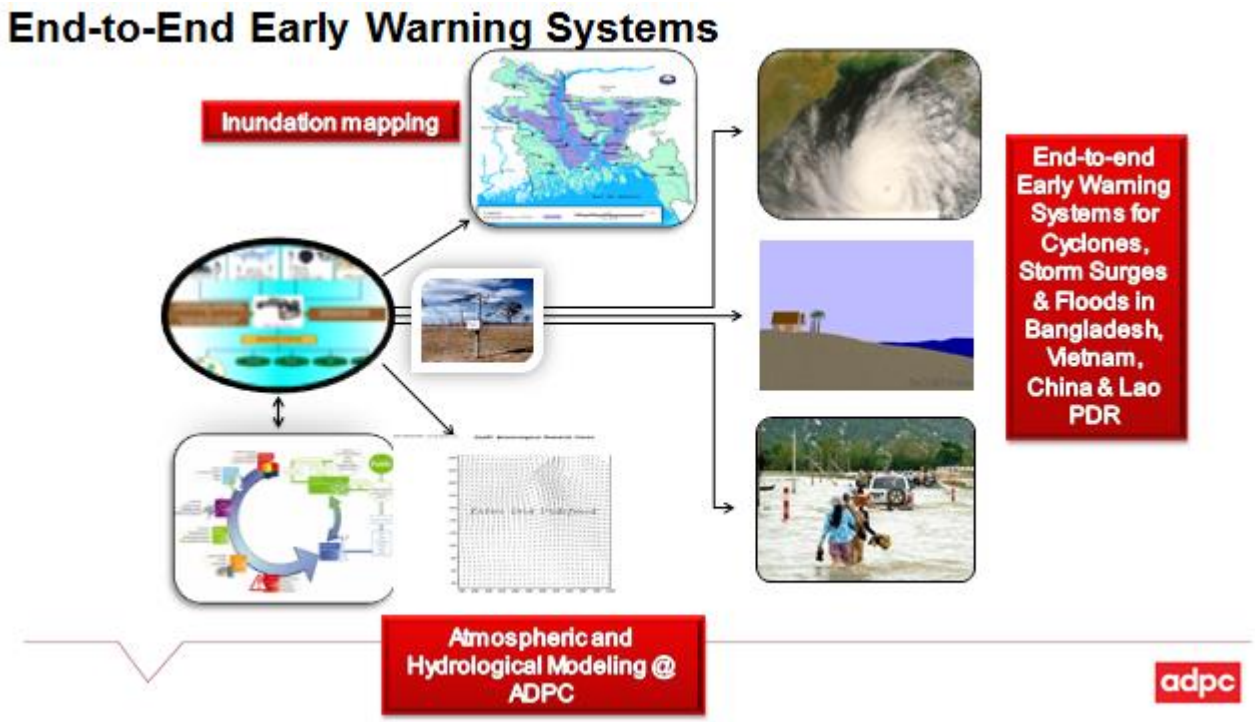
The Cycle of Disaster Management

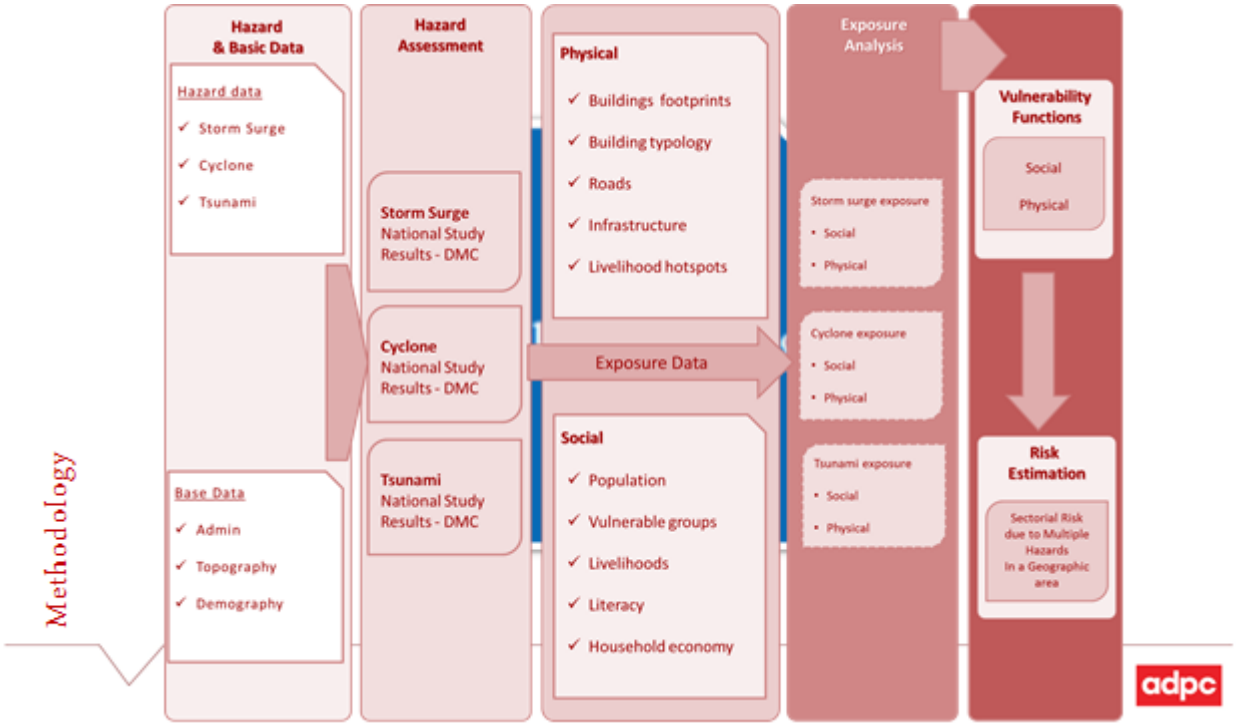


adpc

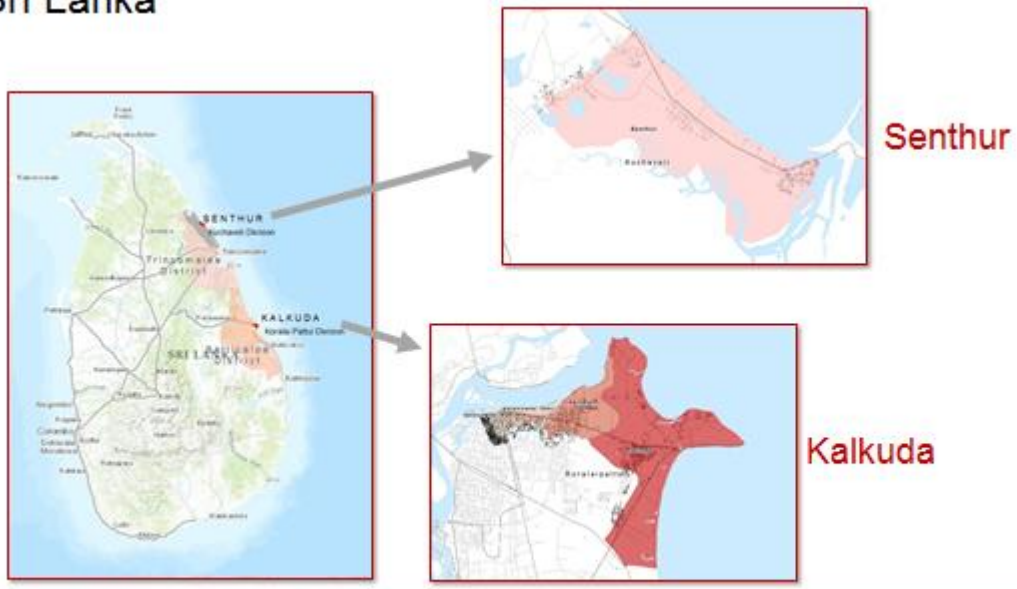

SMEs
Fishermen
Slum dwellers
Farming community
Hazards (Floods / Storm Surge / Winds / Droughts)
Exposure Patterns
Vulnerability
Governance
Land Use & Coastal Zone Management
Socio Economic & Livelihood Development
EWS Development
Emergency Response & Disaster Recovery
Risk Environment
Resilience Building
Disaster Risk Management Framework
adpc


Risk Knowledge
Monitoring and Warning
Dissemination and Communication
Response Capabilities
People-Centric Early Warning System
Risk Knowledge
Monitoring and Warning
Dissemination and Communication
Response Capability
Hazard
Elements of Risk
Vulnerability
Rainfall
River Level
Warning Decision
Radio
Telephone
Household Warning
Evacuation Centre
Search & Rescue
Relief Goods
Source: UNISDR-2006 & IFRC-2008
adpc


End-to-End Early Warning Systems
Inundation mapping
End-to-end Early Warning Systems for Cyclones, Storm Surges & Floods in Bangladesh, Vietnam, China & Lao PDR
Atmospheric and Hydrological Modeling @ ADPC
adpc


Methodology
Hazard & Basic Data
Hazard data
Storm Surge
Cyclone
Tsunami
Base Data
Admin
Topography
Demography
Hazard Assessment
Storm Surge National Study Results - DMC
Cyclone National Study Results - DMC
Tsunami National Study Results - DMC
Physical
Buildings footprints
Building typology
Roads
Infrastructure
Livelihood hotspots
Exposure Data
Social
Population
Vulnerable groups
Livelihoods
Literacy
Household economy
Exposure Analysis
Storm surge exposure
Social
Physical
Cyclone exposure
Social
Physical
Tsunami exposure
Social
Physical
Vulnerability Functions
Social
Physical
Risk Estimation
Sectorial Risk due to Multiple Hazards In a Geographic area
adpc

Sri Lanka

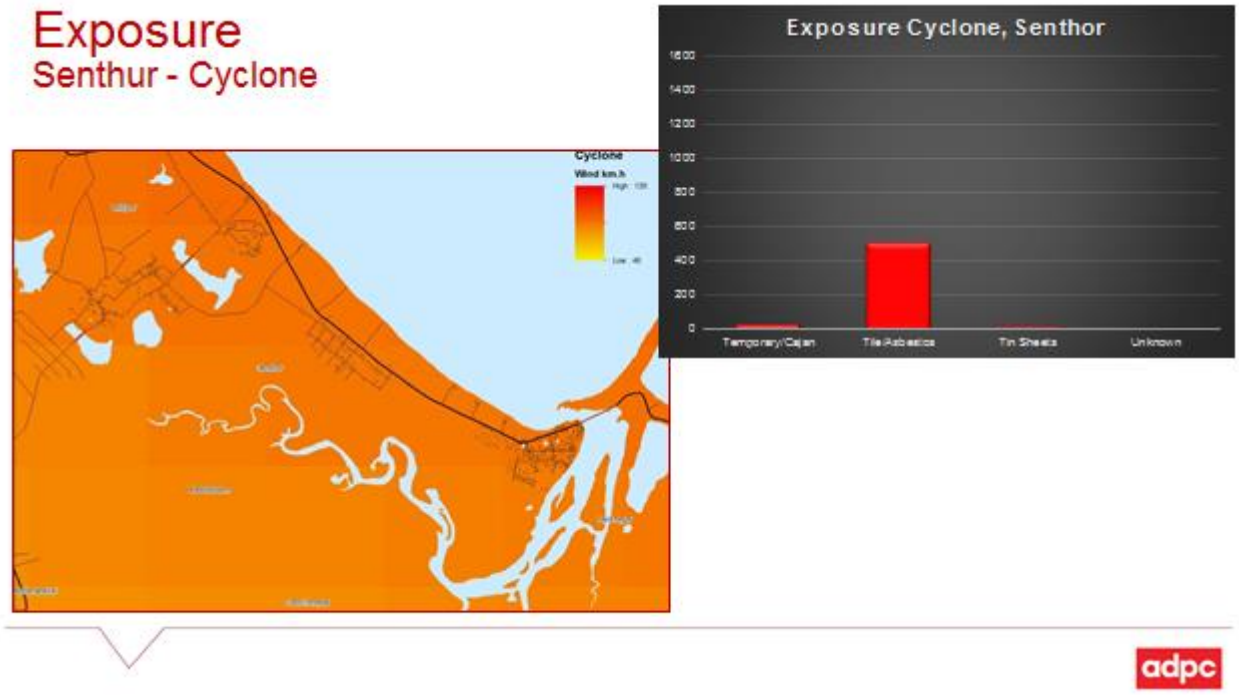


- Ministry of Disaster Management (MDM)
- Disaster Management Center (DMC) / Department of Meteorology (DOM)
- UNESCAP Trust Fund for Tsunami (TTF)
- Asian Disaster Preparedness Center (ADPC)

Hazard

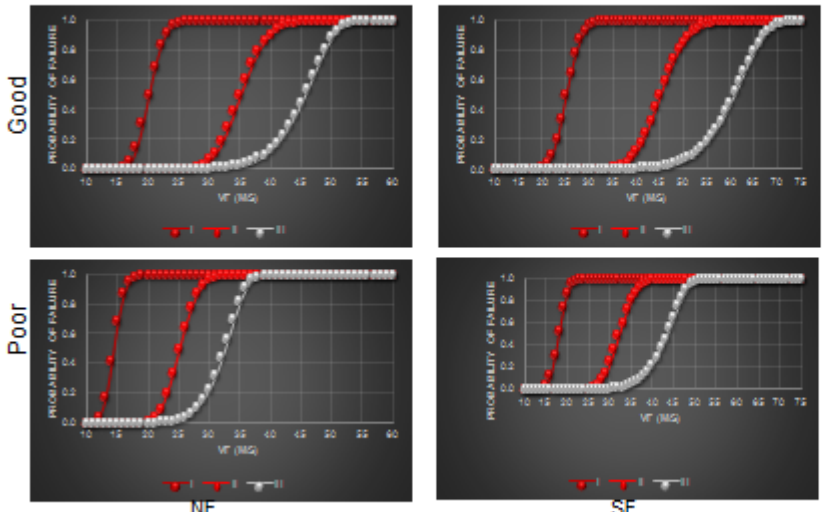
Senthur - Cyclone


Senthur
Current Buildings
adpc


Exposure
Senthur - Cyclone
Exposure Cyclone, Senthor
1600
1400
1200
1000
800
600
400
200
0
Temporary/Cajan
Tile/Asbestos
Tin Sheets
Unknown
Cyclone
Wind km.h
adpc

Vulnerability Function

Building for Cyclone



Structure No.	Building Material	Goyal et al. (2012)
1	Concrete, concrete and wood, trunk, brick with tiles (slab) roof	SE
2	Clay, wood, bamboo, zinc, corrugated iron with flexible roof	NE

Damage States	Mean Vf (m/s)			
	NEG	NEP	SEG	SEP
I	20.0	14.3	25.0	17.9
II	35.0	25.0	45.0	32.1
III	45.0	32.1	60.0	42.9

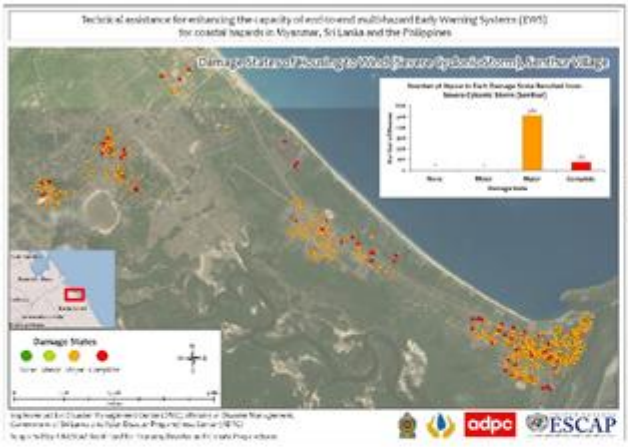
Enhancement factor
Good – 1.00
Poor – 1.40

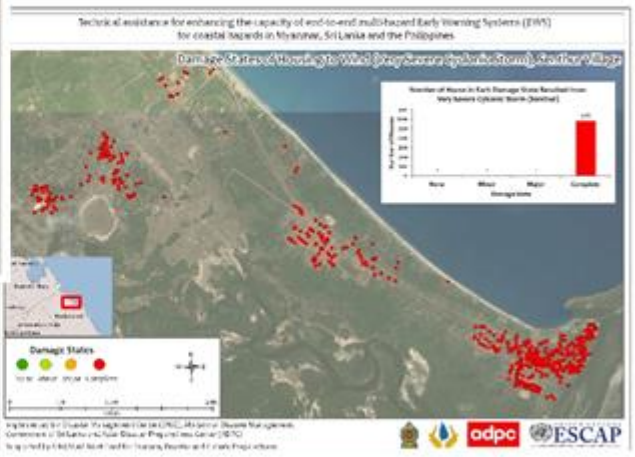
	Damage State			
	0	I	II	III
Repair cost ratio	0	0.1	0.5	1

NE – Non-engineered
SE – Semi-engineered

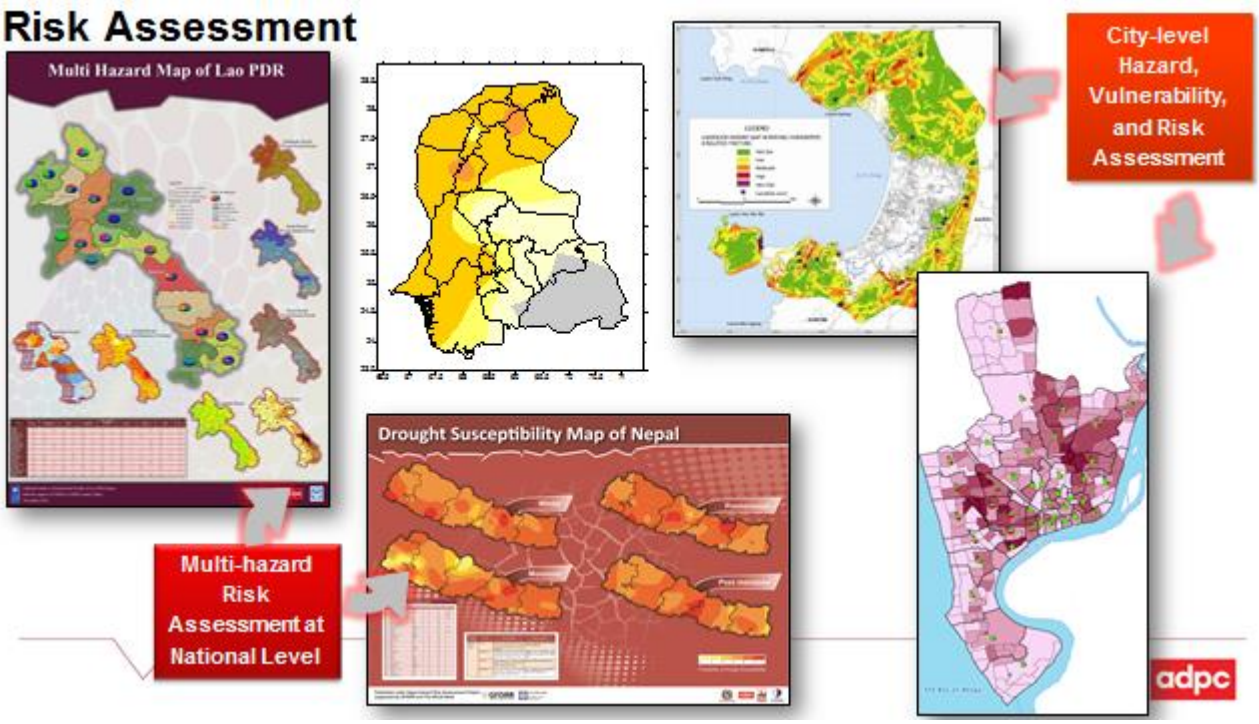
"Vulnerability of rural houses to cyclonic wind"
Goyal, K.P., 2012

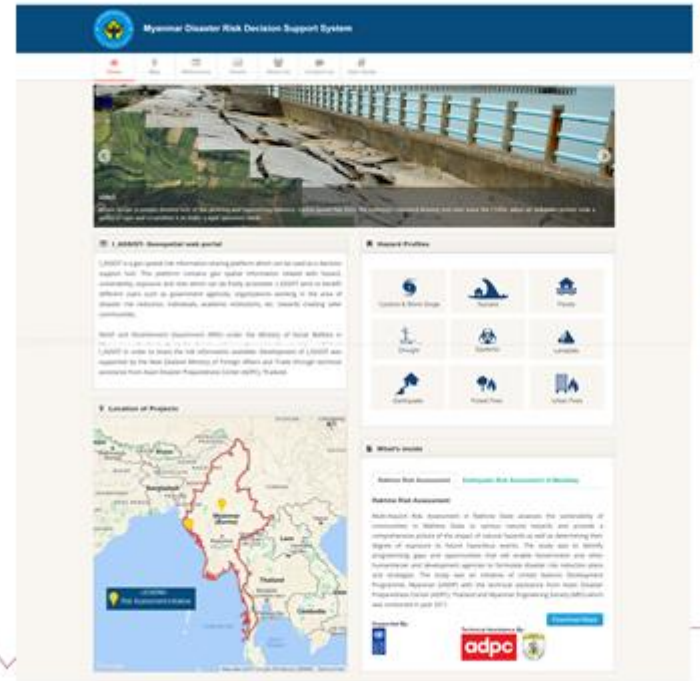
adpc





adpc



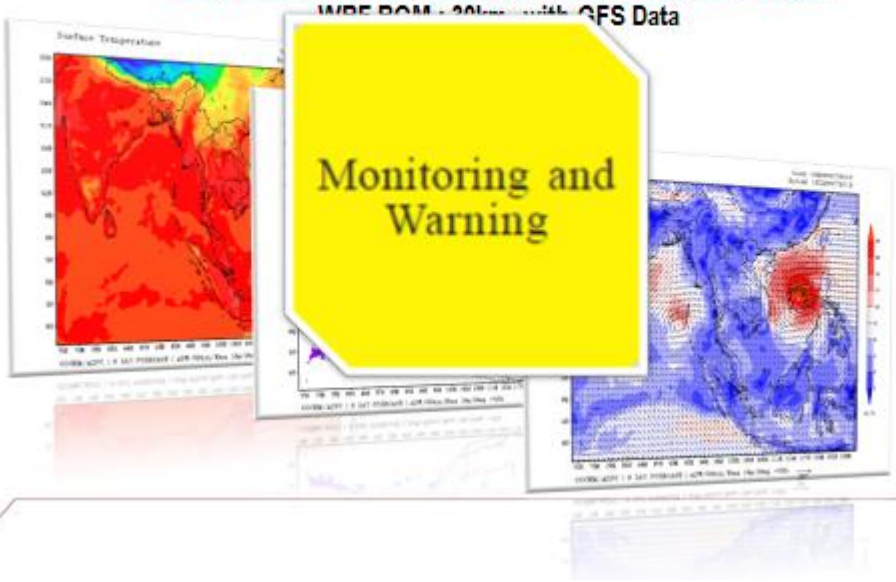


Myanmar Disaster Risk Decision Support System (DSS) (Geonode based)

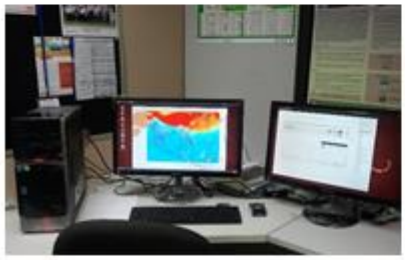
adpc

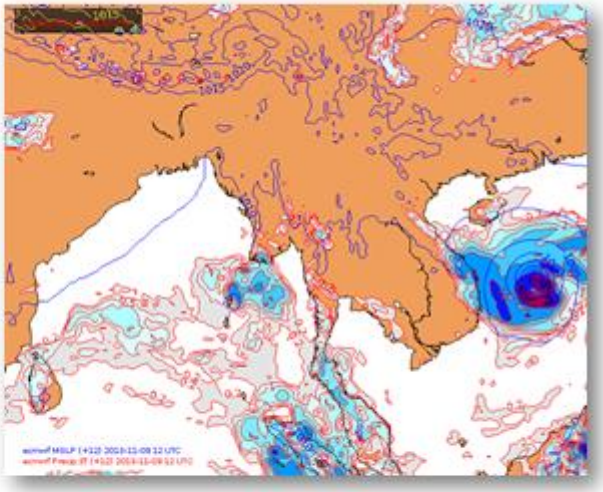
ADPC WRF Modeling system : Since 2012

3 Day Weather Forecast for South Asia and South East Asia

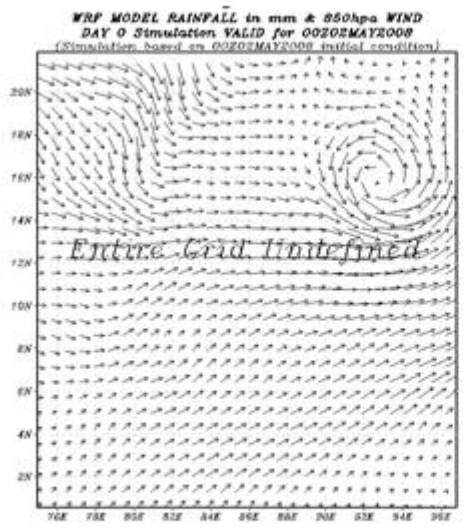


Digital Analysis and Display System
(introduced by MET-Norway and ADPC)

