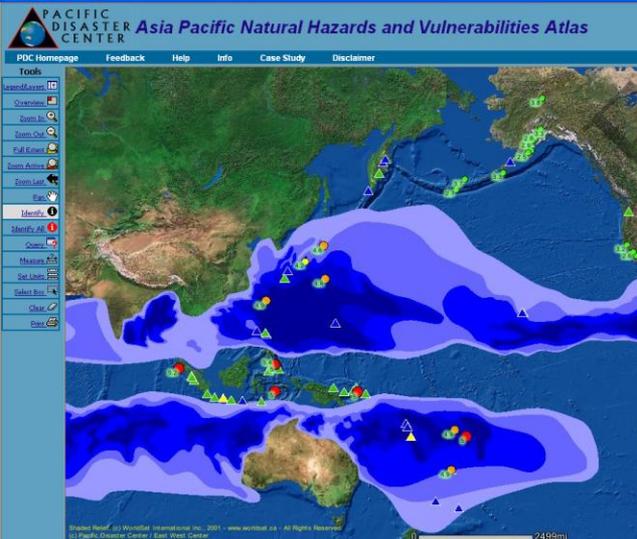




Fostering Disaster-Resilient Communities

Pacific Disaster Center: Challenges and Solutions for Risk Assessment and Disaster Early Warning

http://www.pdc.org - Asia Pacific Natural Hazards and Vulnerabilities Atlas - Microsoft Internet Explorer



Mr. Chris Chiesa
Chief Information Officer
Pacific Disaster Center

cchiesa@pdc.org

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Presentation Outline

- Overview of Pacific Disaster Center
- Disaster Management Challenges
- PDC Solutions and Operational Capabilities
 - Risk and Vulnerability Assessment
 - Disaster Early Warning
- Data Sharing via APNHIN

PDC Mission ...

Provide applied information research and analysis support for the development of more effective policies, institutions, programs and information products for the disaster management and humanitarian assistance communities of the Asia Pacific region and beyond.





NCDR Taiwan MoU 2008



5일 오후 시정 재난 상황실에서 미국의 PDC(태평양재해센터)와 재난 관련 공동 연구 지원을 위한 협약을 체결했다. 윤민호 인터넷기자
 입력: 2007.06.25 21:59