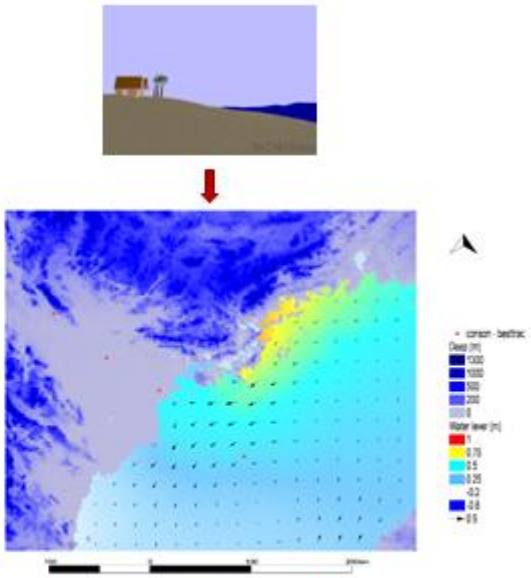




DIANA Visualization software installed in Myanmar and Bangladesh



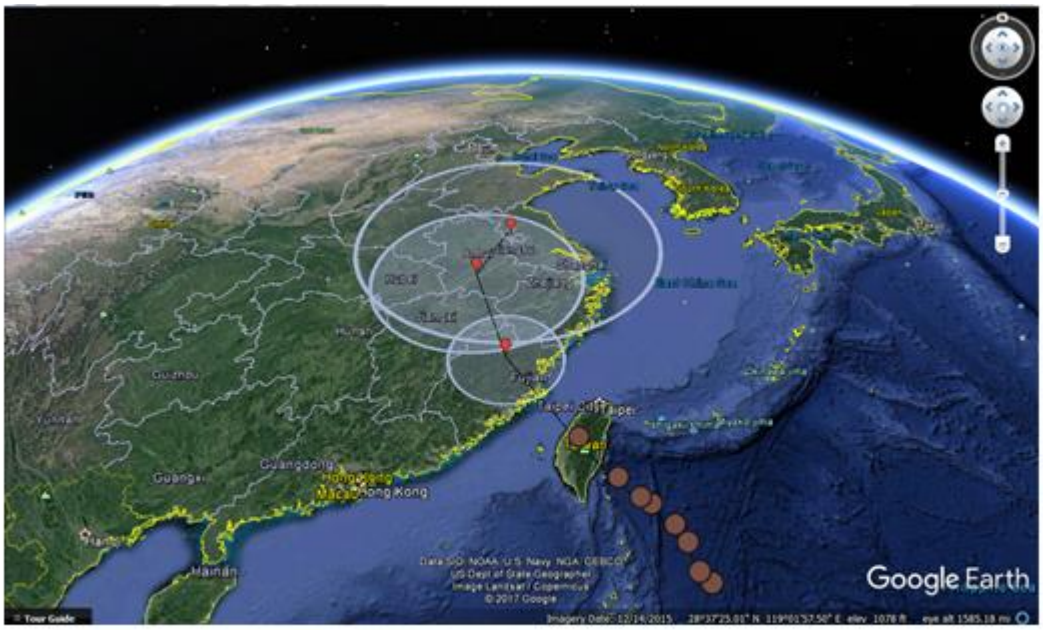
mm



Cyclone forecasting

Storm surge modeling

adpc



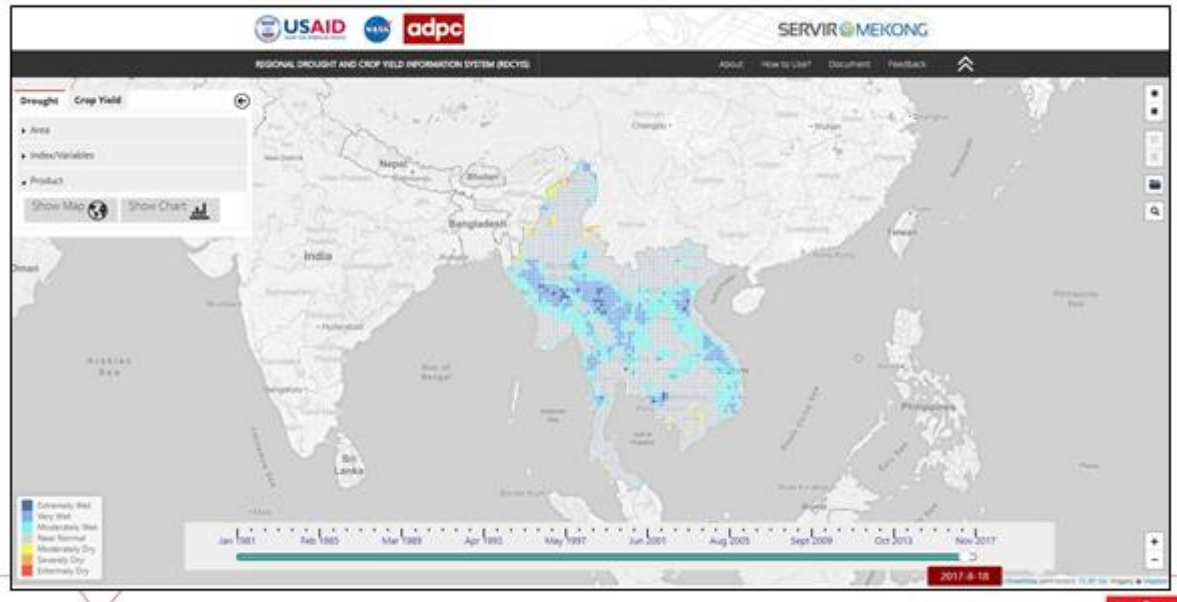
adpc

Digital Cyclone/Typhoon Tracking using Google Map
(data source: WRF simulation)

SERVIR-Mekong
(https://servir.adpc.net/)

Virtual Rain and Stream Gauge Data Service (VRSG)
(http://vrsg-servir.adpc.net/index.html)

Regional Drought and Crop Yield Information System (RDCYIS)
(release soon)

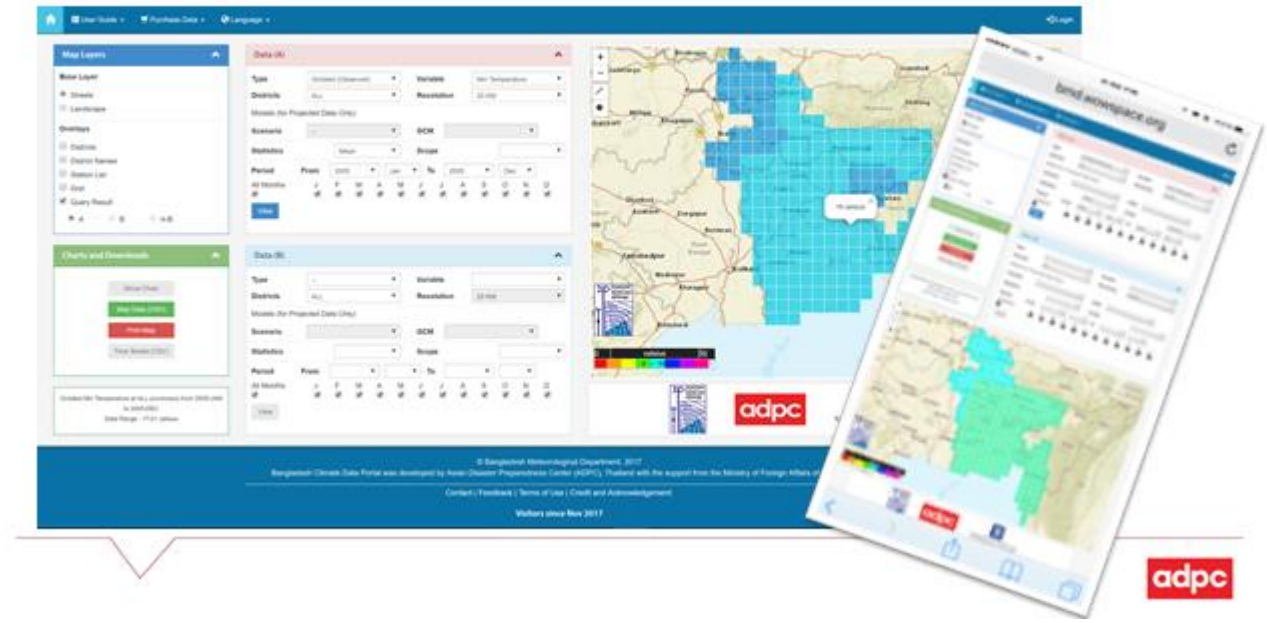


Dissemination and Communication

Dissemination & Communication (VHF Radio)

- Ministry of Disaster Management (MDM)
- Disaster Management Center (DMC) / Department of Meteorology (DOM)
- UNESCAP Trust Fund for Tsunami (TTF)
- Asian Disaster Preparedness Center (ADPC)

Bangladesh Climate Data Portal (Developed for Myanmar as well)
(http://bmd.wowspace.org/team/homex.php)



Rakhine State Disaster EW and Shelter Information Portal
(http://adpc.net/demo/shelter/v7/)

Further improvement of EWSs with Digital Technology

- **Risk Knowledge**
  - Online platforms (mobile / Desktop) to access risk maps / risk profiles, etc
- **Hazard monitoring and detection**
  - Mobile Apps for crowdsourcing to monitoring extent / severity of events
  - Online platforms for accessing ground observations
  - Visualization software (mobile / Desktop) for ground-based and space-based observations
- **Dissemination and communication**
  - Early Warning Apps for dissemination of alerts and warnings
  - Population Alerted Systems
  - Cell broadcasting
  - Virtual Private Network (VPN)
  - Satellite communications
  - Digital media
- **Response Capacity**
  - Online portals / mobile Apps on safer shelters and evacuation routes

adpc

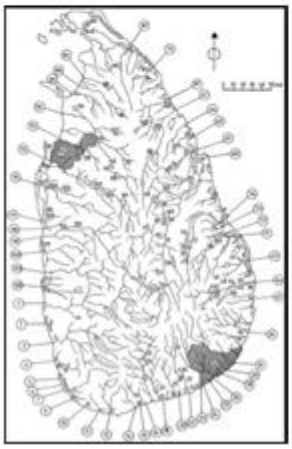

THANK YOU
FOR YOUR ATTENTION
adpc
http://www.adpc.net
http://www.drrprojects.net
Group: Asian Disaster Preparedness Center
@ADPCnet

GEOINFORMATICS FOR DISASTER RISK MANAGEMENT
Case Studies from Sri Lanka

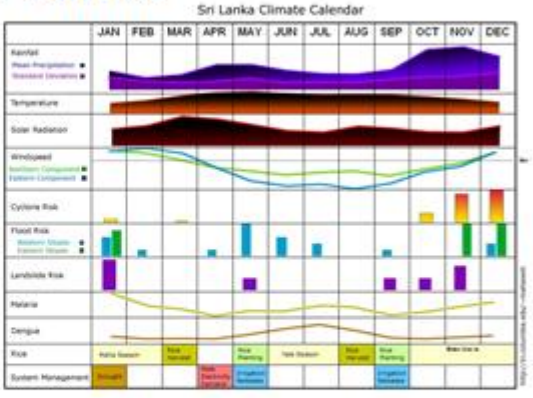
Srimal Samansiri
Assistant Director R&D
DISASTER MANAGEMENT CENTRE

CONTENTS

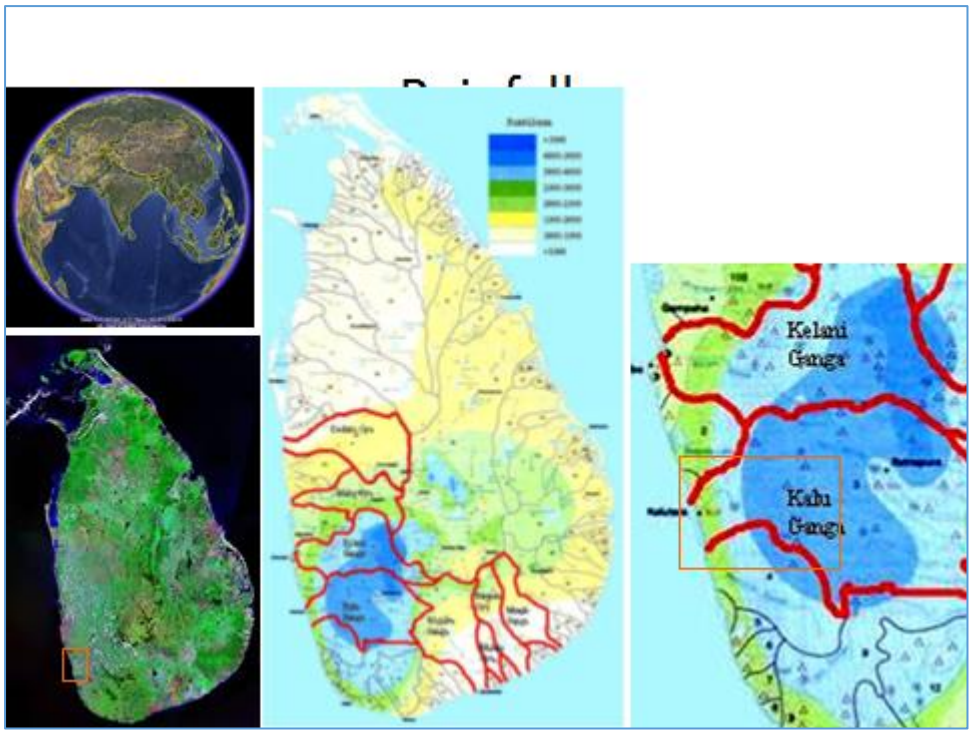
Population – 21 Million
Area – 65,000 sqkm
103 rivers
2 Monsoons
2 Inter Monsoons

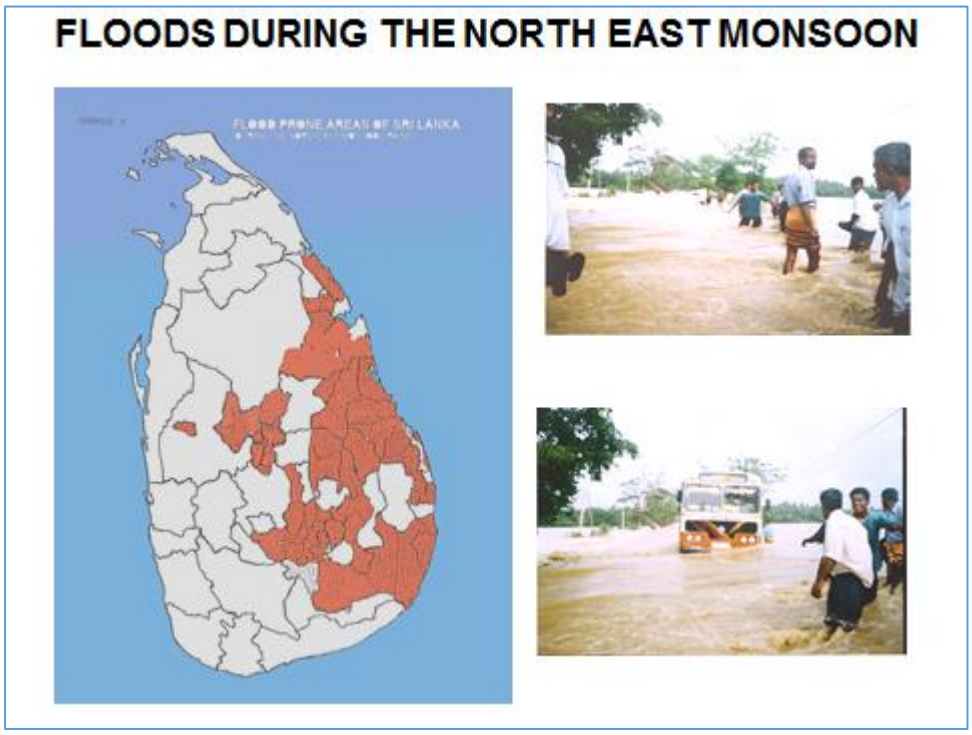


Sri Lanka



Source: Dr. Lareef, Columbia University


Kelani
Ganga
Kalu
Ganga


FLOODS DURING THE NORTH EAST MONSOON

FLOODS DURING THE SOUTH WEST MONSOON

LANDSLIDES

Legal and Institutional Setting

Disaster Management Act No 13 of 2005 establishes National Council for Disaster Management

Disaster Management Centre establishes to implement the directives given by NCDM

Disaster Management Centre

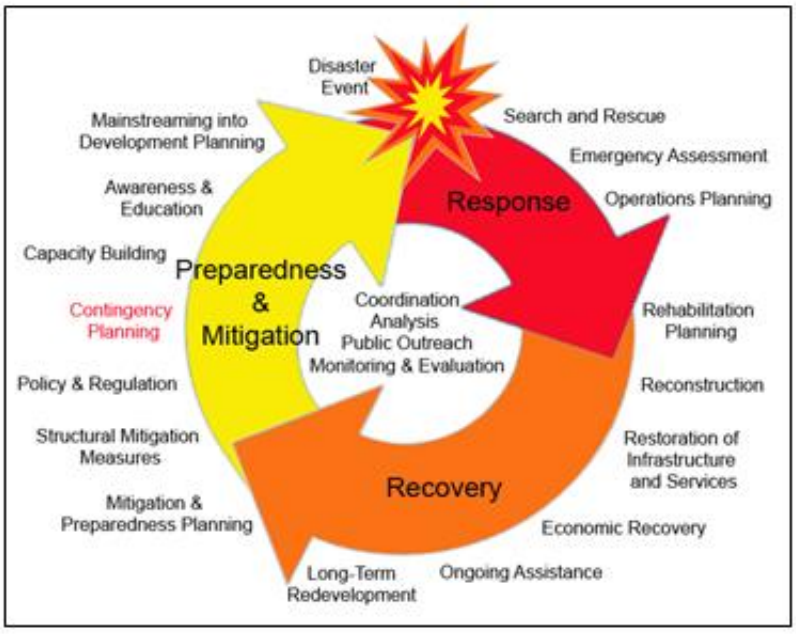
OVERVIEW – Disaster Management in Sri Lanka

- Disaster Management Act No. 13 of 2005 – Establishes National Council for Disaster Management
- Composition – Chair – HE the President, Vice Chair - Pri-Minister, Leader of Opposition, 20 Ministers of selected subjects, 09 Chief Ministers, 05 Members of Opposition

Functions

- ✓ to formulate a national policy and program on the management of disasters
- ✓ to prepare and formulate the National Disaster Management Plan and the National Emergency Operation Plan based on the national policy
- ✓ to monitor the implementation of the National Disaster Management Plan and the National Emergency Operation Plan
- ✓ to facilitate emergency response, recovery, relief, rehabilitation and reconstruction in the event of any disaster
- ✓ to direct, co-ordinate and monitor the activities of the Disaster Management Centre

- In 2005 – Establishment of Disaster Management Centre and Ministry of Disaster Management
- 2006 – 2016 Disaster Management Road Map in parallel to the Hugo Framework for the Action
- 2010 – Disaster Management Policy
- 2014 – 2018 – Sri Lanka Comprehensive Disaster Management Program (SL-CDMP)
- 2015 – 2030 – Sendai Framework for Disaster Risk Reduction



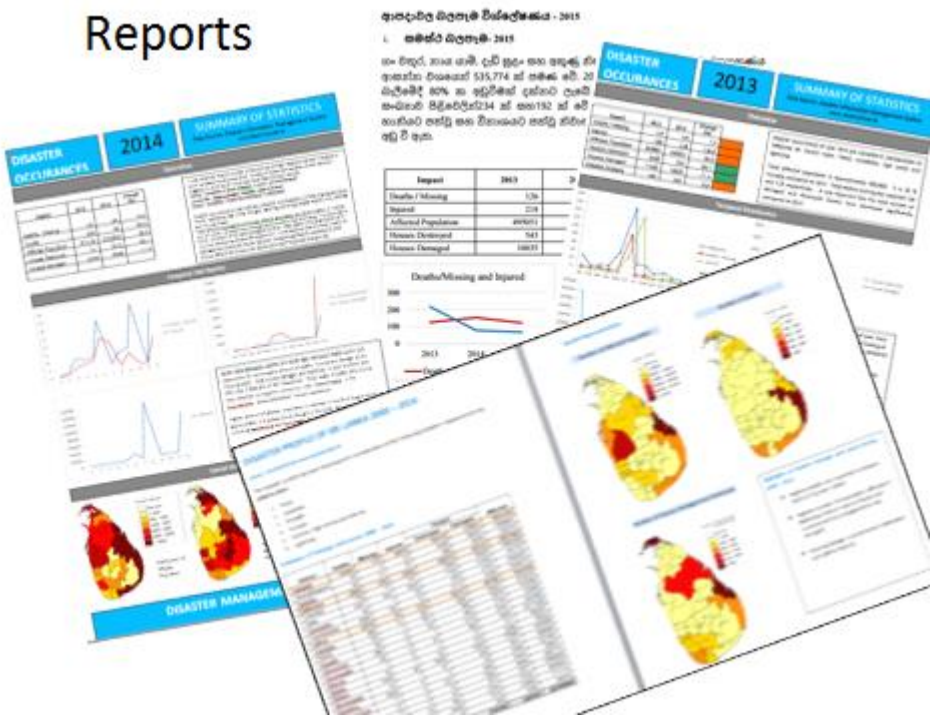
Past Disaster Occurrences Database Sri Lanka

2

www.desinventar.lk

Data Sources

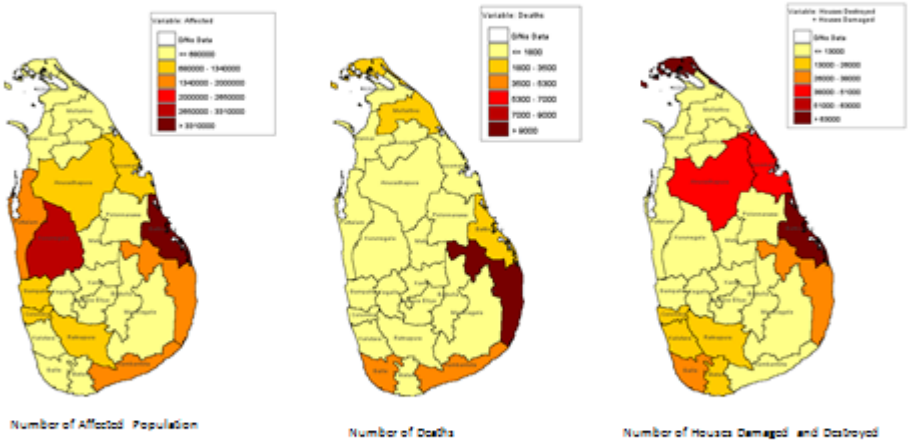
- Daily Situation Reports (EOC published Situation Reports)
- News Papers and other media reports
- Stakeholder organizations (Wildlife, Forest, Central Environment Authority etc)



Summary of Damage and Losses 2000 - 2014

District	Deaths	Missing	Injured	Houses		Affected
				Destroyed	Damaged	
Ampara	10455	113	4979	16210	21601	1601439
Anuradhapura	30	0	23	4046	35253	1095647
Badulla	53	31	57	496	6039	230747
Batticaloa	2550	916	2262	36970	35143	2257952
Colombo	116	11	141	2394	15025	1063029
Galle	4207	643	2525	7153	21025	451727
Gampaha	45	1	55	676	5103	1002937
Hambantota	4566	102	12	2113	3436	1549273
Jaffna	2675	14	512	16317	49756	644345
Kalutara	366	74	257	5087	15623	676335
Kandy	63	1	151	692	5510	143254
Kegalle	39	2	62	453	2154	22905
Kilinochchi	566	0	1	1210	5161	343460
Kurunegala	25	0	24	663	2920	3271526
Mannar	1	0	4	27	411	160257
Matale	15	7	25	470	2365	76523
Matara	1449	45	1945	7253	17599	420009
Moneragala	43	1	57	249	3541	355595
Mullaitivu	3005	0	5	29	4385	227061
Nuwara Eliya	71	4	231	646	5440	55647
Polonnaruwa	27	0	72	1353	9949	455774
Puttalam	31	3	44	913	3477	1355929
Ratnapura	295	34	164	2344	11522	500920
Trincomalee	1054	35	6409	7515	33955	711114
Vavuniya	5	0	15	559	1256	94516
TOTAL	32261	2044	21075	119148	329195	20769584

Distribution of Damage & Losses



Highlights of Disaster Damage and Losses During 2000 - 2014

- Highest deaths are reported in Ampara District (Tsunami 2004)
- Highest number of population affected in Batticaloa District (due to floods and cyclone) and Kurunegala Dirict (by Drought)
- Housing damge is prominent in Batticaloa and Jaffna Districts

3

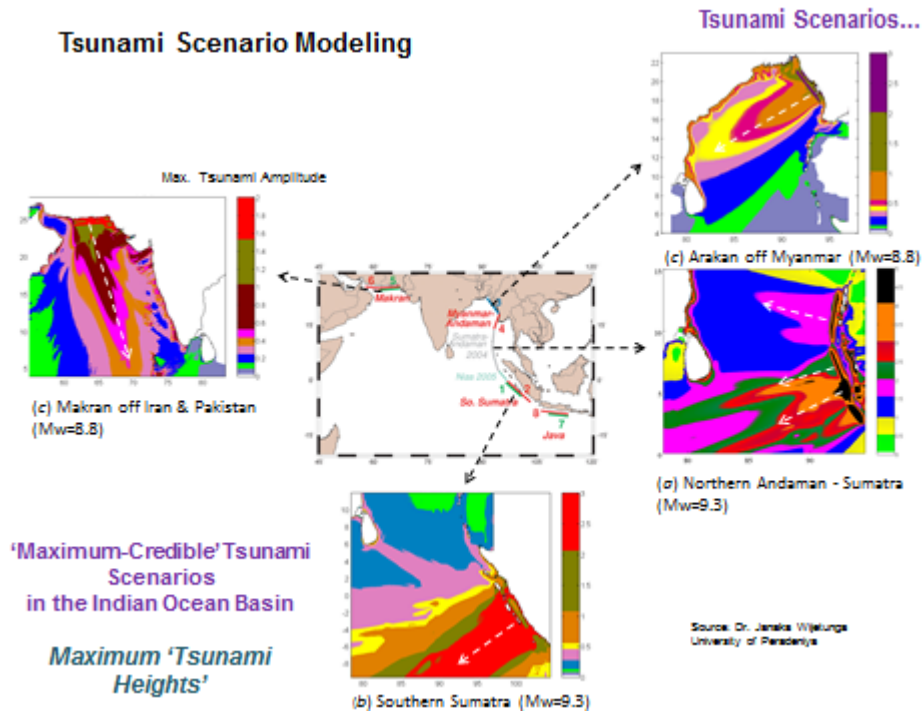
HAZARD PROFILES DEVELOPMENT FOR SRI LANKA

2008 - 2012

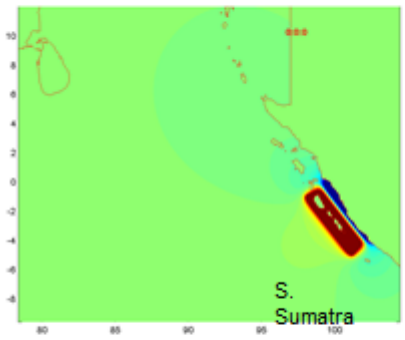
Floods	Department of Irrigation
Landslides	NBRO
Drought	Department of Agriculture
Cyclone	Department of Meteorology
Lightning	
Tsunami	Coast Conservation Department
Sea Level Rise	
Storm Surge	
Coastal Erosion	

Launched on 26th December 2012

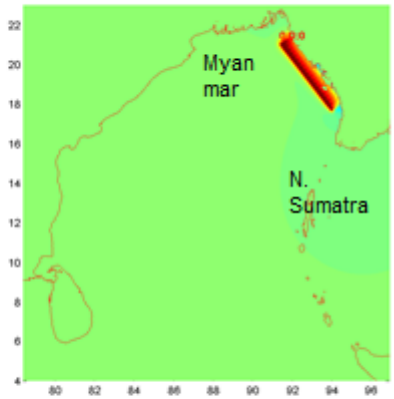
www.dmc.gov.lk



Tsunami due to an Earthquake of Mw = 9.3 in Southern Sumatra Seismic Zone

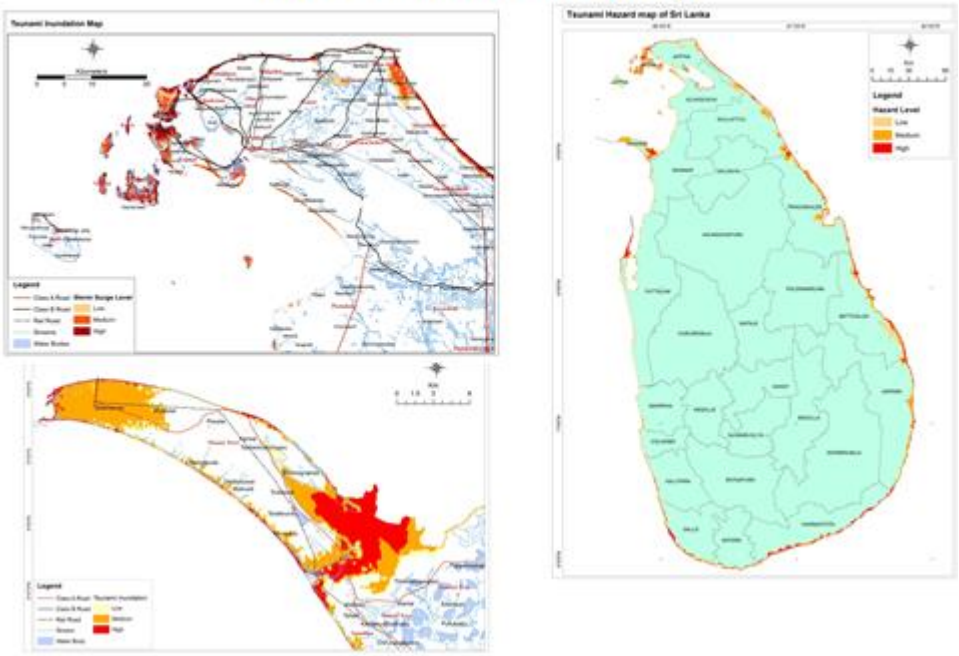


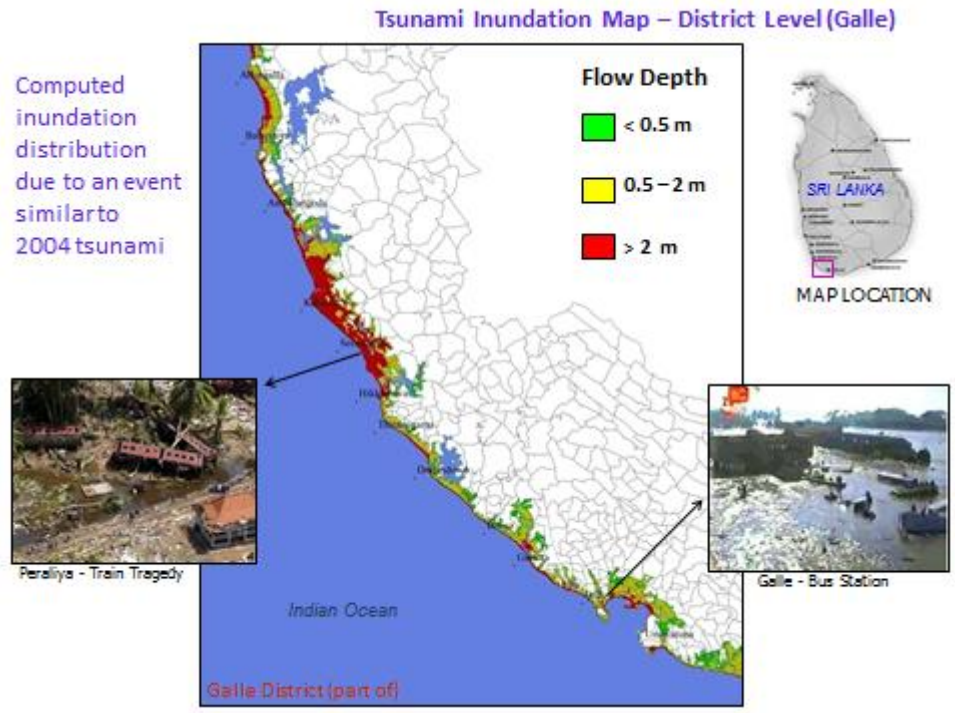
Tsunami due to an Earthquake of Mw = 8.8 in Arakan Seismic Zone off Myanmar



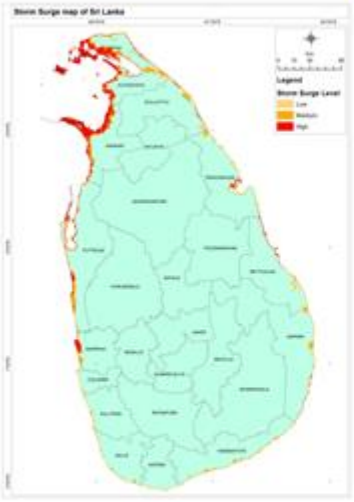
Source: Dr. Janaka Wijetunga University of Peradeniya

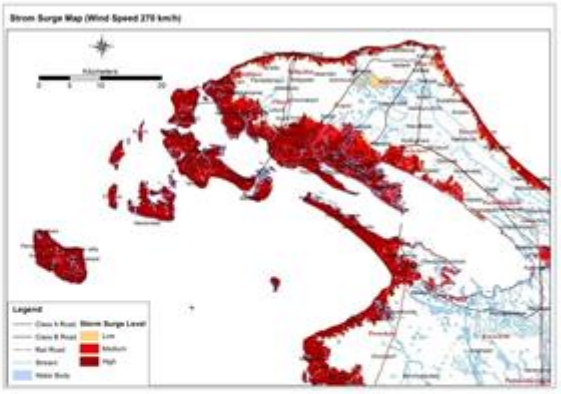
Tsunami Hazard Map

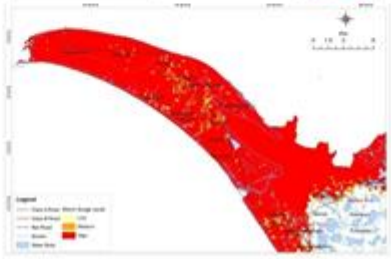




Storm Surge

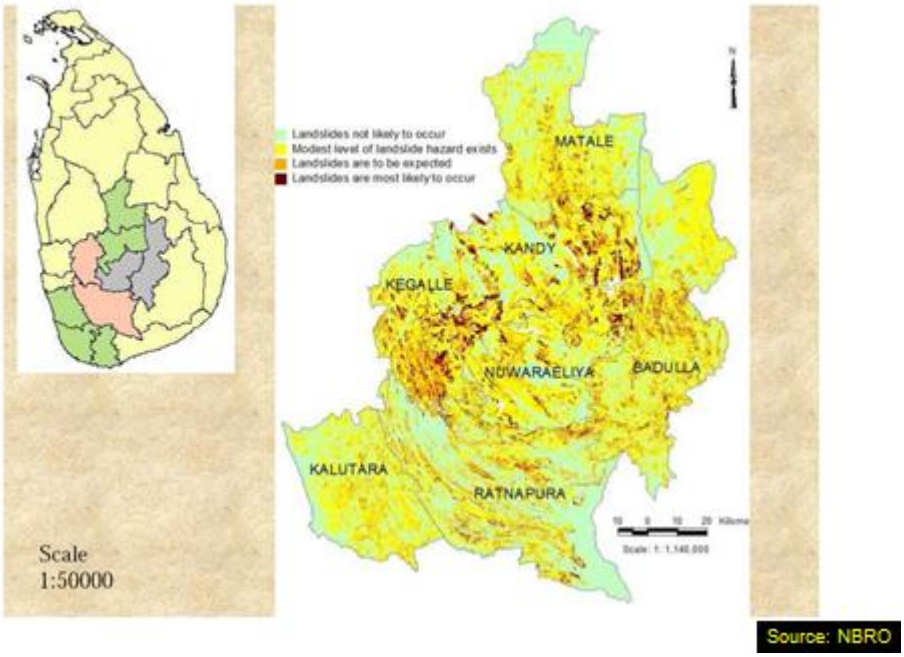






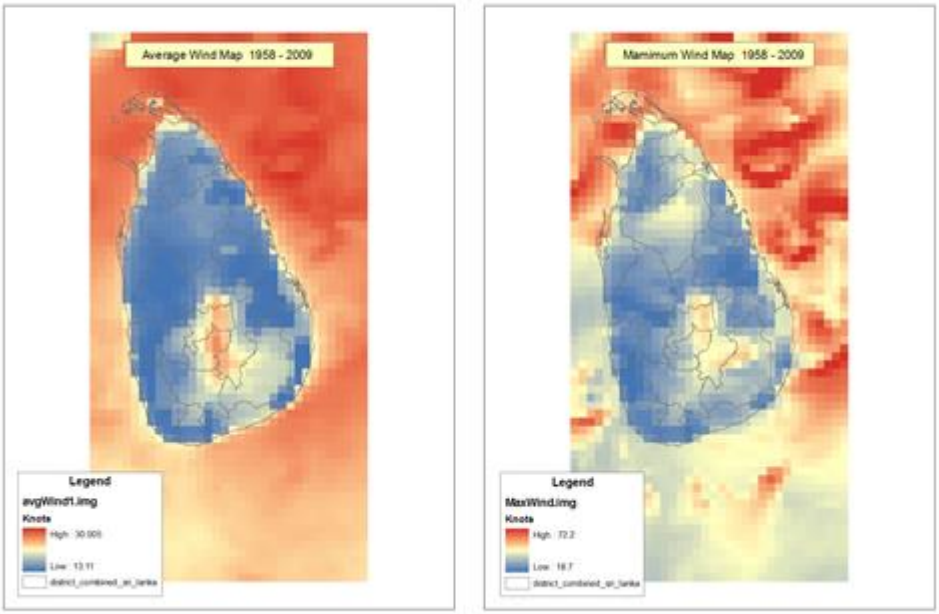
Coastal Erosion / Sea Level Rise

Landslide Hazard Mapping

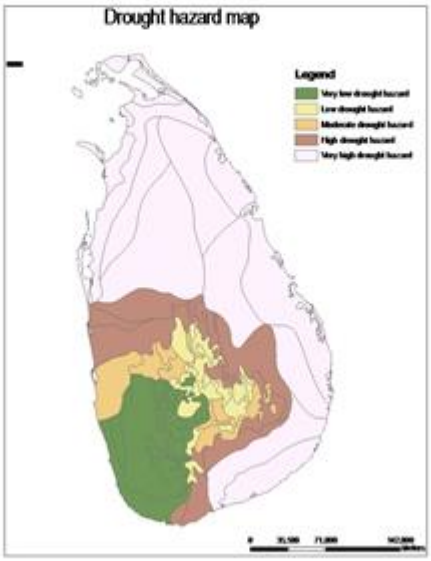


Source: NBRO

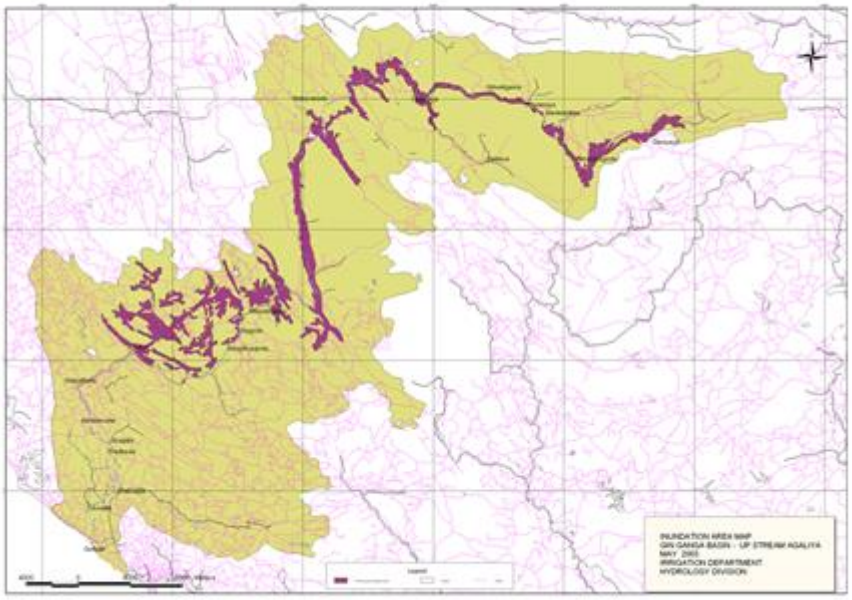
Cyclone & High Wind Hazard

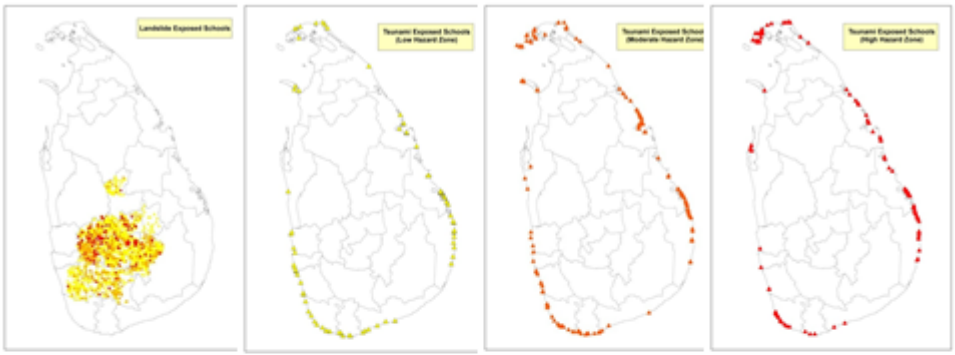


Drought Map



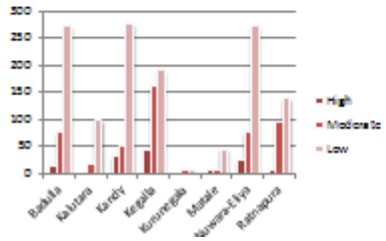
Flood Inundation Map - Gin Ganga



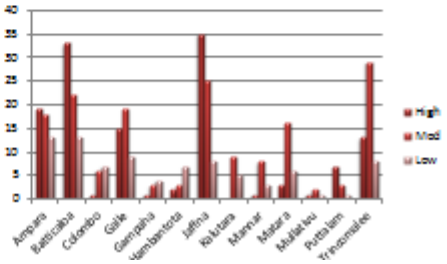


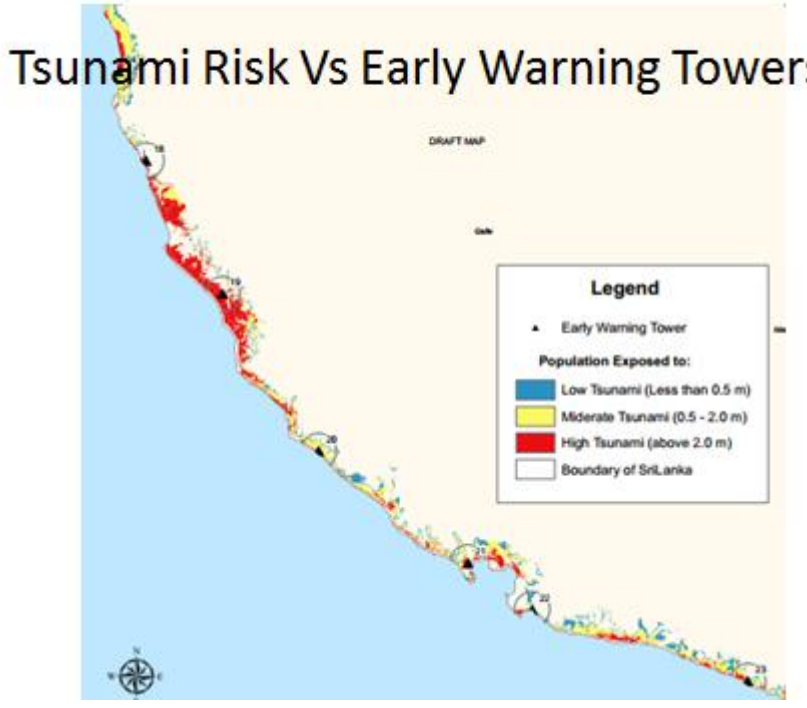
SECTOR LEVEL EXPOSURE MAPPING - Schools

District Profile of Tsunami Exposed Schools



District Profile of Tsunami Exposed Schools





PHASE II
Development of Multi-Hazard Risk Profile for Sri Lanka 2016 - 19

Scope of Work

Risk Map Development for

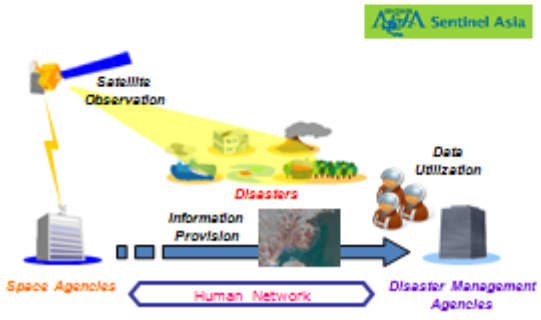
- Riverine Floods - **7 River basins**
- Urban Floods - **23 Urban Cities**
- Tsunami - **(Northern Coast)**
- Storm Surge - **(Entire Coast)**
- Drought – **(Entire Country)**
- Strong Winds / Cyclone – **(Entire Country)**

- **Value – 1.5 US$ Million**
- **Duration 2016 – 2019 : 48 Months**

07 River Basins

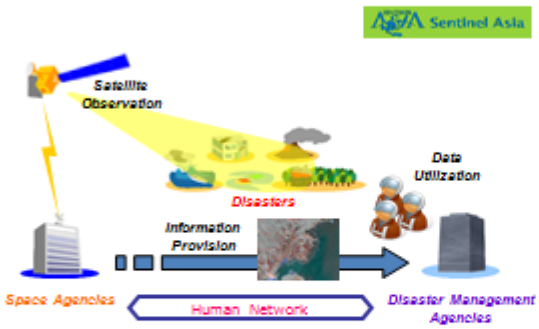
- Mundeni Aru Basin (1475 sqkm)
- Kirindi (1230 sqkm)
- Mi Oya (1113 sqkm)
- Yan Oya Basin (1782 sqkm)
- Walawe Ganga Basin (2596 sqkm)
- Kalu Ganga (2976 sqkm)
- Bolgoda Oya (366 sqkm)

4 Earth Observation in Disaster Monitoring SENTINEL ASIA / INTERNATIONAL CHARTER



- Disaster Management Centre officially started SAS Operations since February 2009
- 08 emergency successful activations
- Became Data Analysis Node (DAN) in 2010
- WINDS receiver has been established in 2011

Sri Lanka with Sentinel Asia



Disaster Management Centre officially started SAS Operations since **February 2009**

08 emergency successful activations

Became Data Analysis Node (DAN) in 2010

WINDS receiver has been

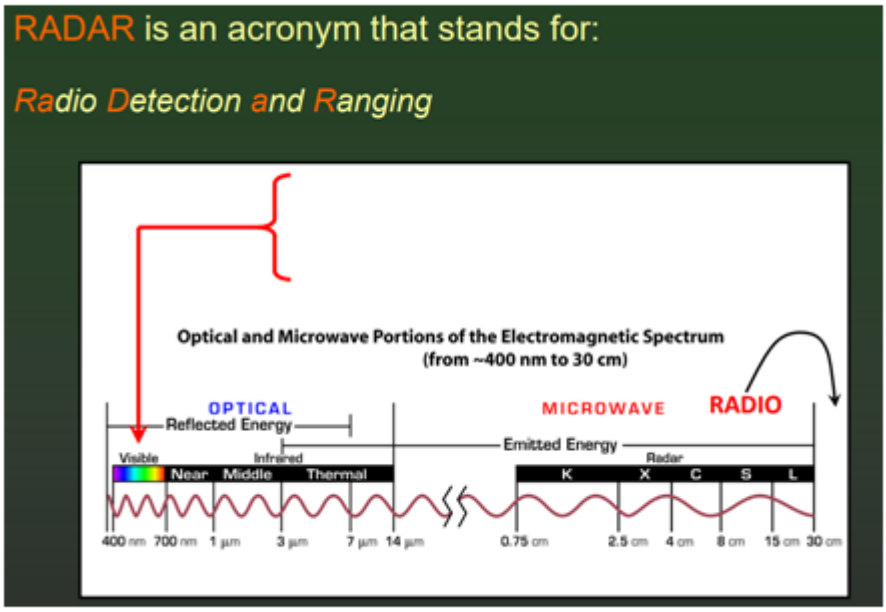
Summary of Earth Observation by Sentinel Asia / Intnl Charter