So. Korea MoU 2007

Int'l "Best Practices" in DM Workshop 2007

(c) Copyright 2008 - PDC



Facilities in the State of Hawaii

Federal Support Office
Ft. Shafter



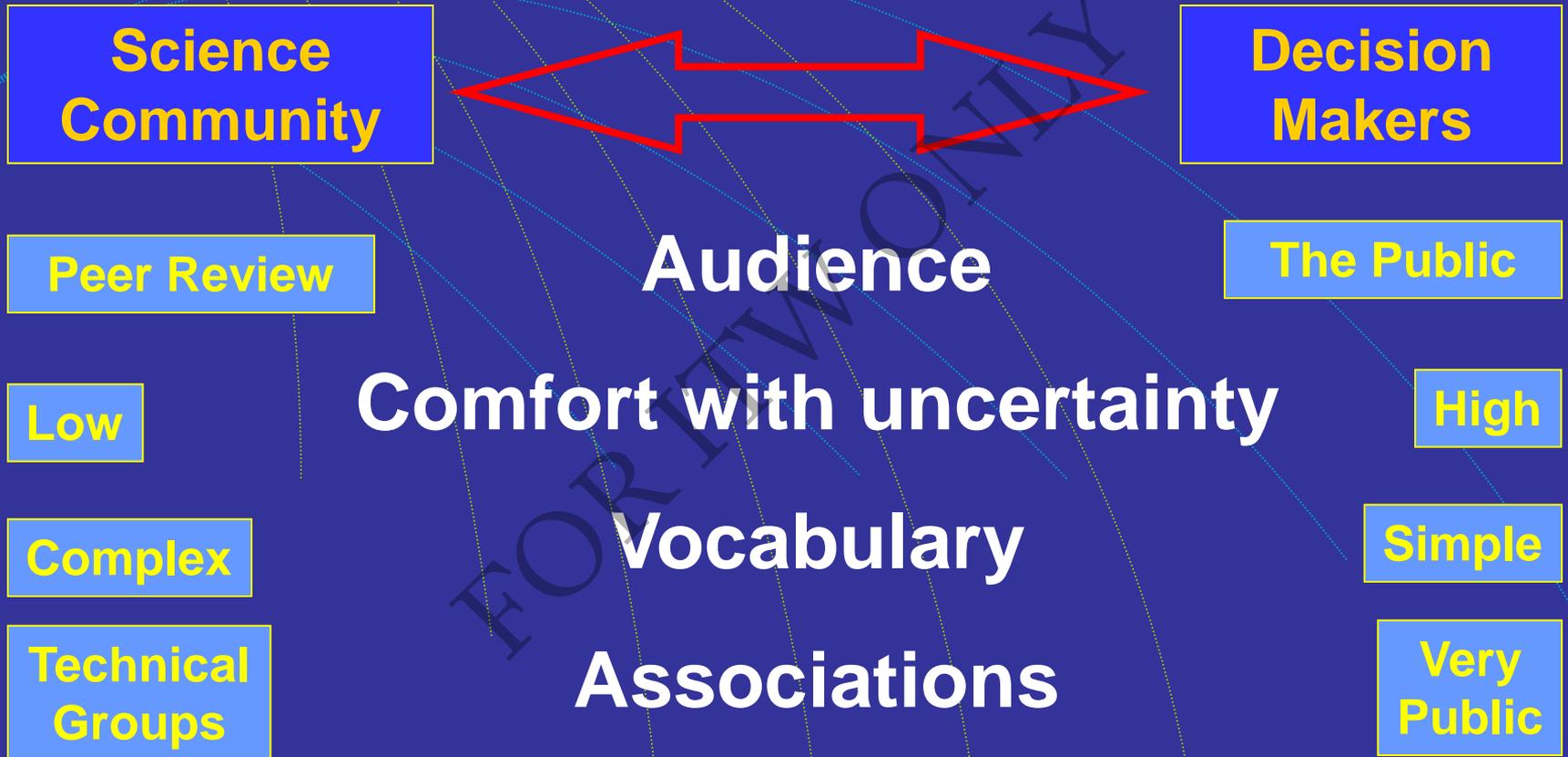
State of Hawaii Support Office
Hawaii SCD,
Diamond Head



Pacific Disaster Center
Maui Research &
Technology Park,
Maui



Building a Bridge



Our Center ...

- Applied Science & Technology
- Information Products Supporting:
 - Policy & Decision Makers,
 - Disaster Managers
 - Humanitarian Assistance



Observation Systems /Data

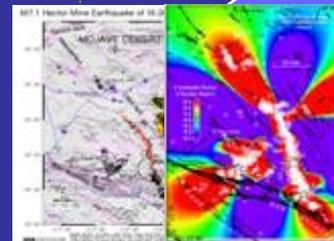
**Integrating
Information, Science,
Technology**



GIS, Visualization and Display Systems



**Improve
Decision-Support
Capabilities**



Advanced Applications, Algorithms, Models



Communication Systems and Networks

Disaster Management Challenges ...

- It is difficult for **Decision Makers** to acquire, process and act upon existing hazard warnings:

- Information is Scattered
- Warnings are Hard to Integrate
- Lack Situational Awareness
- No context to understand Risk
- Dissemination is Limited

- Time is **LIFE**

Sample Advisories

WTPN32 PGTW 231500
 MSGID/GENADMIN/NAVPACMETOCEN PEARL HARBOR HI/JTWC//
 SUBJ/TROPICAL CYCLONE WARNING/
 RMKS/ **Hurricane**
 1. TYPHOON 24W (MITAG) WARNING NR 014
 02 ACTIVE TROPICAL CYCLONES IN NORTHWESTPAC

Starting time: HST 11/14/2005 11:39 **Tsunami**
 Starting time: UTC 11/14/2005 21:39
 Location: longitude 144.8 EAST latitude 38.2 NORTH
 Magnitude: 7.3

<u>MAG</u>	<u>UTC DATE-TIME</u>	<u>LAT</u>	<u>LON</u>	<u>DEPTH</u>	<u>Region</u>	<u>EQ</u>
	<u>y/m/d h:m:s</u>	<u>deg</u>	<u>deg</u>	<u>km</u>		