	Disaster Type	Activation Requested	Observation Conducted	Map Disseminated	Peak Time of Disaster	Data	Result
1	Floods	17th Dec 2009	18 Dec 2009	No map generated	16 Dec 2009	ALOS Prism	Un successful due to cloud
2	Floods	17 May 2010	19 May 2010	20 May 2010	18 May 2010	ALOS Palsar	Successful
3	Floods	08 Dec 2010	09 Dec 2010	10 Dec 2010	8-10 Dec 2010	ALOS Palsar	Successful
4	Floods	11 Jan 2011	13 Jan 2011	14 Jan 2011	10-12 Jan 2011	ALOS Palsar	Successful
5	Floods	04 Feb 2011	06 Feb 2011	07 Feb 2011	03-05 Feb 2011	ALOS Palsar	Successful
6	Landslide	01 Nov 2014	02 Nov 2014	Not generated	30 Oct 2014	ALOS 2	Observation was Successful Results was not Successful
7	Floods	29 Sep 2015	01 Oct 2015	02 Oct 2015	30 Sep 2016	ALOS 2	Successful
8	Floods Landslide	1st observation 14 May 2016	16 May 2016	18 May 2016	30 Oct 2014	ALOS 2	Successful
9	Floods Landslide	1st observation 26 May 2017	28 May 2017	29 May 2017	26 May 2017	TerraSARx / Intnl Charter	Successful

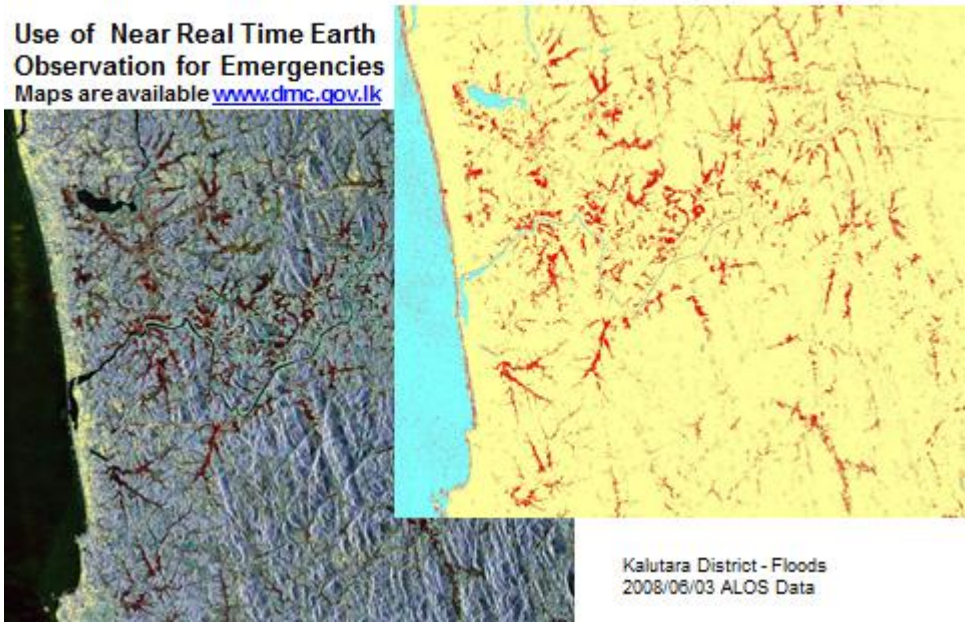
Efficiency of Satellite Activation (Case – May 2010)

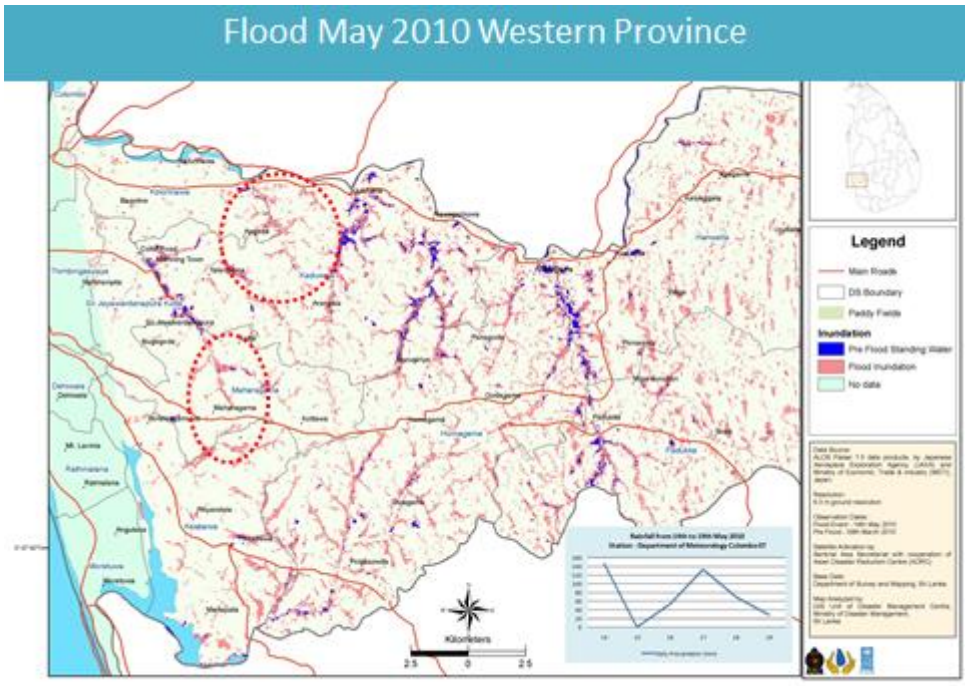
Date	Time	Action
2010.05.17	-	Third consecutive day received heavy rain to Western province.
2010.05.17	14.00	Consultation with Met. Department, Mr. UWL Chandradasa, Dr. Aranda Mallawatantri and Mr. RMS Bandara
2010.05.17	18.00	Request image activation via SMS to JAXA Satellite tracking Centre @Tsukuba
2010.05.18	8.30	Received satellite observation plan, to be utilize ALOS PALSAR
2010.05.19	17.30	Emergency observation over Western Province
2010.05.20	8.30	Received ALOS Palsar raw data from JAXA
2010.05.20	16.30	Produced draft inundation maps and uploaded to the web

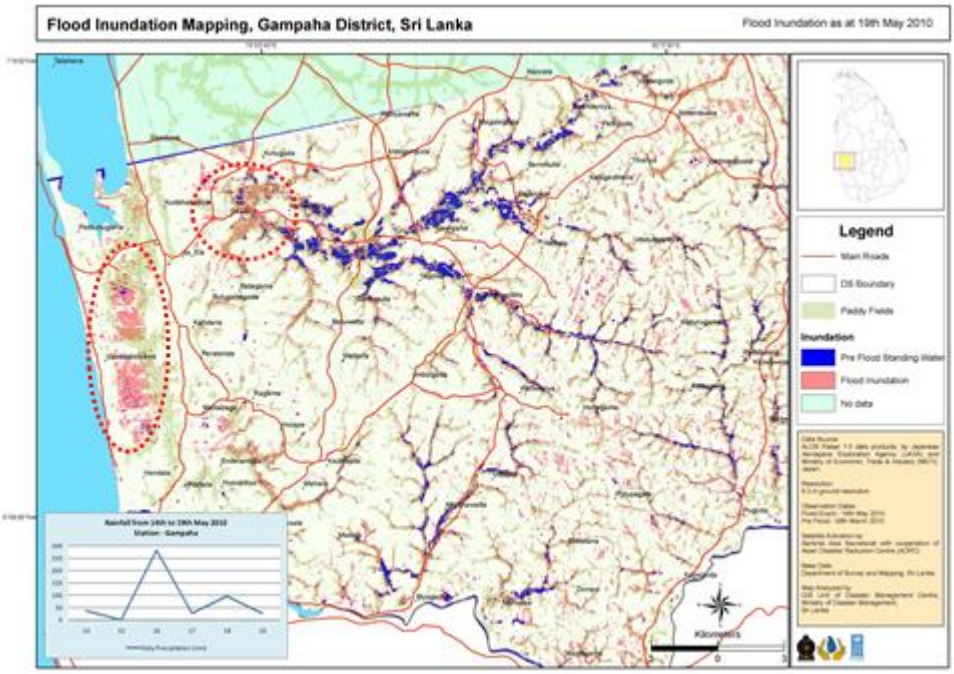
Observation can be made within 48 hours



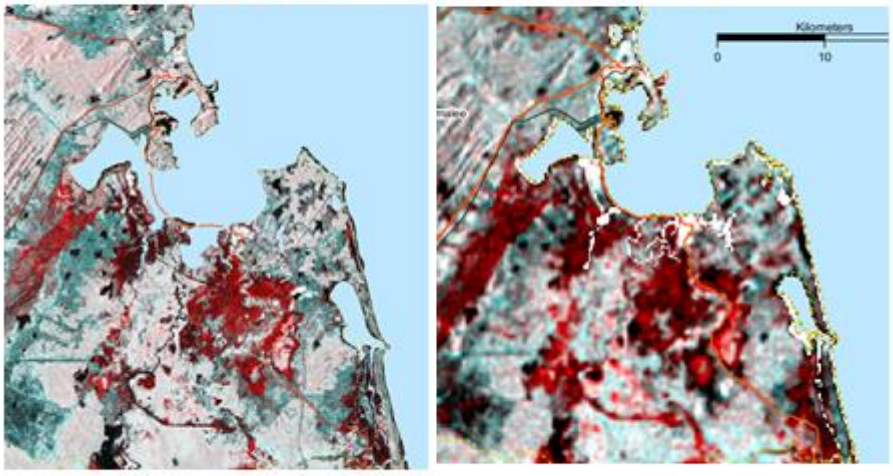
Emergency Earth Observation





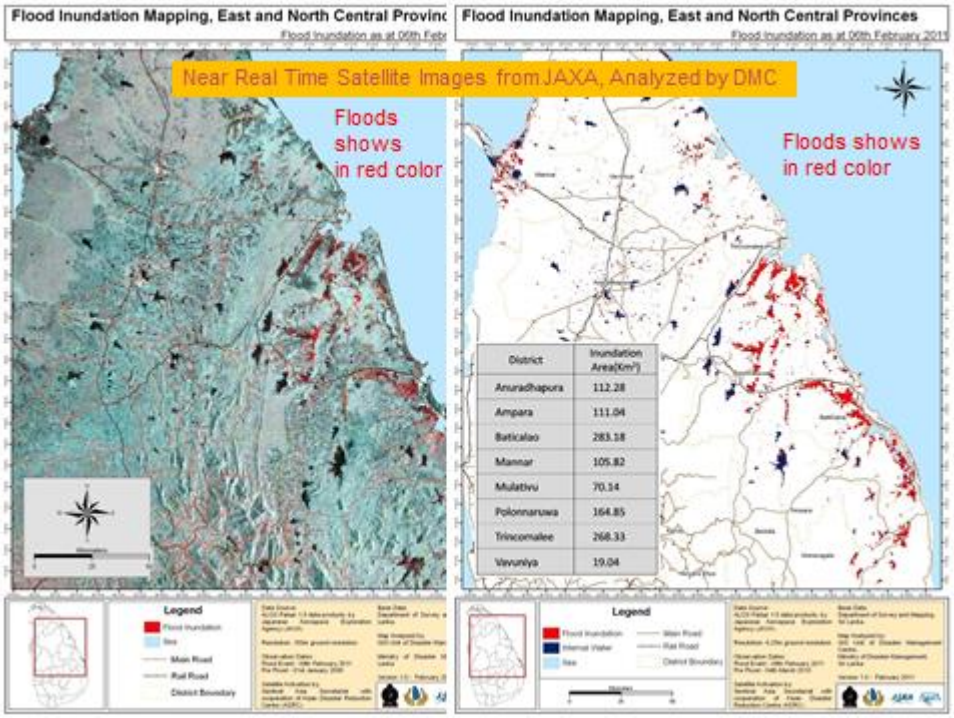


Flood January & February 2011
Eastern Province Sri Lanka

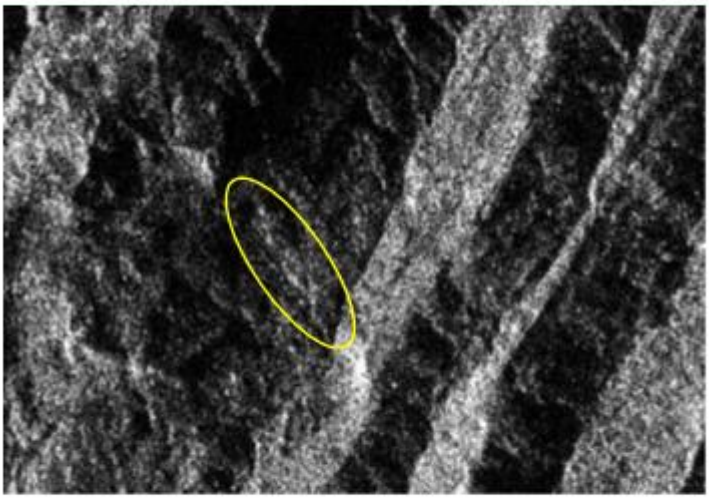


10.30 am 06th Feb. 2011 PALSAR 6m

11.45 pm 06th Feb. 2011 PALSAR 100m

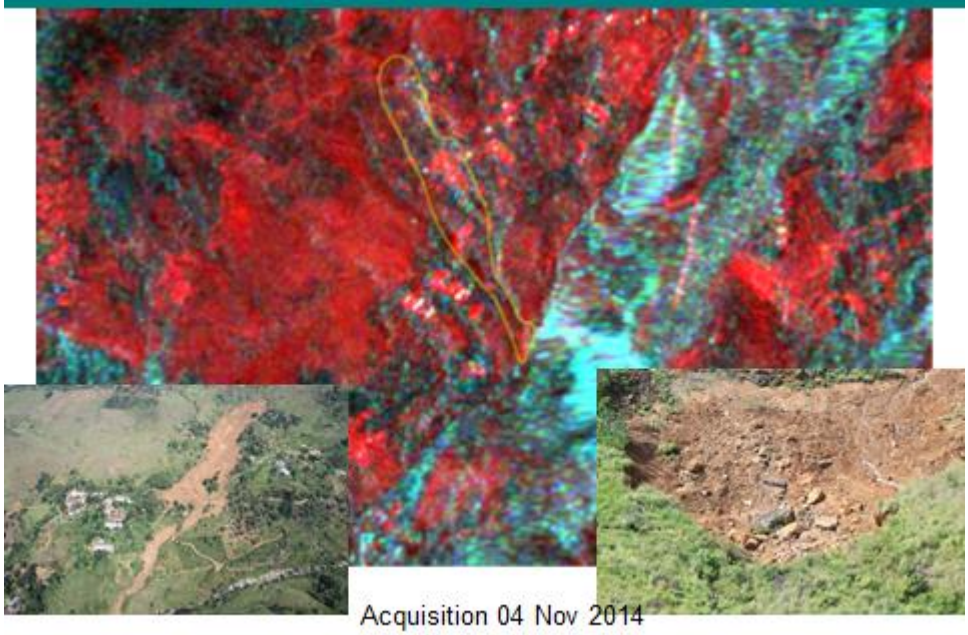


Meeriyabedda Landslide – Sentinel Asia (ALOS2)



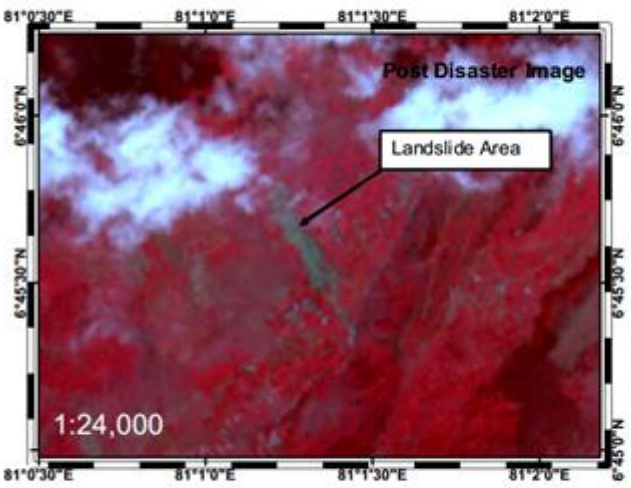
Acquisition 31 Oct 2014

Meeriyabedda Landslide – Intnl Charter (Terra SAR X)



Acquisition 04 Nov 2014

Meeriyabedda Landslide – International Charter (ASTER)



disaster images were acquired by ASTER satellite. Please note that the accuracy of the product is not guaranteed.

Pre Image: World View 2

Resolution: 2m

Acquisition Date: 08 -April-2012

Copyright: (C) COPYRIGHT 2012 DigitalGlobe

Post Image: ASTER

Resolution: 15m

Acquisition Date: 06-Nov-2014

Coordinate System: Geographic

Datum: WGS 1984

Unit: Degree

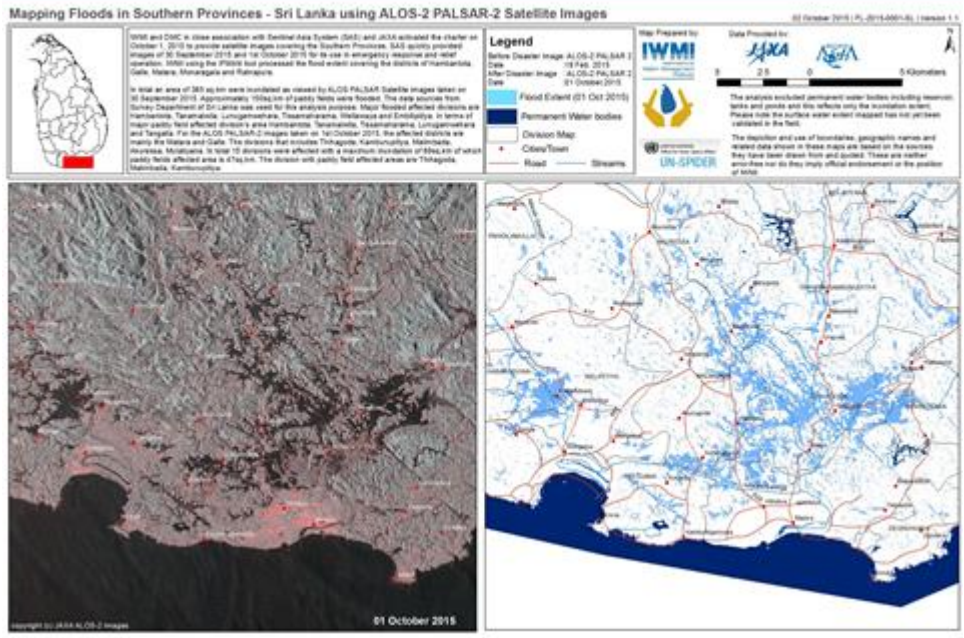
AIT ASIAN INSTITUTE OF TECHNOLOGY

DIGITALGLOBE

USGS science for a changing world

GIC Geoinformatics Center

Southern Province – September 30, 2015

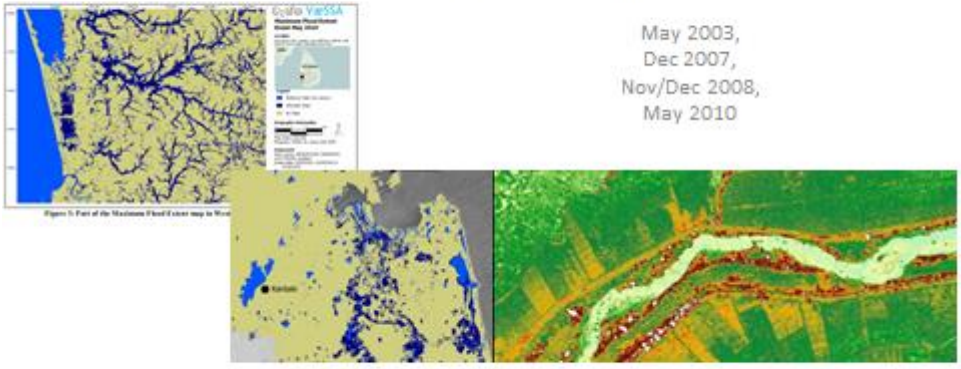


වැස්ස

VæSSA

Historical Flood Mapping

Map historical flood events by Satellites



May 2003,
Dec 2007,
Nov/Dec 2008,
May 2010

DMC esa European Space Agency CRiP THE WORLD BANK IBRD • IDA | WORLD BANK GROUP GFDRR

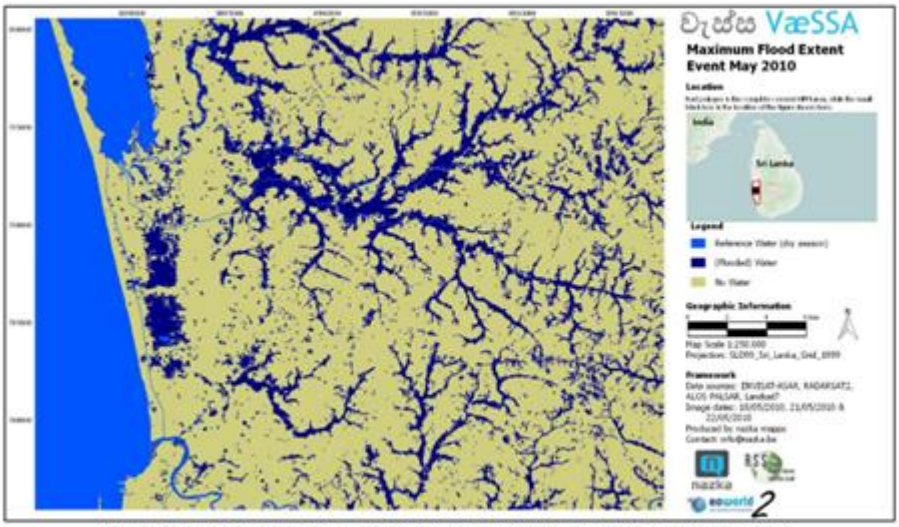
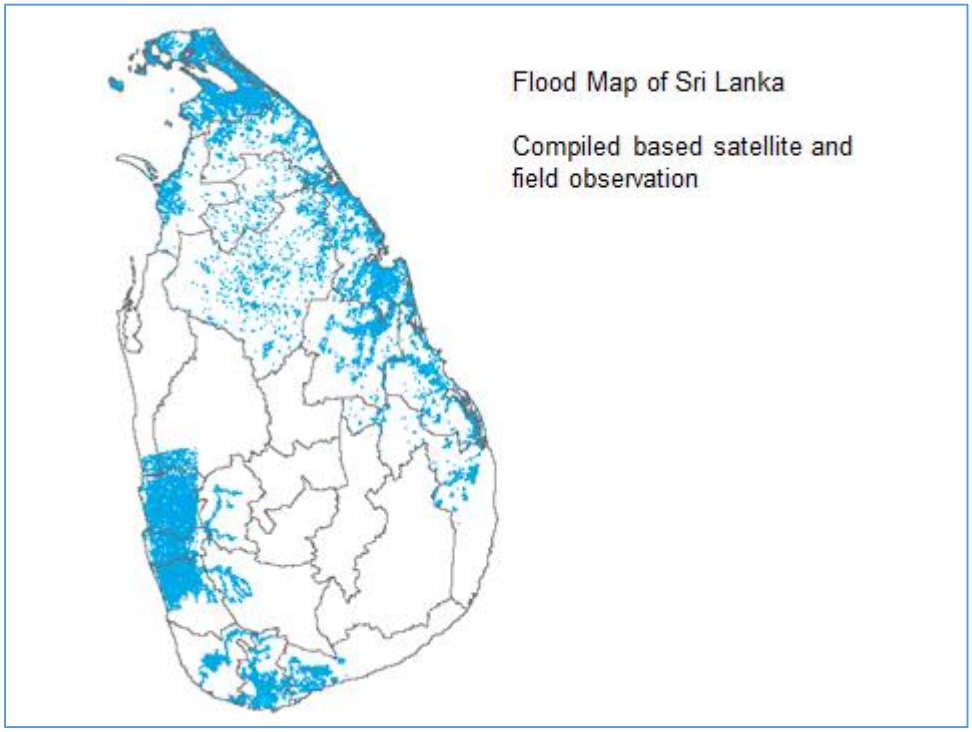


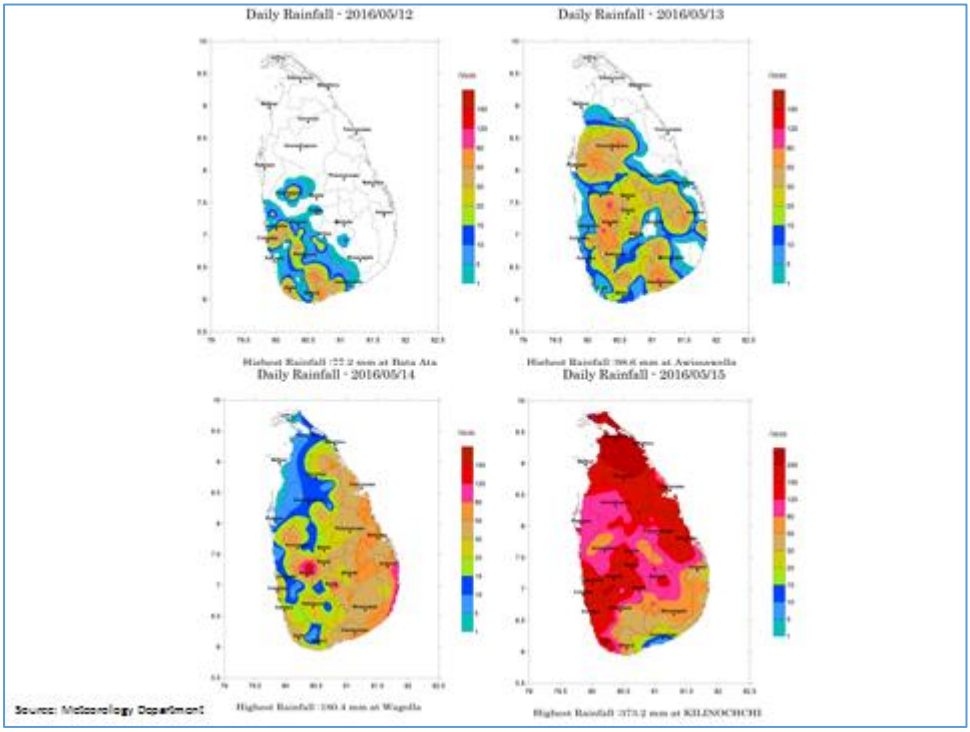
Figure 3: Part of the Maximum Flood Extent map in Western Sri Lanka in May 2010

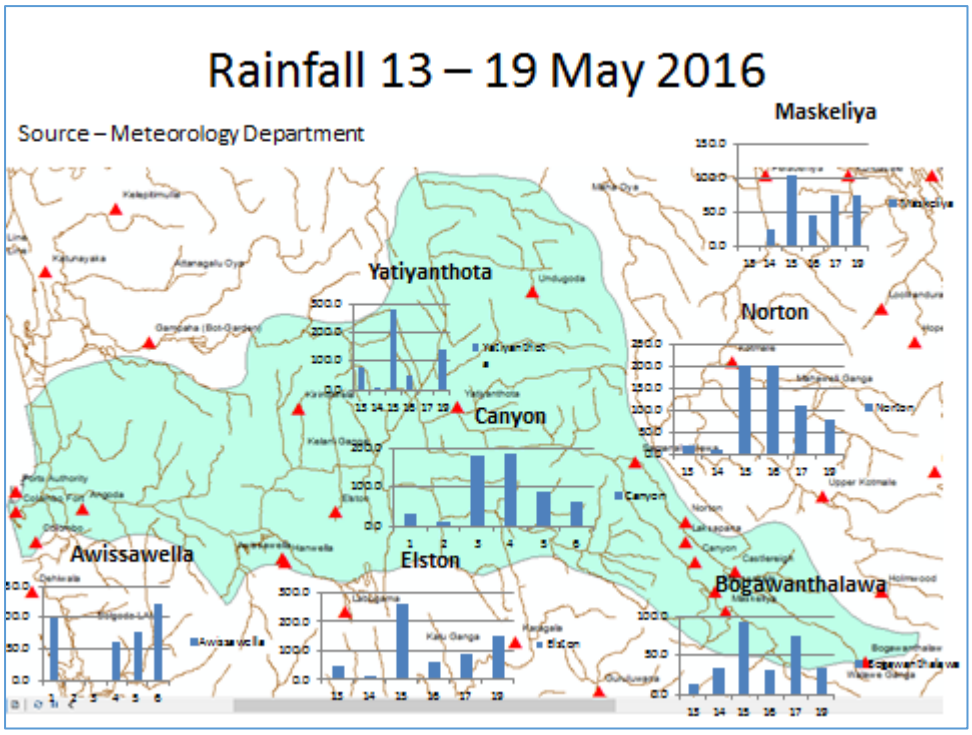


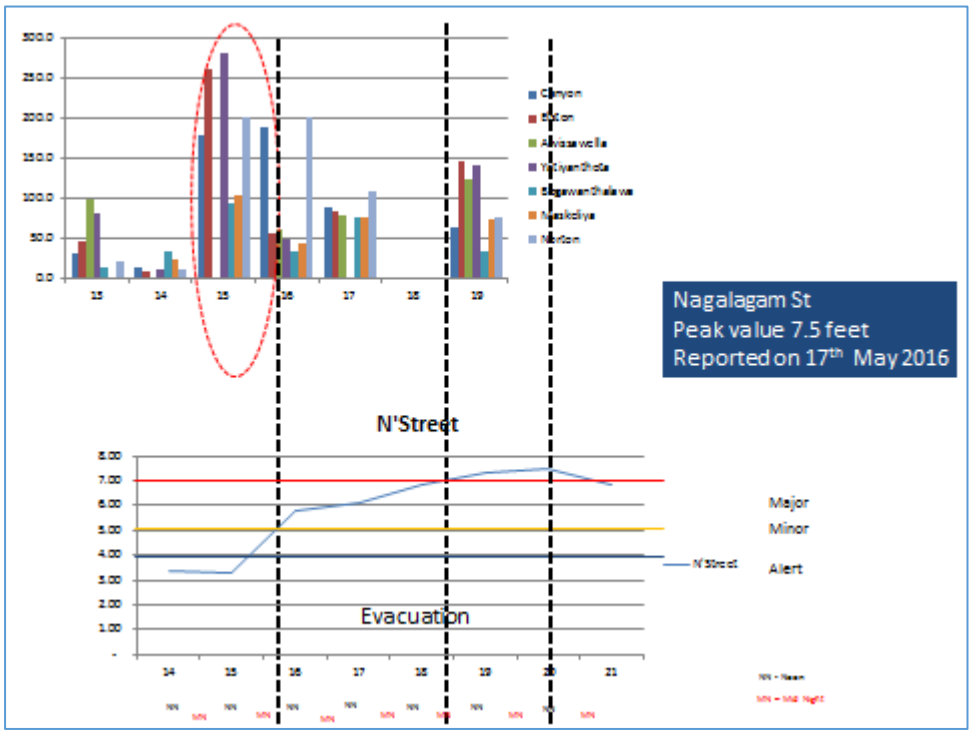
Experience from Flood and Landslide
May 2016

- ✓ Activated Sentinel Asia
- ✓ Activated International Disaster Charter
- ✓ Activated Humanitarian Openstreet Team (HOT)
- ✓ GFDRR provided post disaster images over Aranayake

- ✓ IWMI and OCHA Deployed at DMC
- ✓ Survey Department - Ground Mapping




Rainfall 13 – 19 May 2016
Source – Meteorology Department
Maskeliya
Yatiyanthota
Norton
Canyon
Awissawella
Elston
Bogawanthalawa


Canyon
Elston
Awissawella
Yatiyanthota
Bogawanthalawa
Maskeliya
Norton
Nagalagam St
Peak value 7.5 feet
Reported on 17th May 2016
N'Street
Major
Minor
Alert
Evacuation

Satellites Contributed Data

Radar Satellites

1. ALOS Palsar – Japan
2. RISAT – India
3. Radar Sat – Canada
4. Terra SAR X – Germany

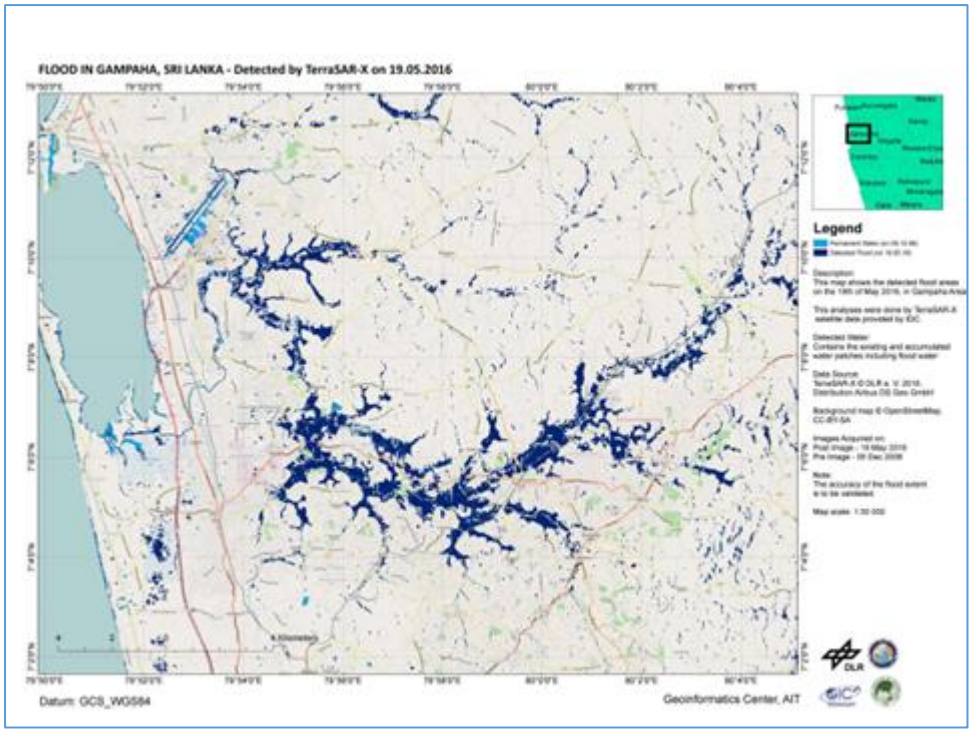
Optical Satellites

1. Plaides – France (0.5 m)

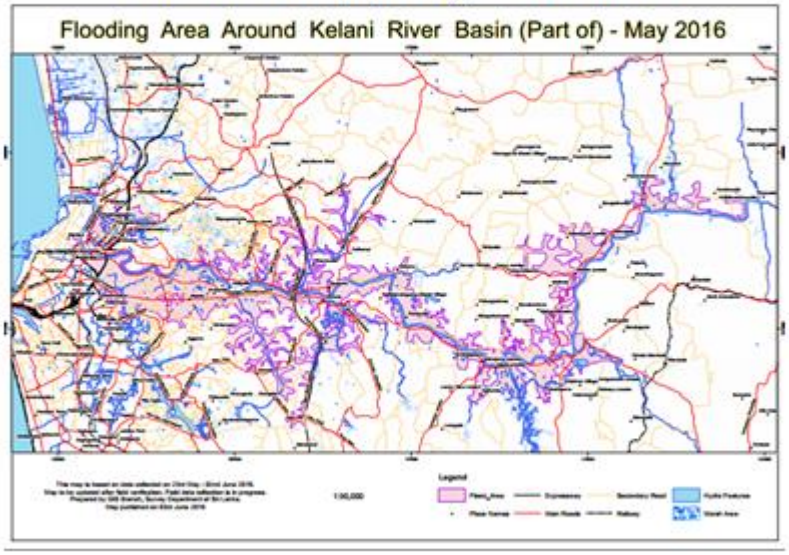
Aranayake – Landslide 16th May 2016

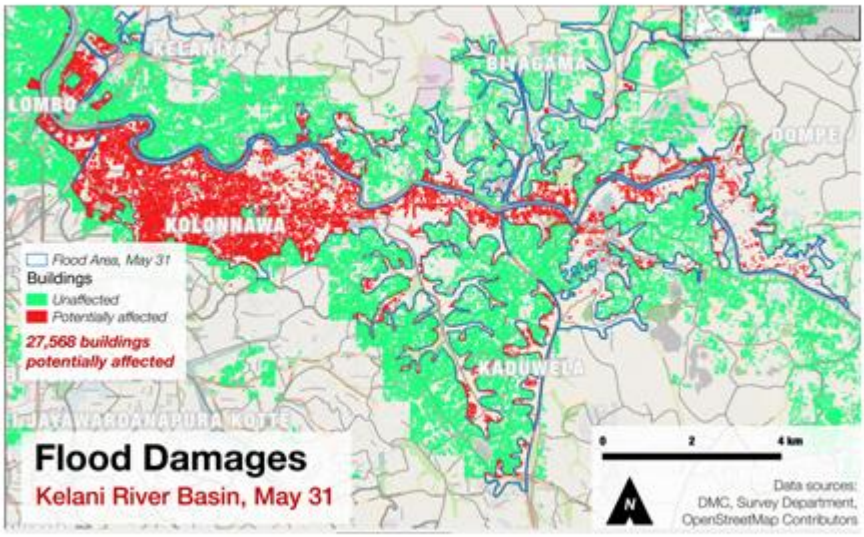
PRE IMAGE March 2016

POST IMAGE June 2016



Field Mapping - Kelani

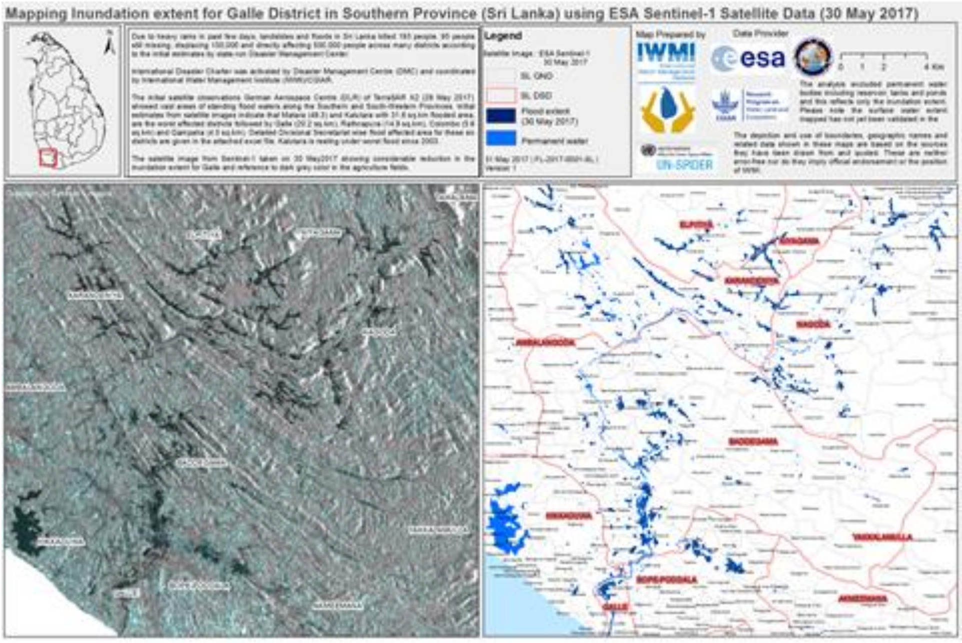


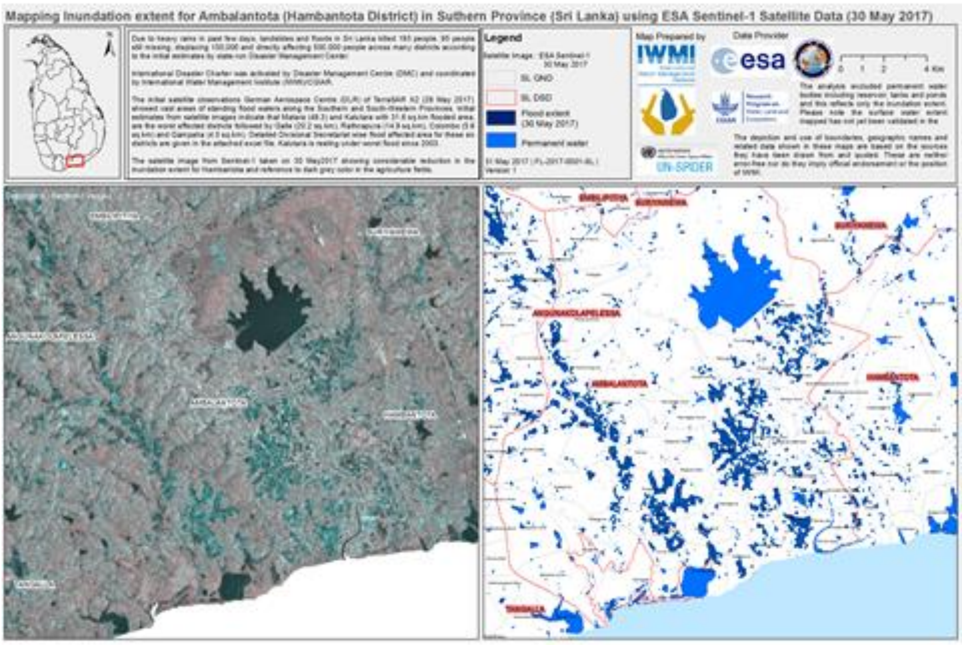


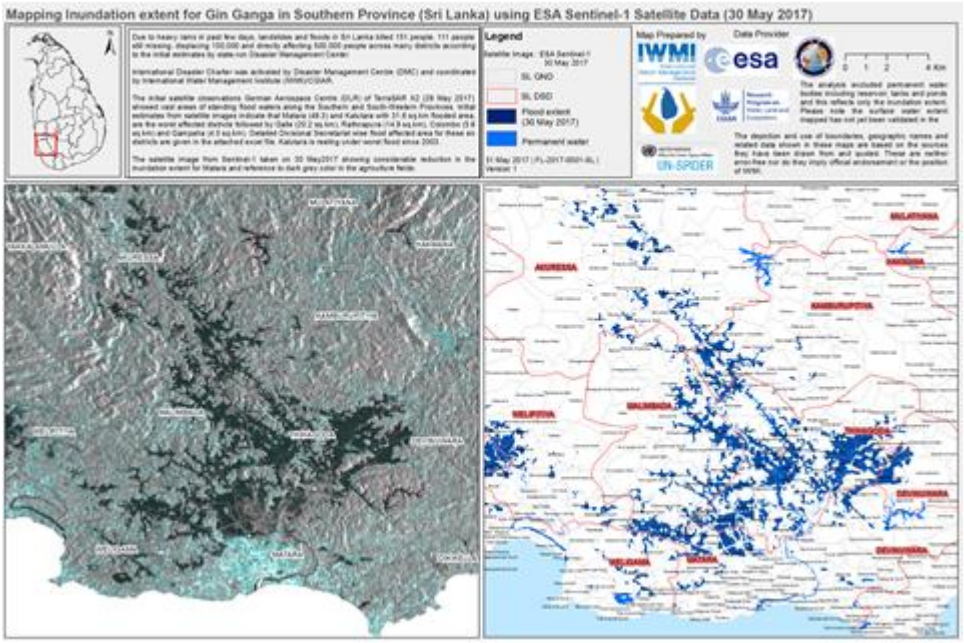
Flood and Landslide
May 2017

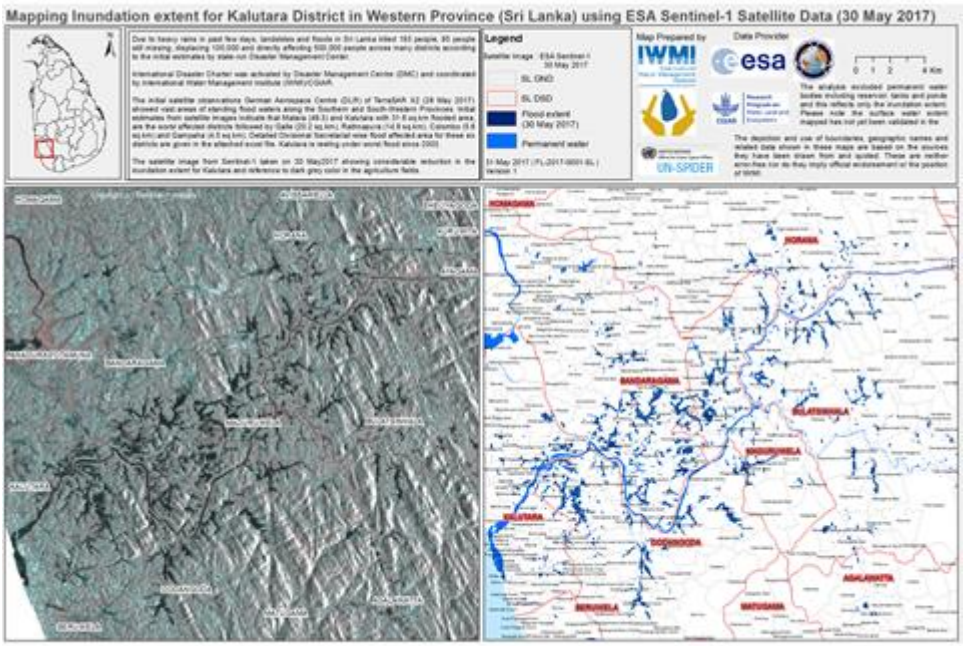
Satellite Activated

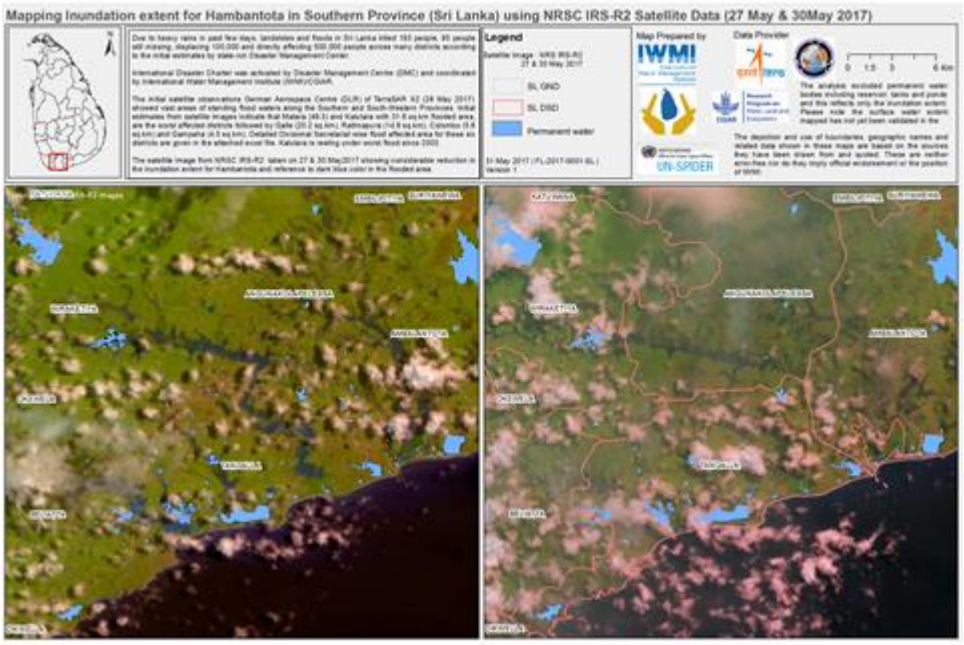
Satellite	Program	Observation Date
Resource Sat 2	Sentinel Asia	27 May 2017
TerraSARx (Radar)	International Charter	28 May 2017
Sentinel 2	International Charter	28 May 2017
THEOS	Sentinel Asia	28 May 2017
RadarSat2 (Radar)	International Charter	29 May 2017
TerraSARx (Radar)	International Charter	30 May 2017
ALOS Palsar (Radar)	Sentinel Asia	30 May 2017
Sentinel 1 (Radar)	International Charter	30 May 2017
Resource Sat 2	Sentinel Asia	30 May 2017
KOMPSAT5	Sentinel Asia	30 May 2017