Long Valley Caldera Daily Update issued Jan 9, 2008 11:23 PST
Volcano Alert Level NORMAL - Aviation Color Code GREEN



Volcano

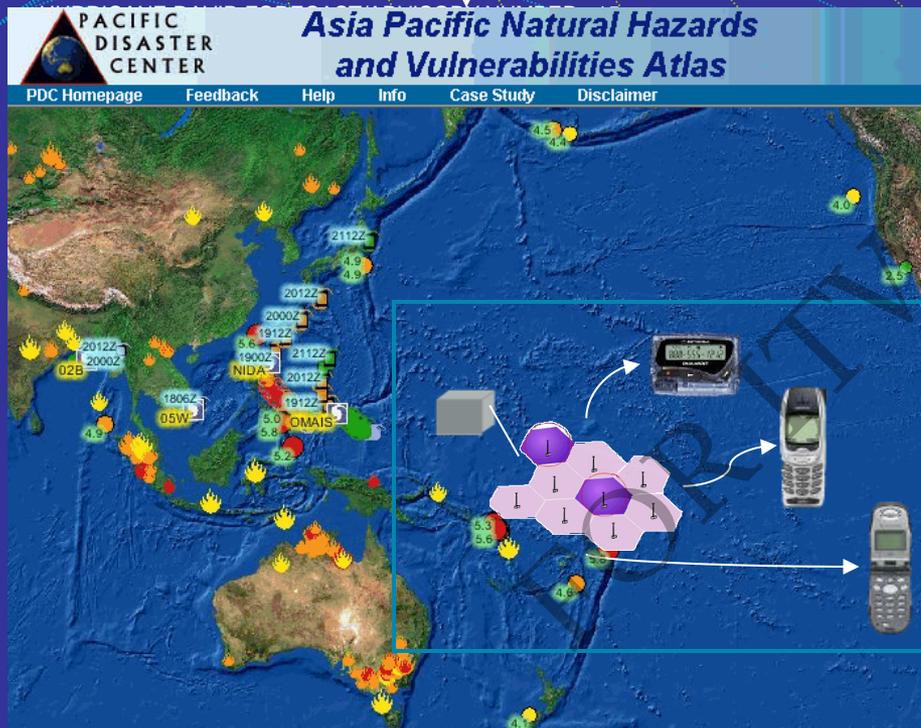
The real-time detection system located three small earthquakes in the Long Valley caldera area since the last update at 10:33 AM on January 8. The events, all with magnitudes below 2.0, were located in the Sierra Nevada south of the caldera.

Kilauea Daily Update issued Jan 9, 2008 08:42 HST
Volcano Alert Level WATCH - Aviation Color Code ORANGE

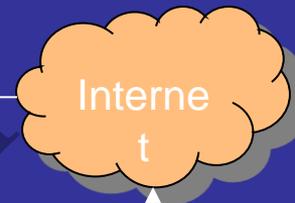


Report prepared by the Hawaiian Volcano Observatory (HVO): Activity Summary for last 24 hours: Lava flow activity was centered on the rootless shields farthest to the southeast. Flows advanced short distances toward the south and east. HVO ...

PDC Approach ...