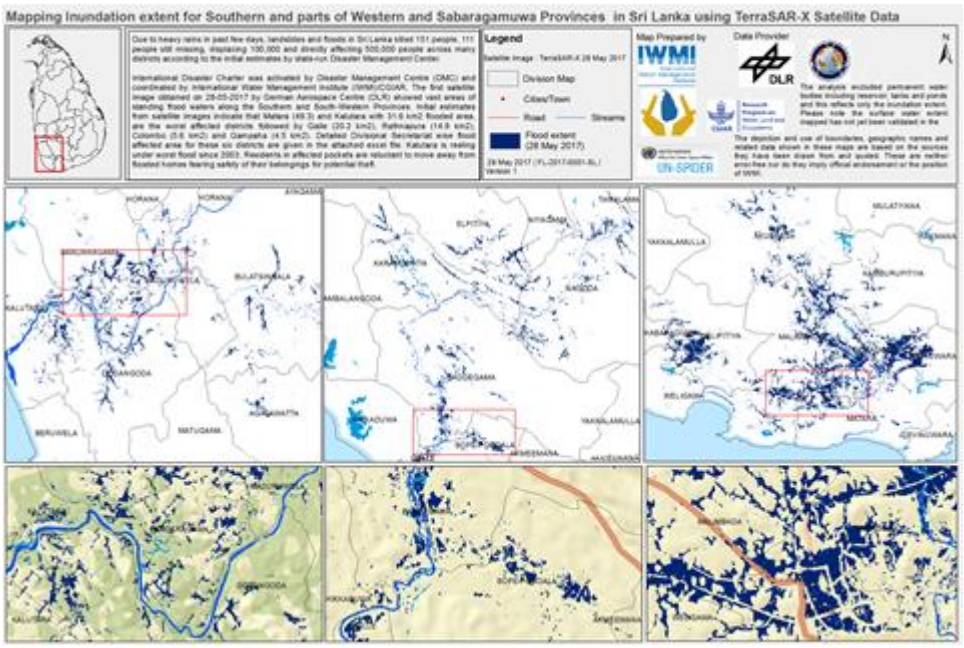

Mapping Inundation extent for Galle District in Southern Province (Sri Lanka) using ESA Sentinel-1 Satellite Data (30 May 2017)
Legend
Map Prepared by
Data Provider
IWMI
esa
UN-SPIDER

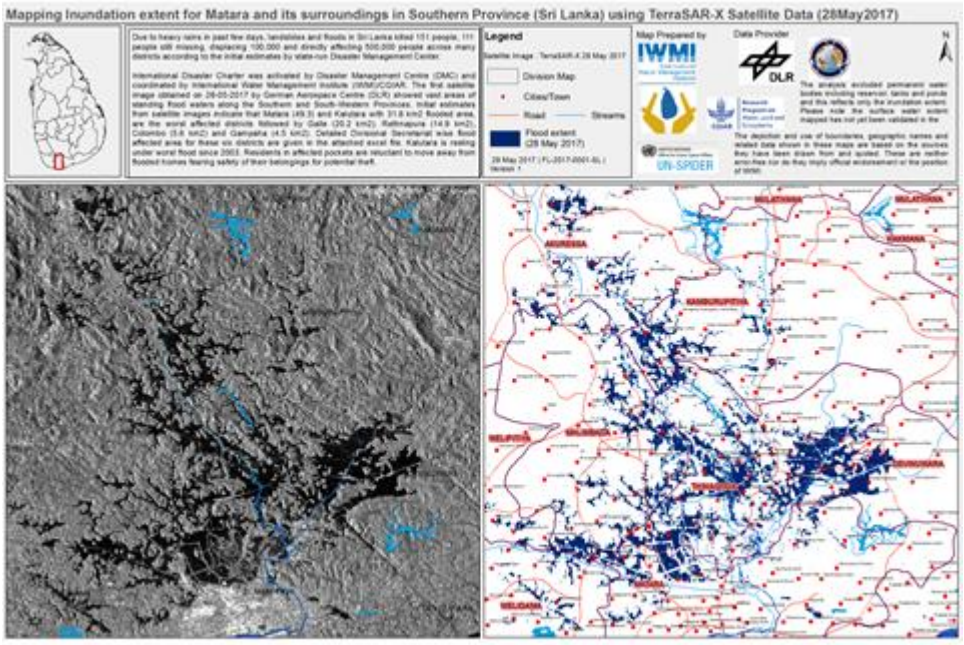

Mapping Inundation extent for Ambalantota (Hambantota District) in Suthern Province (Sri Lanka) using ESA Sentinel-1 Satellite Data (30 May 2017)
Legend
Map Prepared by
Data Provider
IWMI
esa
UN-SPIDER

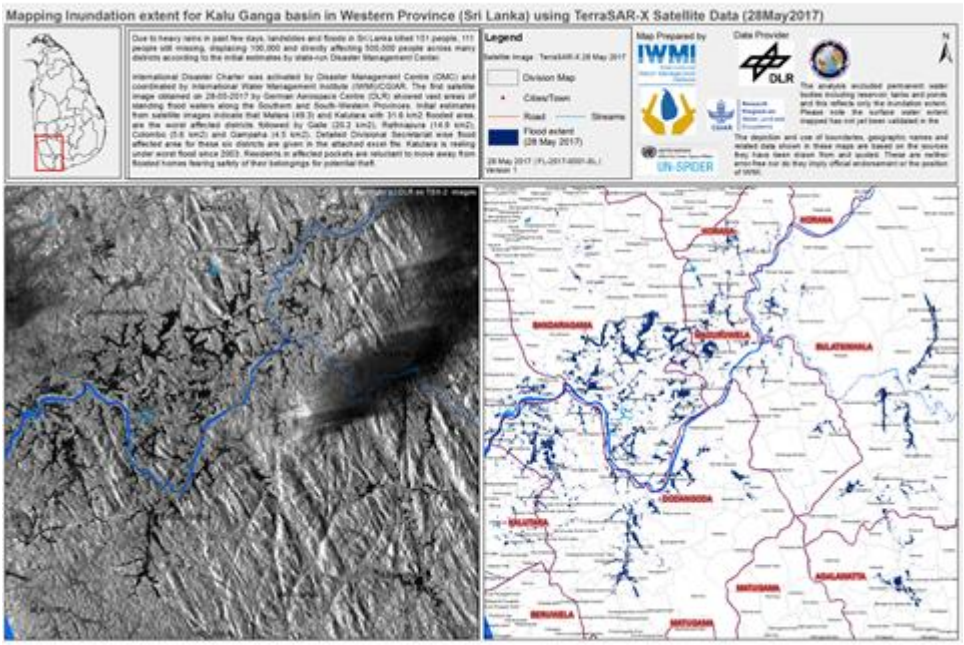

Mapping Inundation extent for Gin Ganga in Southern Province (Sri Lanka) using ESA Sentinel-1 Satellite Data (30 May 2017)
Legend
SL GND
SL DSD
Flood extent (30 May 2017)
Permanent water
Map Prepared by
Data Provider
IWMI
esa
UN-SPIDER
GALLE
MATARA
HAMBANTOTA
AKURESSA
MALIMBADA
DEVINUWARA
WELIGAMA
MATARA

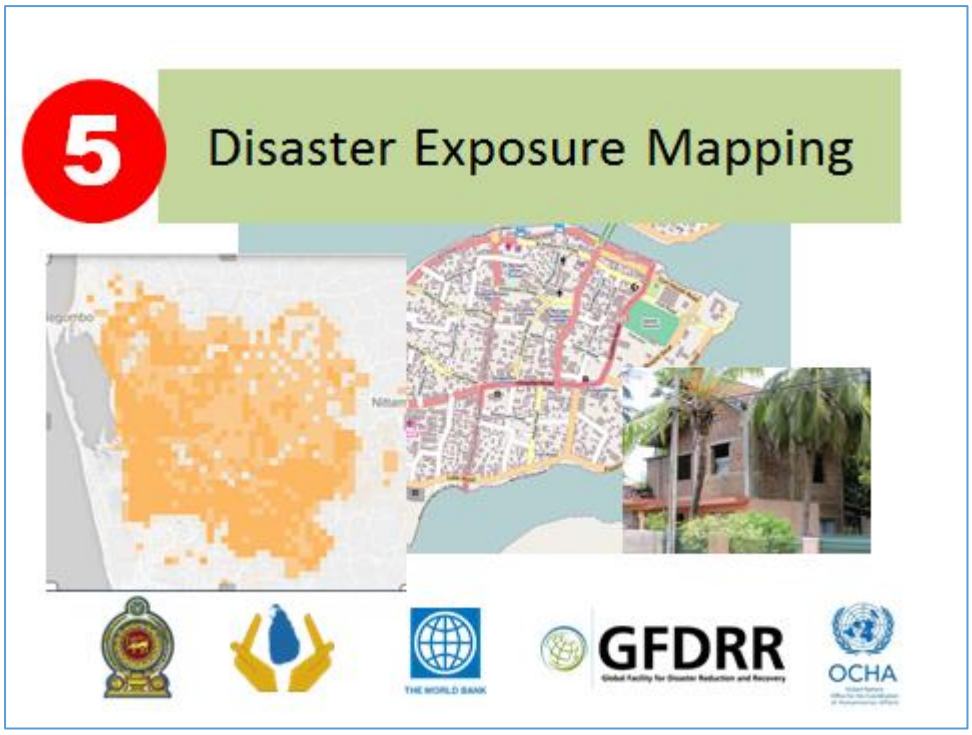

Mapping Inundation extent for Kalutara District in Western Province (Sri Lanka) using ESA Sentinel-1 Satellite Data (30 May 2017)
Legend
SL GND
SL DSD
Flood extent (30 May 2017)
Permanent water
Map Prepared by
Data Provider
IWMI
esa
UN-SPIDER
KALUTARA
DODANDUWA
BERUWELA
AGALAWATTA
MATUGAMA


Mapping Inundation extent for Hambantota in Southern Province (Sri Lanka) using NRSC IRS-R2 Satellite Data (27 May & 30May 2017)
Legend
SL GND
SL DSD
Permanent water
Map Prepared by
IWMI
Data Provider
UN-SPIDER


Mapping Inundation extent for Southern and parts of Western and Sabaragamuwa Provinces in Sri Lanka using TerraSAR-X Satellite Data
Legend
Division Map
Cities/Town
Road
Streams
Flood extent (28 May 2017)
Map Prepared by
IWMI
Data Provider
DLR
UN-SPIDER


Mapping Inundation extent for Matara and its surroundings in Southern Province (Sri Lanka) using TerraSAR-X Satellite Data (28May2017)
Legend
Division Map
Cities/Town
Road
Streams
Flood extent (28 May 2017)
Map Prepared by
IWMI
Data Provider
DLR
UN-SPIDER
N


Mapping Inundation extent for Kalu Ganga basin in Western Province (Sri Lanka) using TerraSAR-X Satellite Data (28May2017)
Legend
Division Map
Cities/Town
Road
Streams
Flood extent (28 May 2017)
Map Prepared by
IWMI
Data Provider
DLR
UN-SPIDER
N



STUDY AREA

Manmunai North DS Division, Batticaloa District

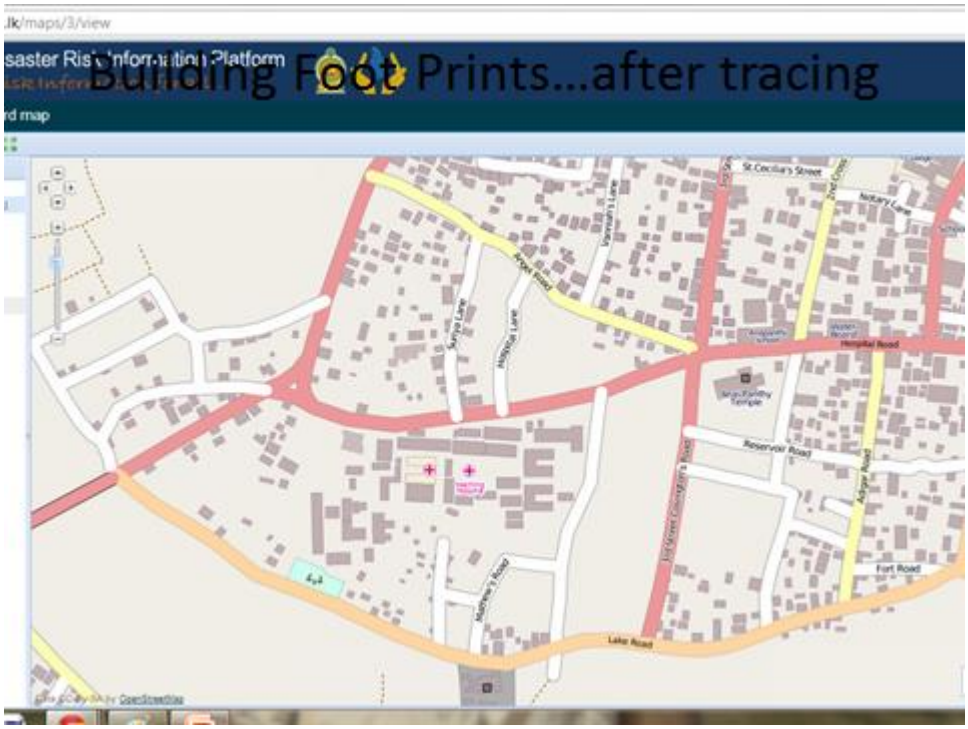
Approximately 30,000 buildings
24,928 Families

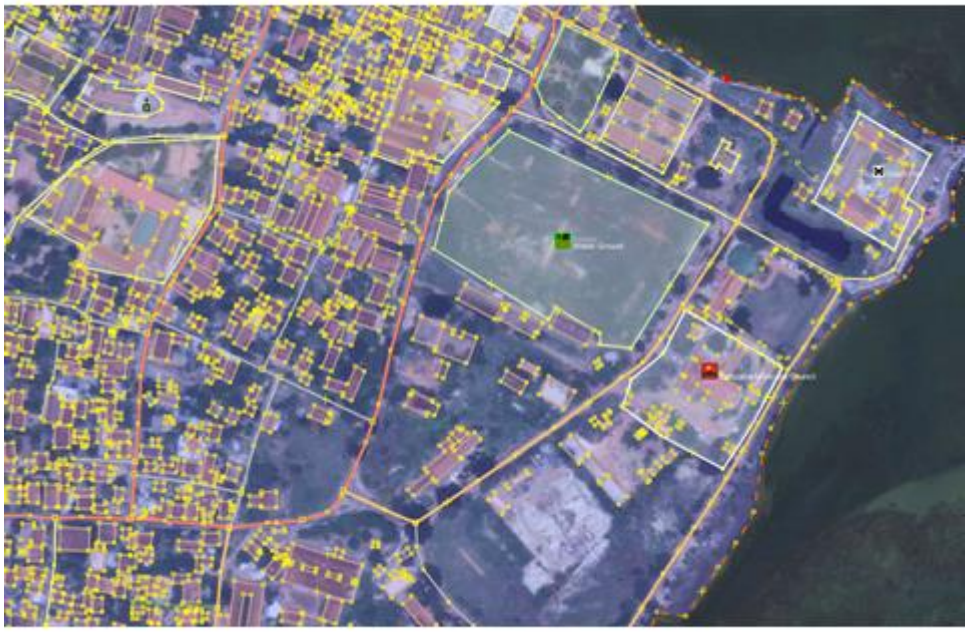
OSM Field Camp

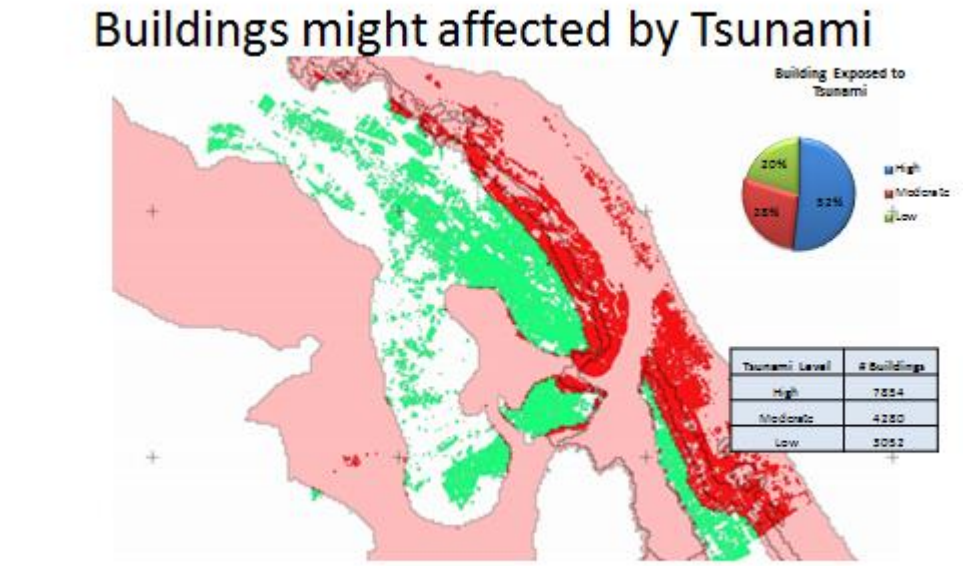
OSM ToT – Sarvodaya, Sathurukondan, Batticaloa

Field Data Collection – Puliyanthivu Central GN

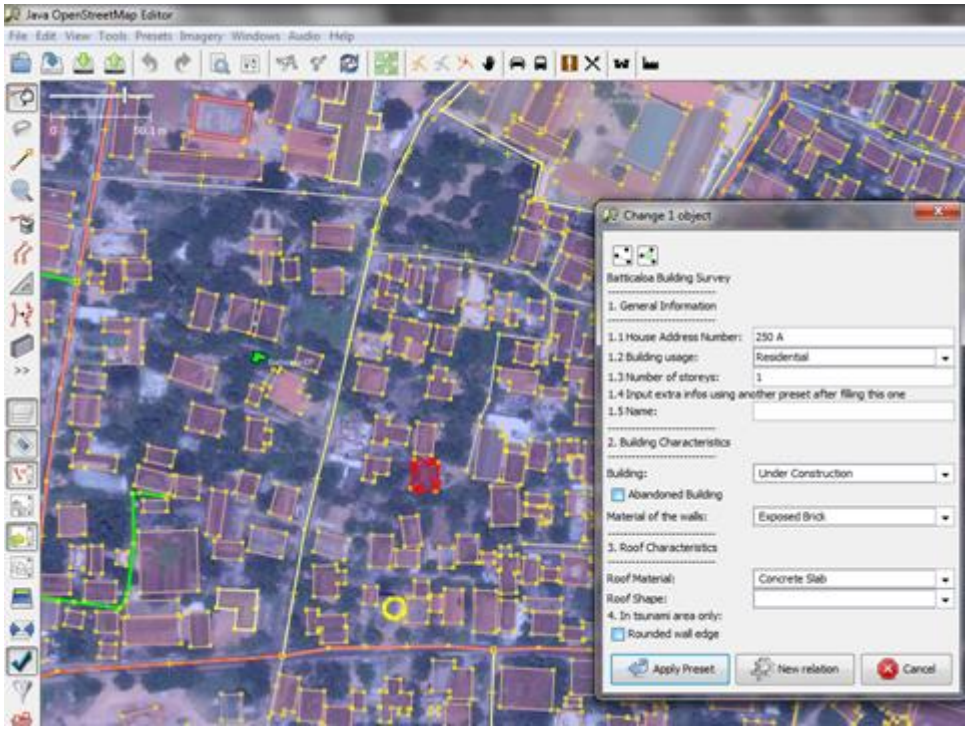
Discussion with Grama Niladari Palameenmadu

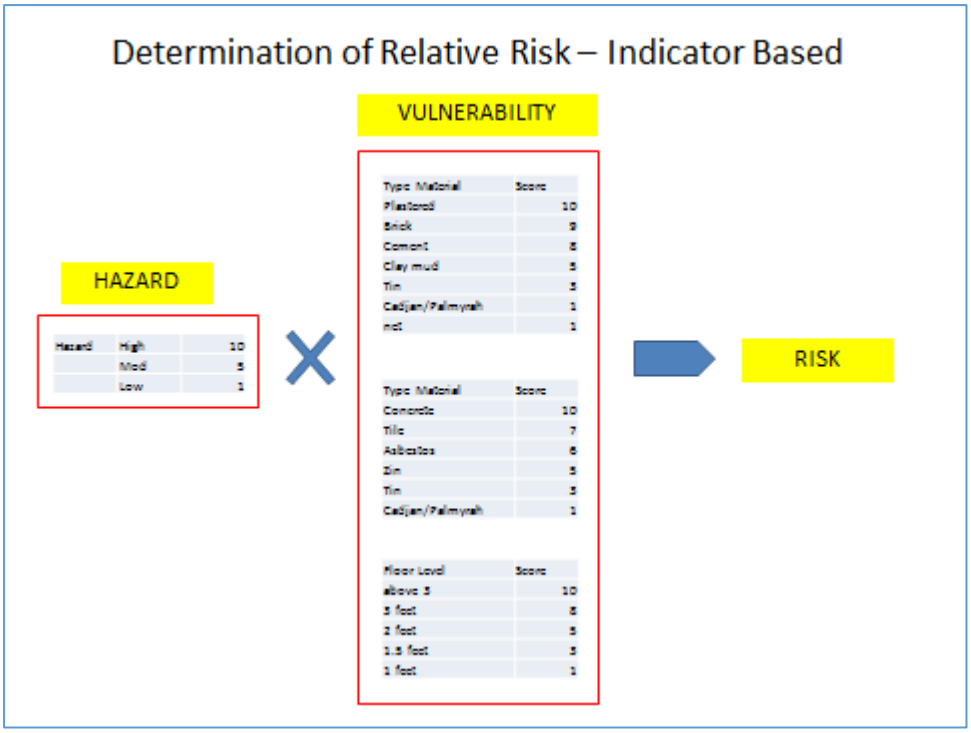

Building Foot Prints…after tracing
St.Cecilia's Street
Hospital Road
Reservoir Road
Fort Road
Lake Road





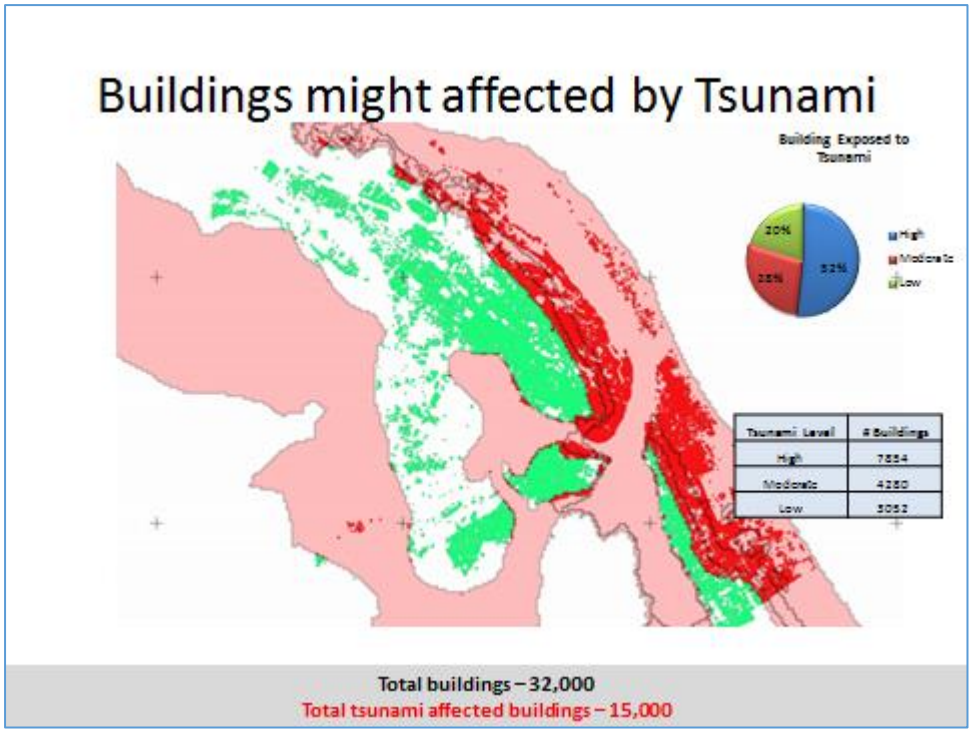
Total buildings – 32,000
Total tsunami affected buildings – 15,000