Multi Hazard Risk Assessment and Warning Dissemination

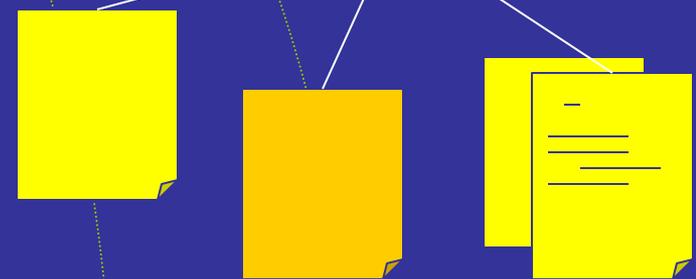


PDC – DisasterAWARE

GIS Applications

Model Model Model

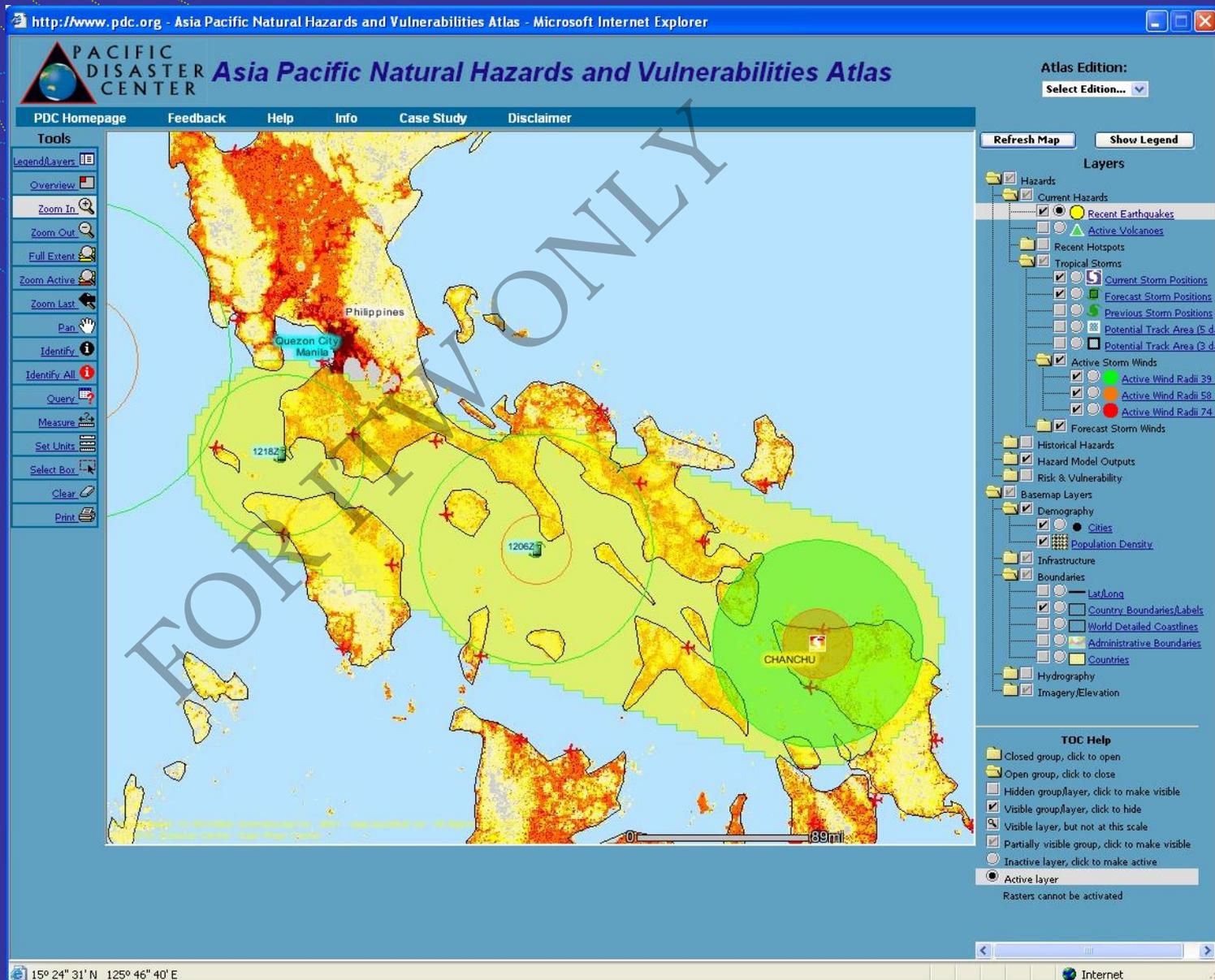
Enterprise Services



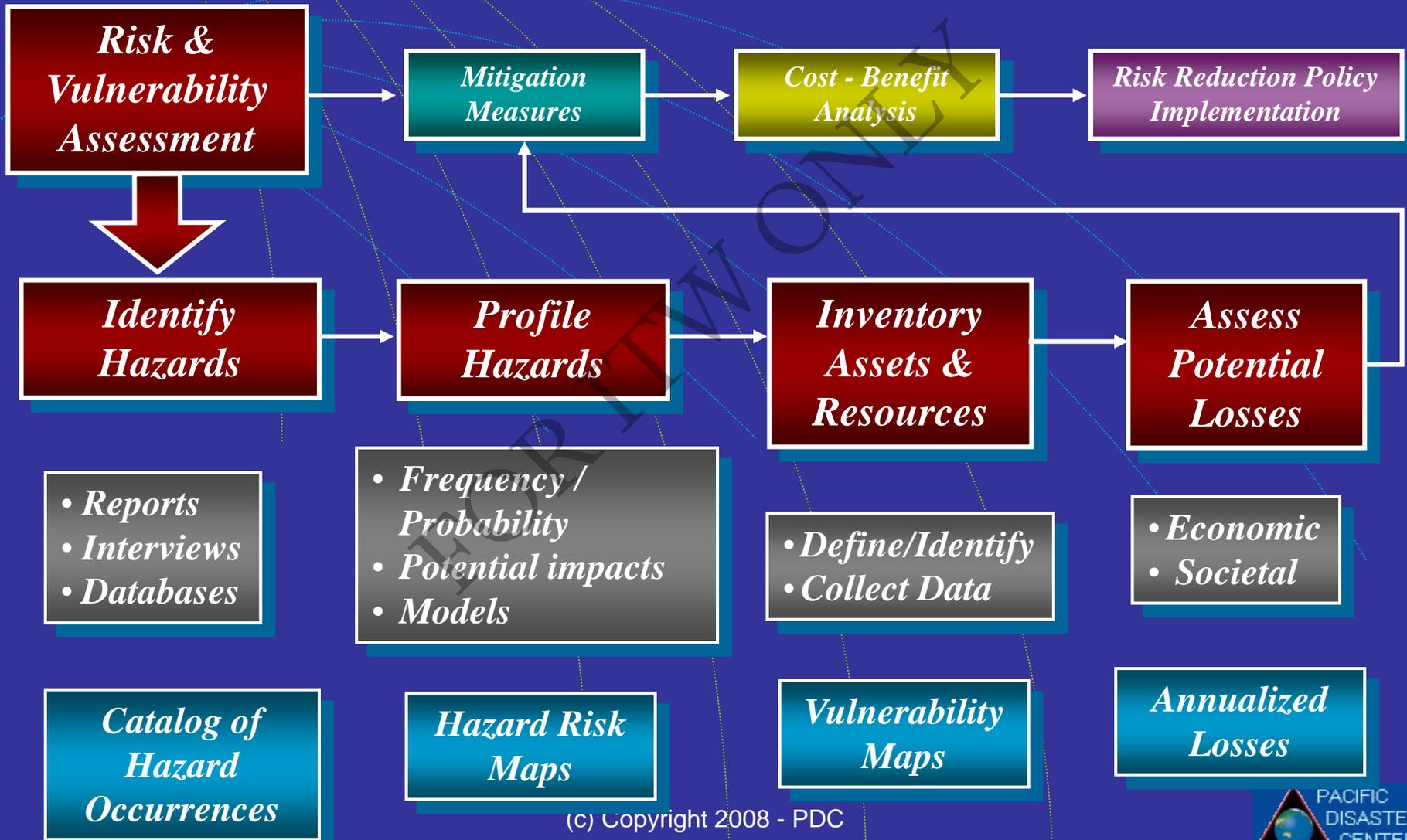
Simplify, Integrate, Understand Risk ...