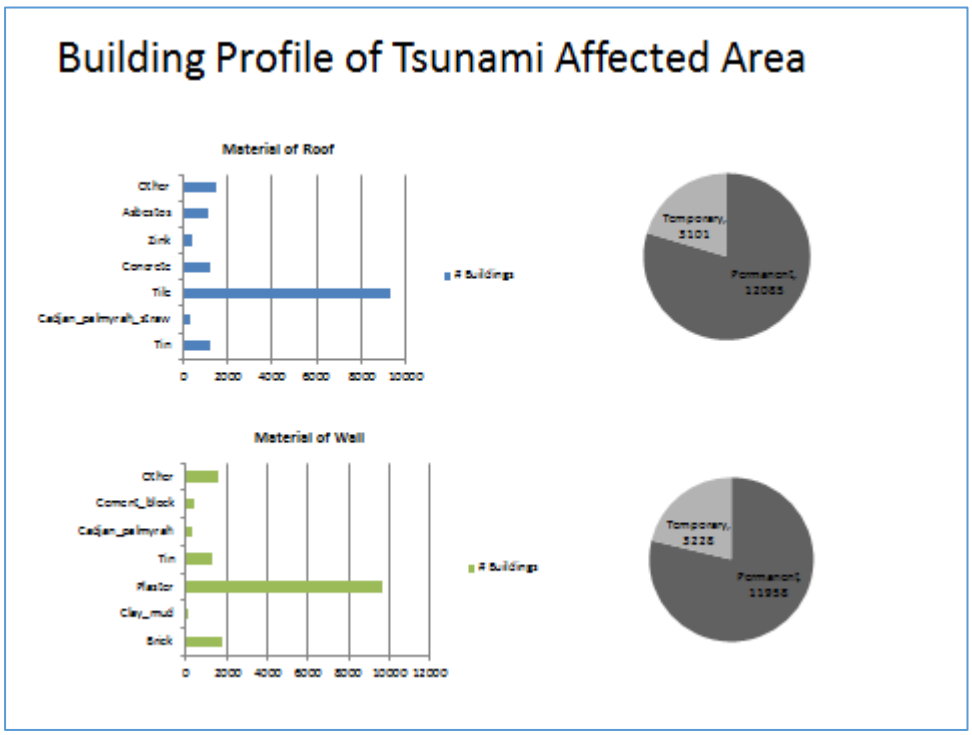




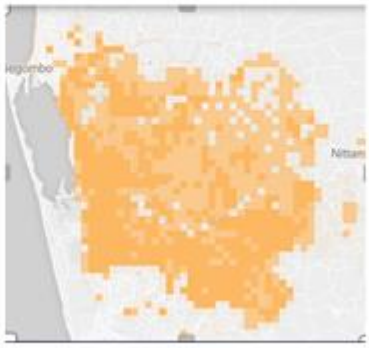
Risk Level	Number of Buildings
High Risk	4569
Moderate Risk	5563
Low Risk	5054

TSUNAMI RISK PROFILE
Buildings – Manmunai North


Buildings might affected by Tsunami
Building Exposed to Tsunami
20%
28%
52%
High
Moderate
Low
Tsunami Level
Buildings
High
7854
Moderate
4280
Low
5052
Total buildings – 32,000
Total tsunami affected buildings – 15,000


Building Profile of Tsunami Affected Area
Material of Roof
Other
Asbestos
Zink
Concrete
Tile
Cadjan_palmyrah_straw
Tin
0
2000
4000
6000
8000
10000
Buildings
Temporary, 5101
Permanent, 11055
Material of Wall
Other
Cement_block
Cadjan_palmyrah
Tin
Plaster
Clay_mud
Brick
0
2000
4000
6000
8000
10000
12000
Buildings
Temporary, 5226
Permanent, 11955

ATTANAGALU OYA DISASTER EXPOSURE MAPPING PROJECT



THE WORLD BANK
IBRD • IDA | WORLD BANK GROUP

GFDRR

Attanagalu Oya Exposure Mapping Project Scope of the Works

- Map buildings, roads and land use of Attanagalu oya lower basin area (Gampaha, Katana, Ja-Ela and Minuwangoda DS Divisions)
- Conduct field survey and obtain characteristics buildings and update the building database
- Capacity Building - Promote OpenstreetMap tool among Government Organizations and Universities

Methodology

Before and After Building Tracing of Building Gampaha Town

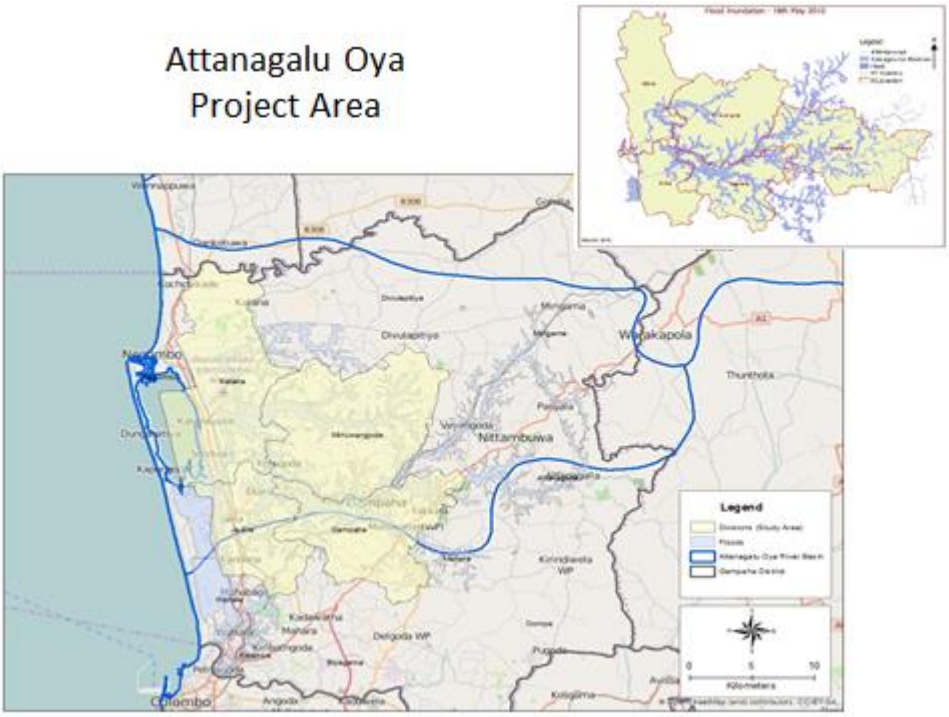
BEFORE

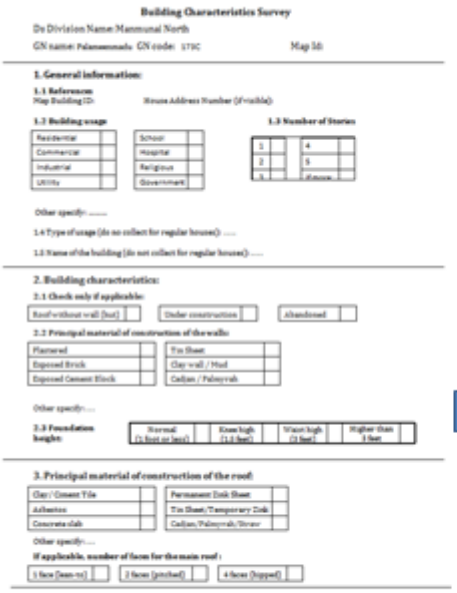
19th October 2015

AFTER

23rd October 2015

Attanagalu Oya
Project Area





Building Characteristics Survey

Ds Division Name: Mammulal North

GN name: Palamunnada GN code: 175C Map Id:

1. General information:

1.1 References:

Map Building ID: House Address Number (if visible):

1.2 Building usage

Residential		School	
Commercial		Hospital	
Industrial		Religious	
Utility		Government	

1.3 Number of Stories

1		4	
2		5	
3		Above	

Other specify: .....

1.4 Type of usage (do no collect for regular houses) .....

1.5 Name of the building (do not collect for regular houses) .....

2. Building characteristics:

2.1 Check only if applicable:

Roof without wall (hut)		Under construction		Abandoned	

2.2 Principal material of construction of the walls:

Plastered		Tin Sheet	
Exposed Brick		Clay wall / Mud	
Exposed Cement Block		Cadjan / Palmyrah	

Other specify: ....

2.3 Foundation height:

Normal (1 foot or less)		Knee high (1-2 feet)		Waist high (3 feet)		Higher than 3 feet	

3. Principal material of construction of the roof:

Clay / Cement Tile		Permanent Zink Sheet	
Asbestos		Tin Sheet/Temporary Zink	
Concrete slab		Cadjan/Palmyrah/Straw	

Other specify: ....

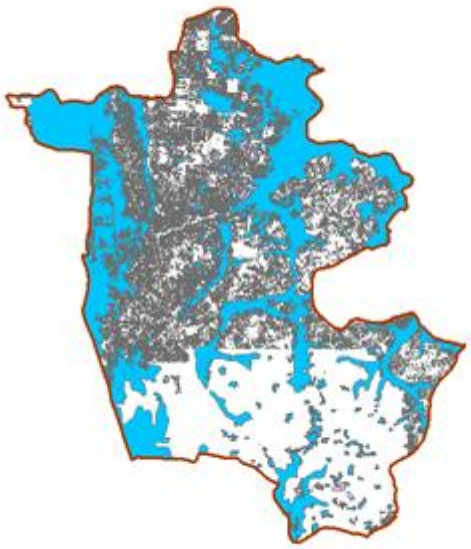
If applicable, number of faces for the main roof :

1 face (lean-to)		2 faces (pitched)		4 faces (hipped)	

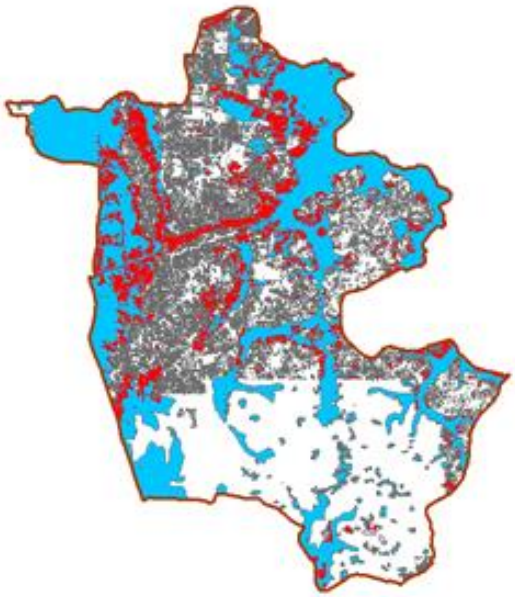
Building Survey
Questionnaire filled
in Digital Form

CASE STUDY
Ja – Ela Divisional Secretariat

Building Exposure
39,697 Buildings



Building with Flooding



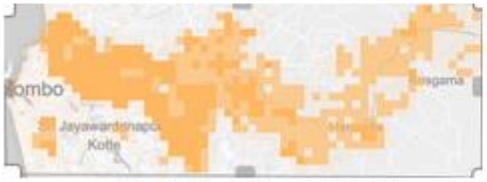
Affected Buildings by Floods
11647 Buildings

Project Outputs – Launched Today

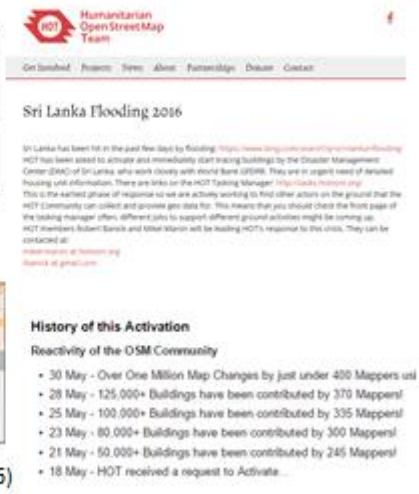
- **Printed GN Maps with boundary, buildings and land use**
- **Digital database of buildings with attributes**

Power of Volunteerism
Mapping with OSM – Flood May 2016

3429 buildings - January 2016



114,421 buildings – Today (Aug. 2016)


Humanitarian OpenStreetMap Team

Sri Lanka Flooding 2016

History of this Activation

Reactivity of the OSM Community

- 30 May - Over One Million Map Changes by just under 400 Mappers usi
- 28 May - 125,000+ Buildings have been contributed by 370 Mappers!
- 25 May - 100,000+ Buildings have been contributed by 335 Mappers!
- 23 May - 80,000+ Buildings have been contributed by 300 Mappers!
- 21 May - 50,000+ Buildings have been contributed by 245 Mappers!
- 18 May - HOT received a request to Activate...

6

SPATIAL DATA SHARING

UNSPIDER Technical Advisory Mission (TAM)

UNSPIDER TAM Recommendations

1. **Policy and Coordination**
   - ✓ DM Policy update
   - ✓ Improve inter-agency coordination
   - ✓ Sharing mechanism between data providers and users / Institute strengthen
   - ✓ **Data sharing policy / NSDI**
   - ✓ **Data policy for interoperability / common arrangement to obtain satellite data**
2. **Data and Access / Info Management**
   - ✓ Improve base line data at 1:10,000 including DEM
   - ✓ Development of Hazard & Risk Maps
   - ✓ Right to access data from different institutes
   - ✓ A dedicated unit for Information Management in DMC
   - ✓ **Implementation of NSDI**
3. **Capacity Building**
   - ✓ Building institutional and individual capacity

Cabinet Paper for NSDI

Draft-2

අමාත්‍ය මණ්ඩල සංදේශය

ජාතික අවකාශගතිය තොරතුරු පිළිබඳ යටිතල පහසුකම් පද්ධතිය ශක්තිමත්කිරීම

භූගෝලීය තැනතොත් අවකාශගතිය මිනිසුන් හා බිඳුනු තොරතුරු රාජ්‍ය මෙන්ම පෞද්ගලික අංශයේද භාවිතයට, තීරණ ගන්නන් හා කළමනාකරුවන් විසින් තම කටයුතු සැලසුම් කර ගැනීමට හා තීරණ ගැනීම සඳහා මෙවලමක් ලෙස යොදා ගනු ලැබේ. එයිනුත් පොදුවේ ගත් කළ ජාතික සංවර්ධන ක්‍රියාවලිය වඩාත් කාර්යක්ෂම කිරීම සඳහා මෙම තොරතුරු වඩාත් ගතිවේග ලෙස මෙලඟ වඩා ගැනීම, සුවිශාල කිරීම, පරිමාණ කිරීම හා ආරක්ෂා කිරීම ඉතා වැදගත් කටයුත්තකි. එයට අමතරව මෙම තොරතුරු අංශවල කළමනාකරණය, රජය, පිදුලිය හා දුරකථන සමාගම් වැනි සේවාවන් වඩාත් ඵලදායී ලෙස ගැනයිම හා අඛණ්ඩ කළමනාකරණය වැනි විෂිට කටයුතු සඳහාද යොදා ගැනීම මගින් එම කටයුතුද වඩාත් කාර්යක්ෂමව සිදු කිරීමට අවස්ථාවක් ලබාදිය හැකිවේ.

එමෙන්ම දිනෙන් දින දියුණුවෙමින් යන තොරතුරු මත පදනම්වූ ලොවෙහි භූගෝලීය හා අවකාශගත තොරතුරු ඉතා වැදගත් තැනක් ගනී. විශ්වසනීයත්වය හා ඉහළ ගුණාත්මක මිරින් යුතු තොරතුරු සොයන් ක්‍රියාවලින් සඳහා

It took around 01 year to approve this paper...

Sri Lanka Spatial Data Infrastructure

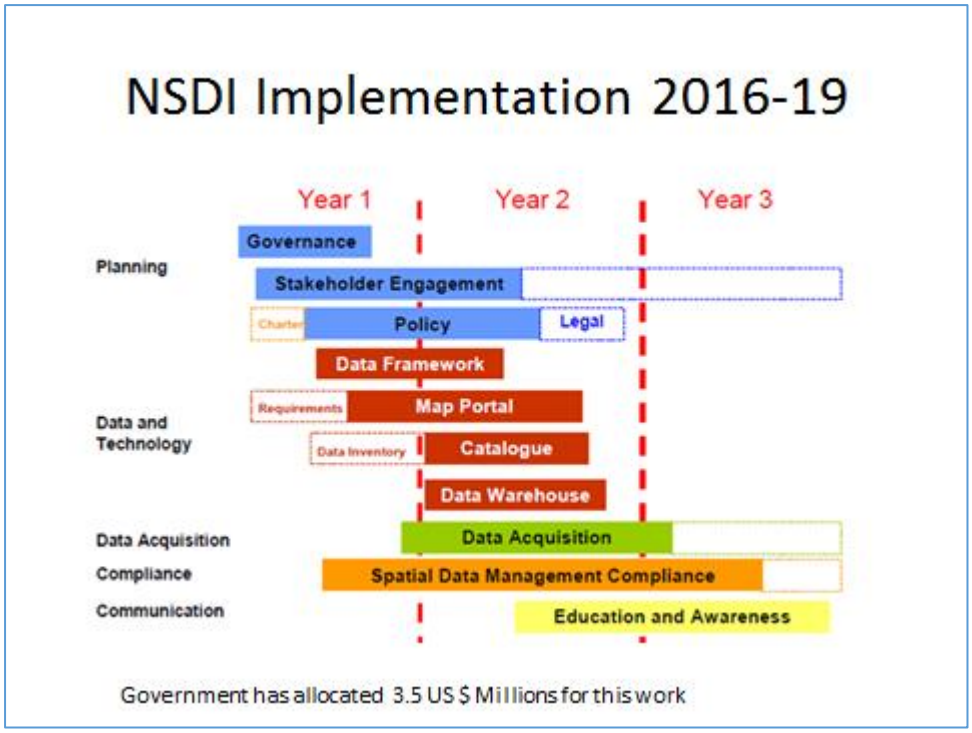
POWERING DECISION MAKING AND INNOVATION USING SPATIAL INFORMATION TECHNOLOGIES

Sri Lanka Spatial Data Infrastructure Strategy 2020

Consultation Document - August 2014

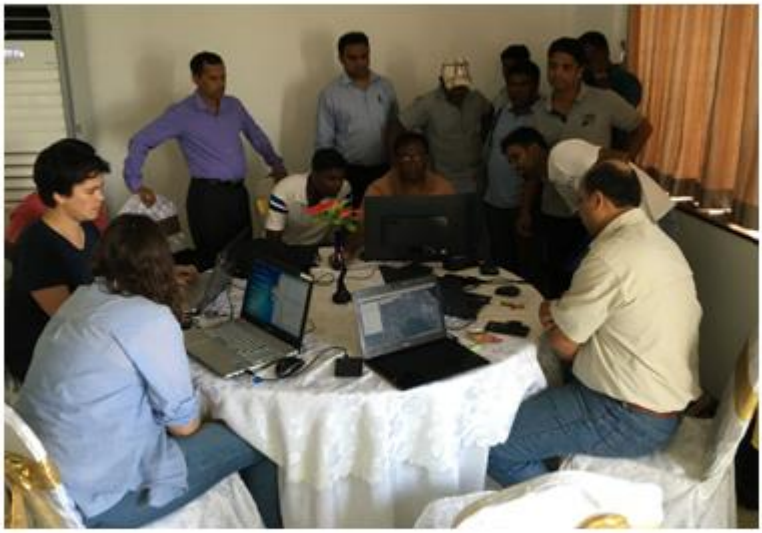
Cabinet decision:

1. To implement NSDI with overall supervision of Prof. Tissa Vitharana
2. Appointed parliamentary committee to oversee the process
3. Implement Pilot project by Sec MDM


NSDI Implementation 2016-19
Year 1
Year 2
Year 3
Planning
Governance
Stakeholder Engagement
Charter
Policy
Legal
Data Framework
Data and Technology
Requirements
Map Portal
Data Inventory
Catalogue
Data Warehouse
Data Acquisition
Data Acquisition
Compliance
Spatial Data Management Compliance
Communication
Education and Awareness
Government has allocated 3.5 US $ Millions for this work


RISKINFO Disaster Risk Information Platform
Floods and Landslides Situation
DATA LAYERS
RISKINFO is the strategy to share all the Risk related data


Drone Mapathon
22 March 2016, Batticaloa



Invite you to be a volunteer and contribute generation and sharing data for others use:

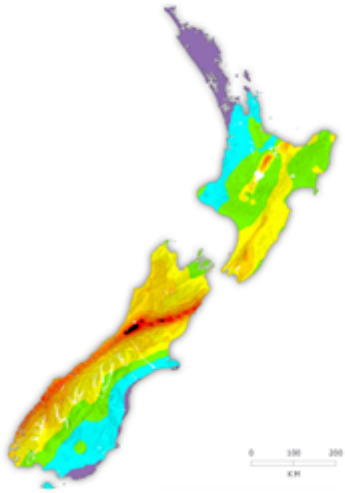
www.openstreetmap.org

www.openaerialmap.org

srimal@dmc.gov.lk

towards a safer Sri Lanka

Introduction



- Who are Opus International Consultants?
- New Zealand is in a high seismic zone,
- Significant seismic events in 2010, 2011, 2015 and 2016
- Opus International Consultants working with several agencies, private and public to help with post-disaster preparedness

opusinternational.com

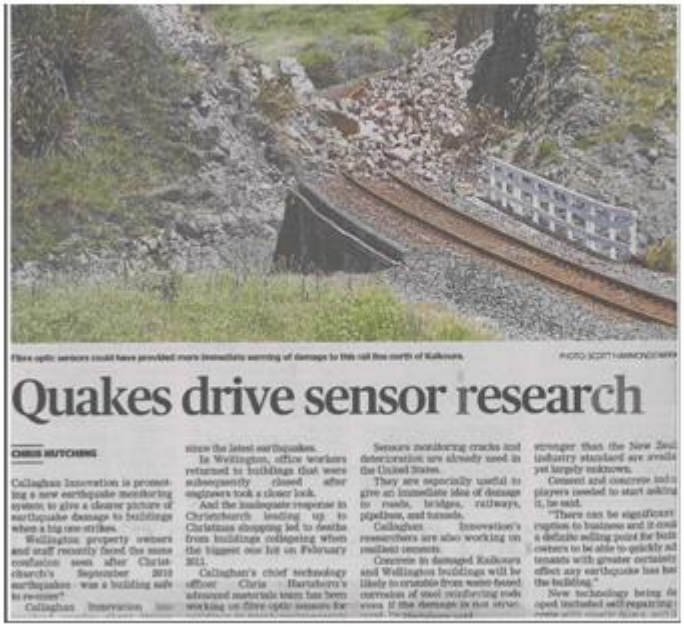
Systems

Building Monitoring - SMART

Remote Bridge Monitoring

opusinternational.com

Why?



Fibre optic sensors could have provided more immediate warning of damage to this rail line north of Kalkoura. PHOTO: SCOTT HAMMOND/FAIRFAX

Quakes drive sensor research

CHRIS HUTCHING

Callaghan Innovation is promoting a new earthquake monitoring system to give a clearer picture of earthquake damage to buildings when a big one strikes.

Wellington property owners and staff recently faced the same confusion seen after Christchurch's September 2010 earthquakes was a building safe to re-enter?

Callaghan Innovation ... since the latest earthquakes.

In Wellington, office workers returned to buildings that were subsequently closed after engineers took a closer look.

And the inadequate response to Christchurch leading up to Christmas shopping led to deaths from buildings collapsing when the biggest one hit on February 2011.

Callaghan's chief technology officer Chris Hartshorn's advanced materials team has been working on fibre optic sensors for ...

Sensors monitoring cracks and deterioration are already used in the United States.

They are especially useful to give an immediate idea of damage to roads, bridges, railways, pipelines, and tunnels.

Callaghan Innovation's researchers are also working on resilient cements.

Concrete in damaged Kaikoura and Wellington buildings will be likely to crumble from water-based corrosion of steel reinforcing rods ... if the damage is not struc...

... stronger than the New Zeal... industry standard are availa... yet largely unknown.

Cement and concrete indu... players needed to start addre... it, he said.

"There can be significant ... ruption to business and it coul... a definite selling point for build... owners to be able to quickly ad... tenants with greater certainty ... effect any earthquake has ha... the building."

New technology being de... oped included self-repairing ...

"Fibre optic sensors could have provided more immediate warning of damage to this rail line north of Kalkoura."

opusinternational.com

What is SMART?

SMART is a system which has incorporated structural engineering analysis with accelerometer sensors and algorithms to provide clients with real time information on building or structural performance following an earthquake event. An integrated system has been created that includes not only data collection, but also uses a detailed non-linear assessment of the building to compare the shaking experienced against the assessed building performance.

Seismic Monitoring Asset Reporting Tool – SMART has been developed by Opus to provide rapid asset assessment following an earthquake to enable owners to make quick decisions on continued use of the building.

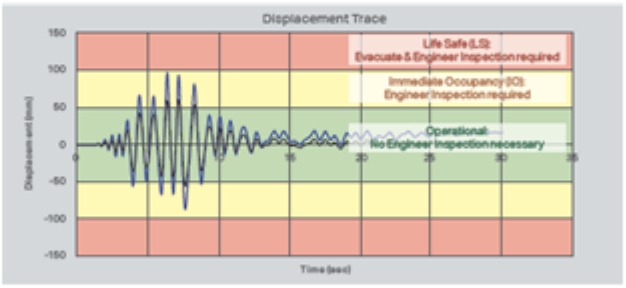
How SMART works…

- First, the building/structure performance limits are assessed.
- Sensors are then installed at key locations.
- Following the event of an earthquake, Data Acquisition occurs.
- Opus interpret the results of the DA against structural performance
- The results are then quickly communicated to the user via web interface or text

Figure 1 - Integrated Structural Seismic Monitoring and Assessment Stages.

OPUS

- Unlike most other monitoring systems, the Opus solution provides an immediate evaluation of the data collected against the building capacity to alert the building user. This is done using a simple traffic light display:



- Safe to occupy
- Carry out an inspection
- Evacuate the building

The Benefits of Using SMART

- Alerts building owners and occupiers in real time
- Accurate information provided on the intensity of shaking the building experienced in a seismic event
- A high degree of confidence given regarding occupancy status following a significant earthquake
- Reduced down-time following a significant earthquake
- Identifies loss of capacity due to seismic event
- Reduces the risk of damage being overlooked
- Provides factual information which can be used for insurance claims

opusinternational.com

Remote Bridge Monitoring

opusinternational.com

Why do we need it?

- High Productivity Motor Vehicles (HPMVs) introduced in 2010
- 20% of NZ bridges were constructed prior to 1945, to considerably lower load standards than HPMV loading.
- Many of these bridges provide key links for freight.
- However, some bridges on critical freight routes are very costly to strengthen.
- Vehicle Mass Limits are continuing to increase (2016 VDAM Rule)

opusinternational.com

Structural Response Monitoring Process:

1. Preliminary diagnostics
2. Analysis and calibration
3. Assessment of failure mechanisms
4. Focussed response monitoring
5. Risk mitigation systems

opusinternational.com

Structural Response Monitoring

- Use of data loggers, displacement sensors and crack sensors.
- Low cost, remotely configurable monitoring system that can be installed on any bridge
  - Small or large
    - scalable, sensor clusters
  - With/without access to mains
    - low powered
  - Made from any material
    - concrete, steel, wood
  - With/without mobile phone coverage
    - LoRA

opusinternational.com

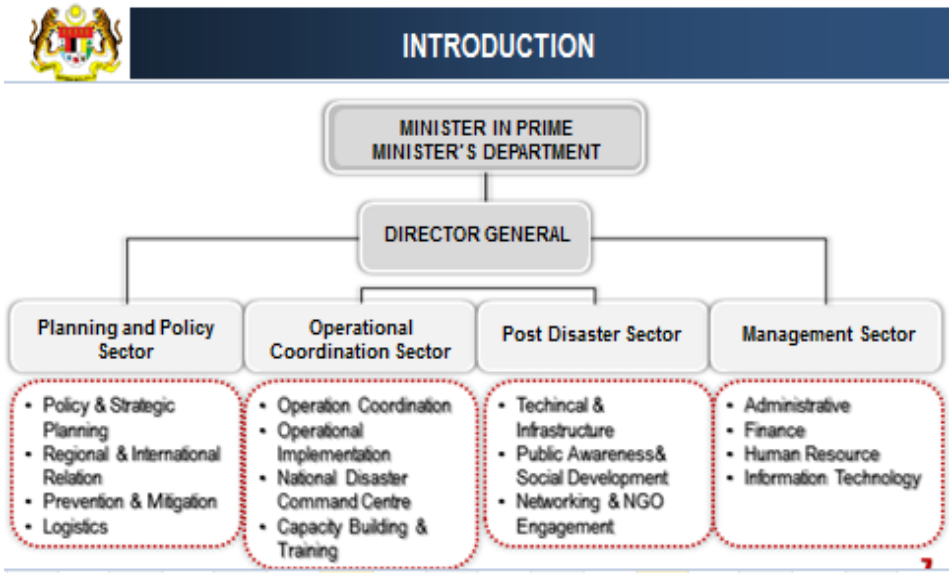

OPUS
Thank you for listening.
Any questions?

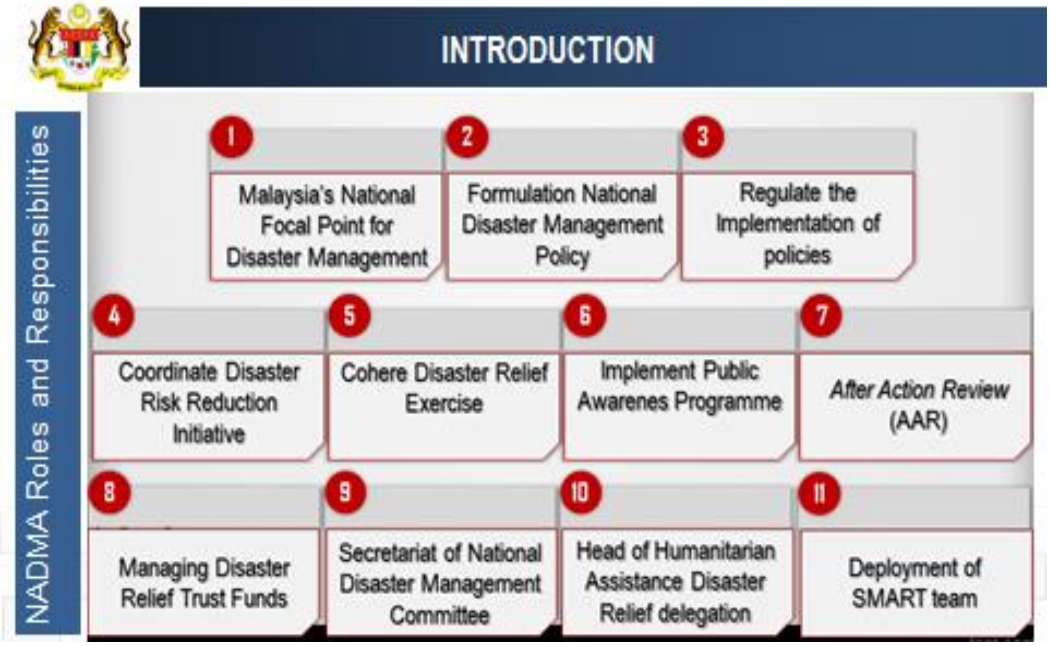
INTRODUCTION

In December 2014, Malaysia faced its worst monsoon flood affecting several states. 541,896 people were affected RM2.5B billion in losses causing extensive damage to infrastructure.

Cabinet consider the memorandum of the Prime Minister dated 26th August 2015 agreed :
"the establishment of the National Disaster Management Agency (NADMA) under the Prime Minister's Department taking over the responsibility from the National Security Council."

NADMA officially formed on 1st October 2015 with the consolidation of the Disaster Management Division of the National Security Council, Post-Flood Recovery Unit of the Prime Minister's Department and the Special Malaysia Disaster Assistance and Rescue Agency (SMART). Designated as a coordinating and leading agency under Prime Minister's Department for disaster management.


INTRODUCTION
MINISTER IN PRIME MINISTER'S DEPARTMENT
DIRECTOR GENERAL
Planning and Policy Sector
Operational Coordination Sector
Post Disaster Sector
Management Sector
• Policy & Strategic Planning
• Regional & International Relation
• Prevention & Mitigation
• Logistics
• Operation Coordination
• Operational Implementation
• National Disaster Command Centre
• Capacity Building & Training
• Techincal & Infrastructure
• Public Awareness& Social Development
• Networking & NGO Engagement
• Administrative
• Finance
• Human Resource
• Information Technology

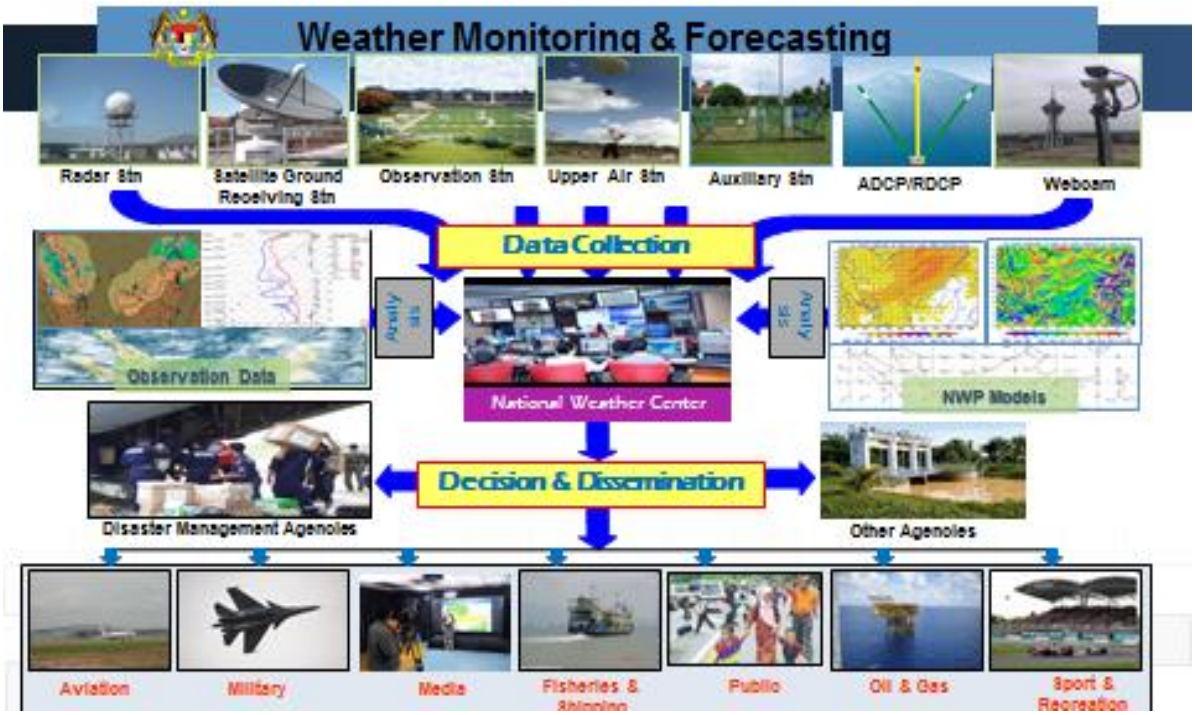

INTRODUCTION
NADMA Roles and Responsibilities
1 Malaysia's National Focal Point for Disaster Management
2 Formulation National Disaster Management Policy
3 Regulate the Implementation of policies
4 Coordinate Disaster Risk Reduction Initiative
5 Cohere Disaster Relief Exercise
6 Implement Public Awarenes Programme
7 After Action Review (AAR)
8 Managing Disaster Relief Trust Funds
9 Secretariat of National Disaster Management Committee
10 Head of Humanitarian Assistance Disaster Relief delegation
11 Deployment of SMART team

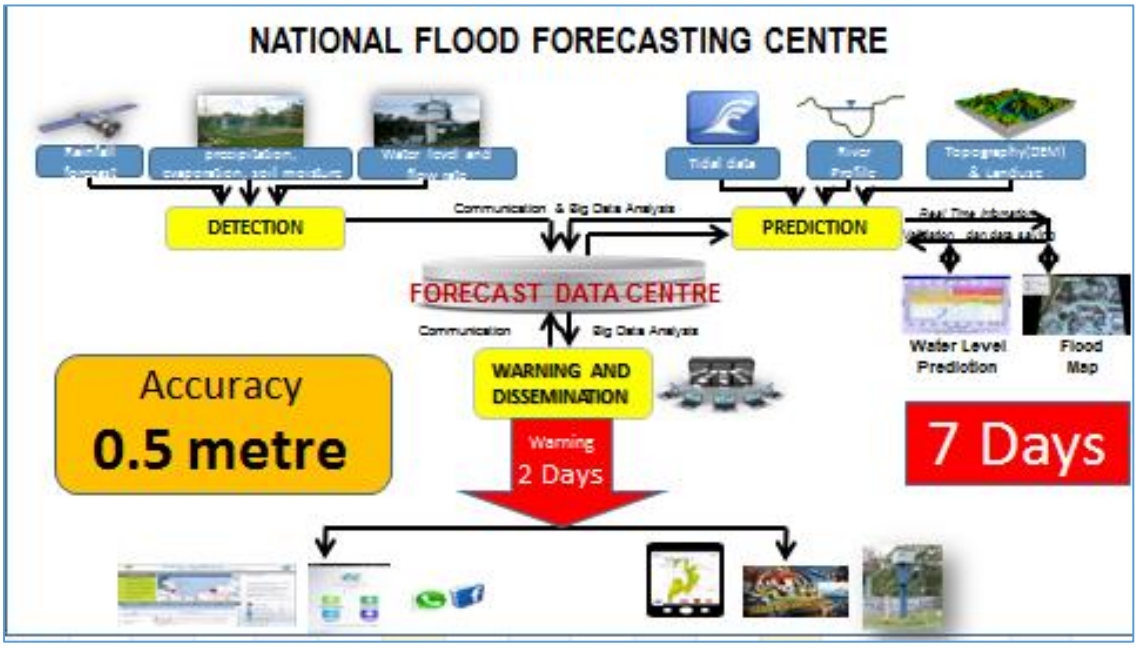
LIST OF NOTABLE DISASTERS IN MALAYSIA

DISASTER RISK REDUCTION SUPPORT TOOLS

- Initiated a step forward action for disaster risk reduction by changing the old policy that favors a post disaster management into pre-disaster management policy.

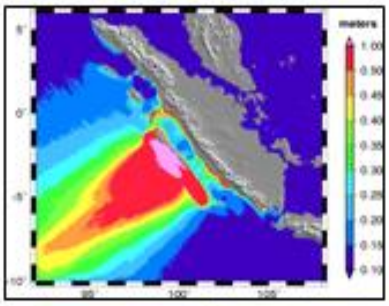
- Utilizing modern and advance technology techniques to support disaster prevention, forecasting, response and building resilience through:
  - Forecasting & early warning;
  - Disaster hazard & risk assessment;
  - Monitoring & Implementation


Weather Monitoring & Forecasting
Radar Stn
Satellite Ground Receiving Stn
Observation Stn
Upper Air Stn
Auxiliary Stn
ADCP/RDCP
Webcam
Data Collection
Observation Data
National Weather Center
NWP Models
Decision & Dissemination
Disaster Management Agencies
Other Agencies
Aviation
Military
Media
Fisheries &
Public
Oil & Gas
Sport &
Recreation


NATIONAL FLOOD FORECASTING CENTRE
DETECTION
PREDICTION
Communication & Big Data Analysis
FORECAST DATA CENTRE
Communication
Big Data Analysis
WARNING AND DISSEMINATION
Warning
2 Days
Accuracy
0.5 metre
Water Level Prediction
Flood Map
7 Days

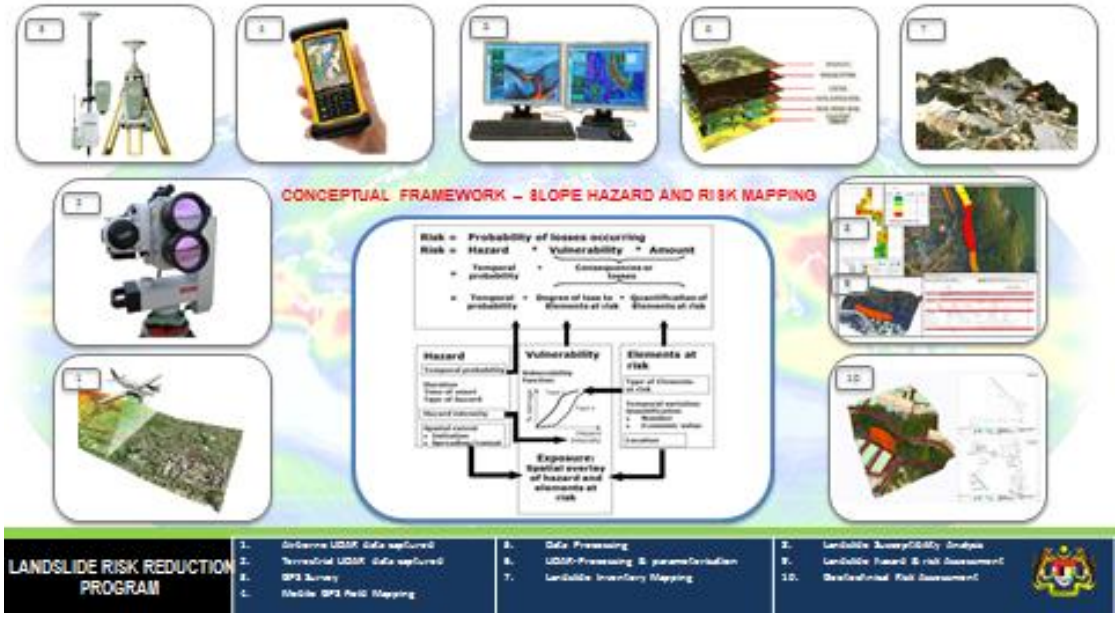
EARTHQUAKE AND TSUNAMI MONITORING NETWORKS

- 39 Seismic Strong Motion Networks
- 25 Seismic Weak Motion Networks
- 17 Tidal Gauges Networks
- 18 Coastal Camera Networks
- 53 Tsunami Siren Networks



HAZARD & RISK ASSESSMENT

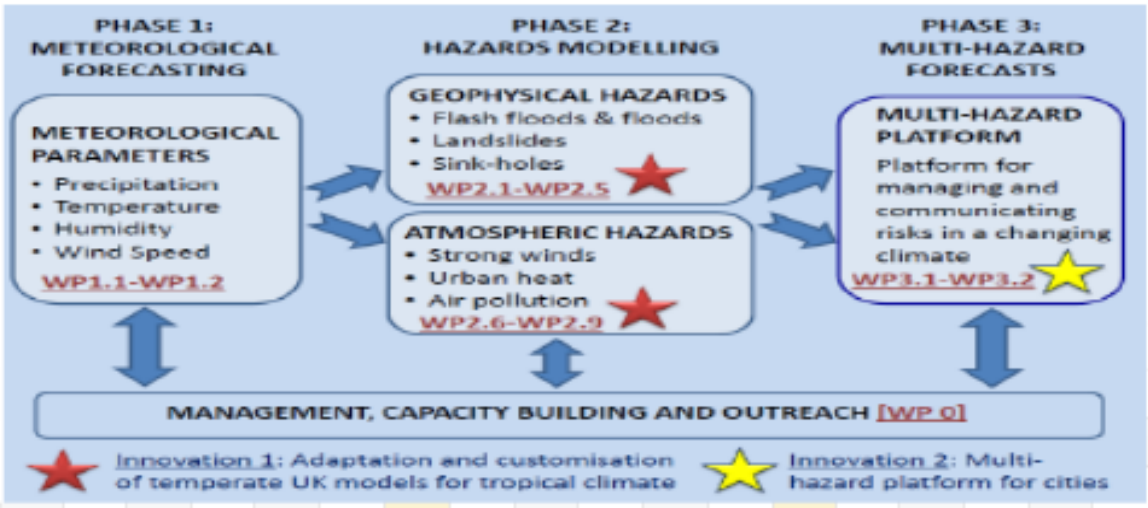
- Utilization of geospatial technology techniques to assess the disaster risk especially for slope related hazards;
- Application of satellite imageries for forestry activity monitoring


CONCEPTUAL FRAMEWORK – SLOPE HAZARD AND RISK MAPPING
Risk = Probability of losses occurring
Risk = Hazard * Vulnerability * Amount
Hazard
Vulnerability
Elements at risk
Exposure: Spatial overlay of hazard and elements at risk
LANDSLIDE RISK REDUCTION PROGRAM


FOREST MONITORING
USING HYPERSPECTRAL TECHNOLOGY FOR FOREST MANAGEMENT AND PROTECTION
TECHNOLOGY APPLICATION FOR TRANS-BOUNDARY CONSERVATION AND MANAGEMENT (HYPERSPECTRAL SENSING SYSTEM)

DISASTER RESILIENT CITIES PROJECT

FORECASTING LOCAL LEVEL CLIMATE EXTREMES AND PHYSICAL HAZARDS FOR KUALA LUMPUR



CONCLUSION

The form of disasters in the future may become more complex. Fast-paced developments in technology have the potential to help the world rein in the impact of natural and human-induced hazards. Co-development of social and technological systems is necessary in making a sustainable and disaster resilient community.

THANK YOU

Appendix 7.3: List of Participants

	Name	Institution	Country
1.	Prof. Karl Dayson	University of Salford	United Kingdom
2.	Luana Avagliano	Cabinet Office	United Kingdom
3.	John Fletcher	GM Fire & Rescue Service	United Kingdom
4.	Emma Dean	GM Fire & Rescue Service	United Kingdom
5.	Clare Nolan	GM Fire & Rescue Service	United Kingdom
6.	Kathy Oldham	Association of Greater Manchester Authorities	United Kingdom
7.	Jon Percival	Association of Greater Manchester Authorities	United Kingdom
8.	Lucy Jopson	Environment Agency	United Kingdom
9.	Nick Mercer	Environment Agency	United Kingdom
10.	Prof. Siri Hettige	University of Colombo	Sri Lanka
11.	Srimal Samansiri	The Centre of Governance Innovations Disaster Management Center	Sri Lanka
12.	Chandana Siriwardana	University of Moratuwa	Sri Lanka
13.	Hemanthi Goonasekera	The Federation of Sri Lankan Government Authorities	Sri Lanka
14.	Gimhan Jayasiri	University of Moratuwa	Sri Lanka
15.	Prof. Noor Jehan	Centre for Disaster Preparedness and Management, University of Peshawar	Pakistan
16.	Mohammed Khalid	Khyber Pakhtunkhwa Provincial Disaster Management Authority	Pakistan
17.	Mustaq Ahmad Jan	Centre for Disaster Preparedness and Management, University of Peshawar	Pakistan
18.	Norah Sulaiman	KANZU Research Centre, Universiti Tun Hussein Onn Malaysia	Malaysia
19.	Mohd Ariff Bin Baharom	National Disaster Management Agency	Malaysia
20.	Wei She Teo	KANZU Research Centre, Universiti Tun Hussein Onn Malaysia	Malaysia
21.	Senaka Basnayake	ADPC	Thailand
22.	Elena Lobo	SA Catapult	United Kingdom
23.	Daniel Wicks	SA Catapult	United Kingdom
24.	Tom Beaton	Telespazio	United Kingdom
25.	Jonathan Shears	Telespazio	United Kingdom
26.	Jonathan Hill	Opus International	New Zealand
27.	Adam Hiley	Opus International	New Zealand
28.	Mike Wellington	Opus International	New Zealand
29.	Gillian Blake	Ordnance Survey	United Kingdom
30.	Ian Everall	Mirrorworld	United Kingdom

31.	Martin Knapp	Secure Information Assurance	United Kingdom
32.	Kamal Ahmed	IUSS, Istituto Universitario di Studi Superiori di Pavia	Italy
33.	Shamaila Iram	The University of Huddersfield	United Kingdom
34.	Angela Connelly	University of Manchester	United Kingdom
35.	Prof. Terrence Fernando	THINKlab, University of Salford	United Kingdom
36.	Udaya Kulatunga	CDR, University of Salford	United Kingdom
37.	Chaminda Pathirage	CDR, University of Salford	United Kingdom
38.	Arturo Garcia	THINKlab, University of Salford	United Kingdom
39.	Zihao Tan	THINKlab, University of Salford	United Kingdom
40.	Hisham Tariq	THINKlab, University of Salford	United Kingdom
41.	Simon Campion	THINKlab, University of Salford	United Kingdom
42.	Michal Cieciura	THINKlab, University of Salford	United Kingdom
43.	Komal Raj Aryal	THINKlab, University of Salford	United Kingdom
44.	Inji Kenawy	University of Salford	United Kingdom
45.	Simi Goyal	University of Salford	United Kingdom
46.	Jayne Hunter	University of Salford	United Kingdom
47.	Rukshan De Mel	University of Salford	United Kingdom
48.	Jono Guildford	University of Salford	United Kingdom
49.	Mohammad Takhtravanchi	University of Salford	United Kingdom
50.	Payam Salamati	University of Salford	United Kingdom
51.	Zeeshan Aziz	University of Salford	United Kingdom
52.	Candace James	University of Salford	United Kingdom
53.	Akin Osundina	University of Salford	United Kingdom
54.	Philippa Demonte	University of Salford	United Kingdom

The University of Salford is in the United Kingdom where academia, industries and policy makers meet to map global development challenges.

The THINKlab is one of the key research hubs at the University of Salford. It supports research-led industries centred knowledge co-production using appropriate technologies in order to promote the future digital economy.

Interdisciplinary researchers in the THINKlab focus on neutralising risk in every stage of the industrial and development processes for building resilient systems around the globe. If you would like to know more about our activities, please feel free to visit www.salford.ac.uk/thinklab or email us at c.kocsis@salford.ac.uk.

University of Salford MANCHESTER
1967-2017 50 YEARS
THINKlab

MOBILISE
Building Resilient Communities

EPSRC
Engineering and Physical Sciences Research Council
GCRF
Global Challenges Research Fund