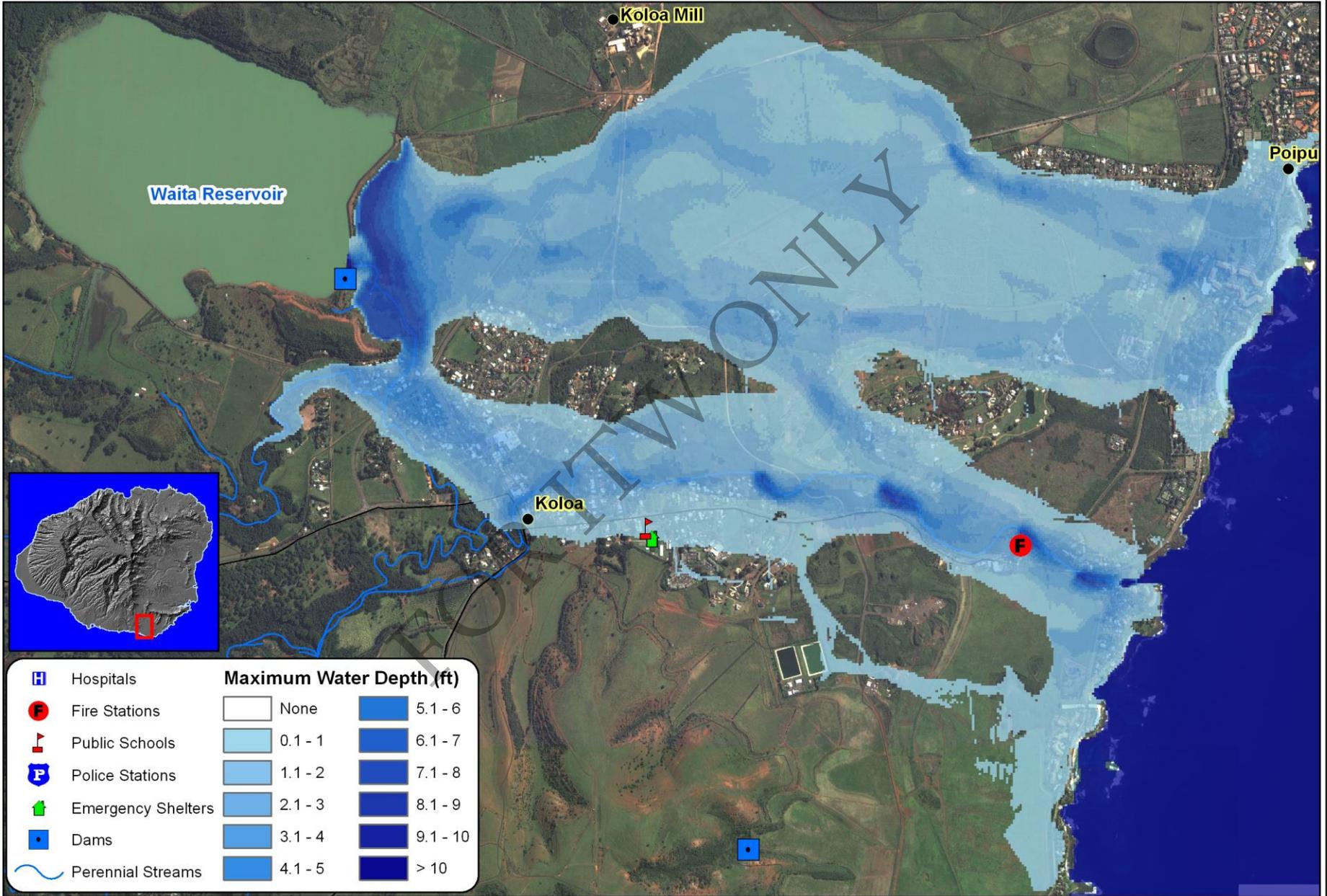
May 11, 2006

- Automate & Simplify
- Integrate ...
- Intensity Zones (EQ & Storms)
- Infrastructure
- Hazard Zones (model-based)
- Population at Risk



RVA Implementation Strategy

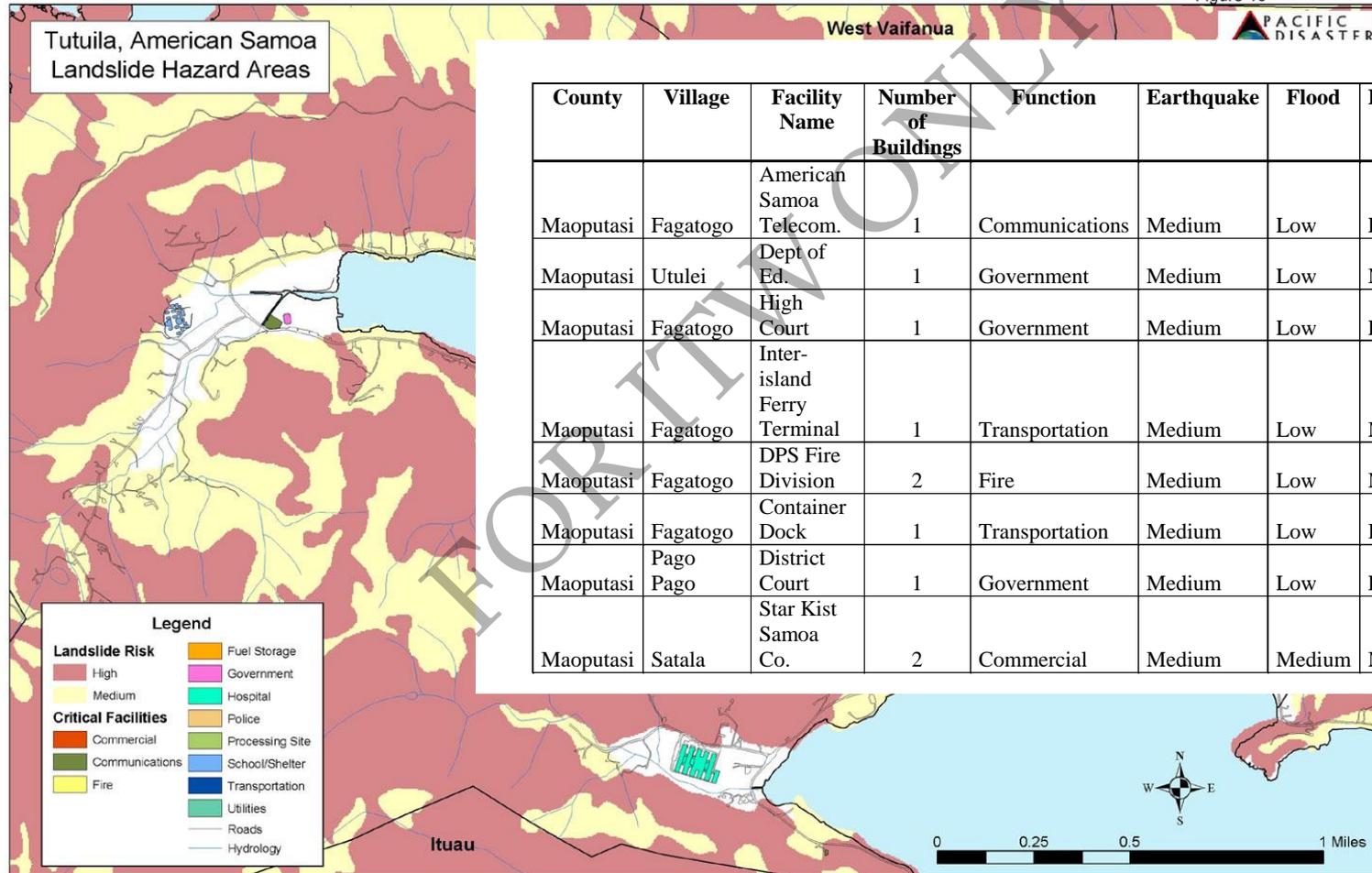




Landslide Hazard

Landslide Hazard displayed in context with Critical Facilities and basic infrastructure

Figure 16



County	Village	Facility Name	Number of Buildings	Function	Earthquake	Flood	Landslide	Storm Surge / Tsunami
Maoputasi	Fagatogo	American Samoa Telecom.	1	Communications	Medium	Low	Low	High
Maoputasi	Utulei	Dept of Ed.	1	Government	Medium	Low	Medium	High
Maoputasi	Fagatogo	High Court	1	Government	Medium	Low	Low	High
Maoputasi	Fagatogo	Inter-island Ferry Terminal	1	Transportation	Medium	Low	Medium	High
Maoputasi	Fagatogo	DPS Fire Division	2	Fire	Medium	Low	Medium	High
Maoputasi	Fagatogo	Container Dock	1	Transportation	Medium	Low	High	High
Maoputasi	Pago Pago	District Court	1	Government	Medium	Low	Low	High
Maoputasi	Satala	Star Kist Samoa Co.	2	Commercial	Medium	Medium	Medium	High

Earthquake Vulnerability Map

Marikina City Earthquake Risk



Legend

- ◆ Bridge
- City Hall
- Barangay Hall
- Public Safety Center
- Fire Station
- Elementary School
- Hospital
- Market
- Residential Buildings
- Business Buildings
- River
- Fault line (PHIVOLCS)
- Roads
- Barangay Boundary

Peak Ground Acceleration cm/s2 (MMI)

- 710 - 860 (IX)
- 620 - 710 (IX)
- 580 - 620 (IX)
- 550 - 580 (IX)
- 510 - 550 (IX)
- 430 - 510 (VII)
- 320 - 430 (VII)

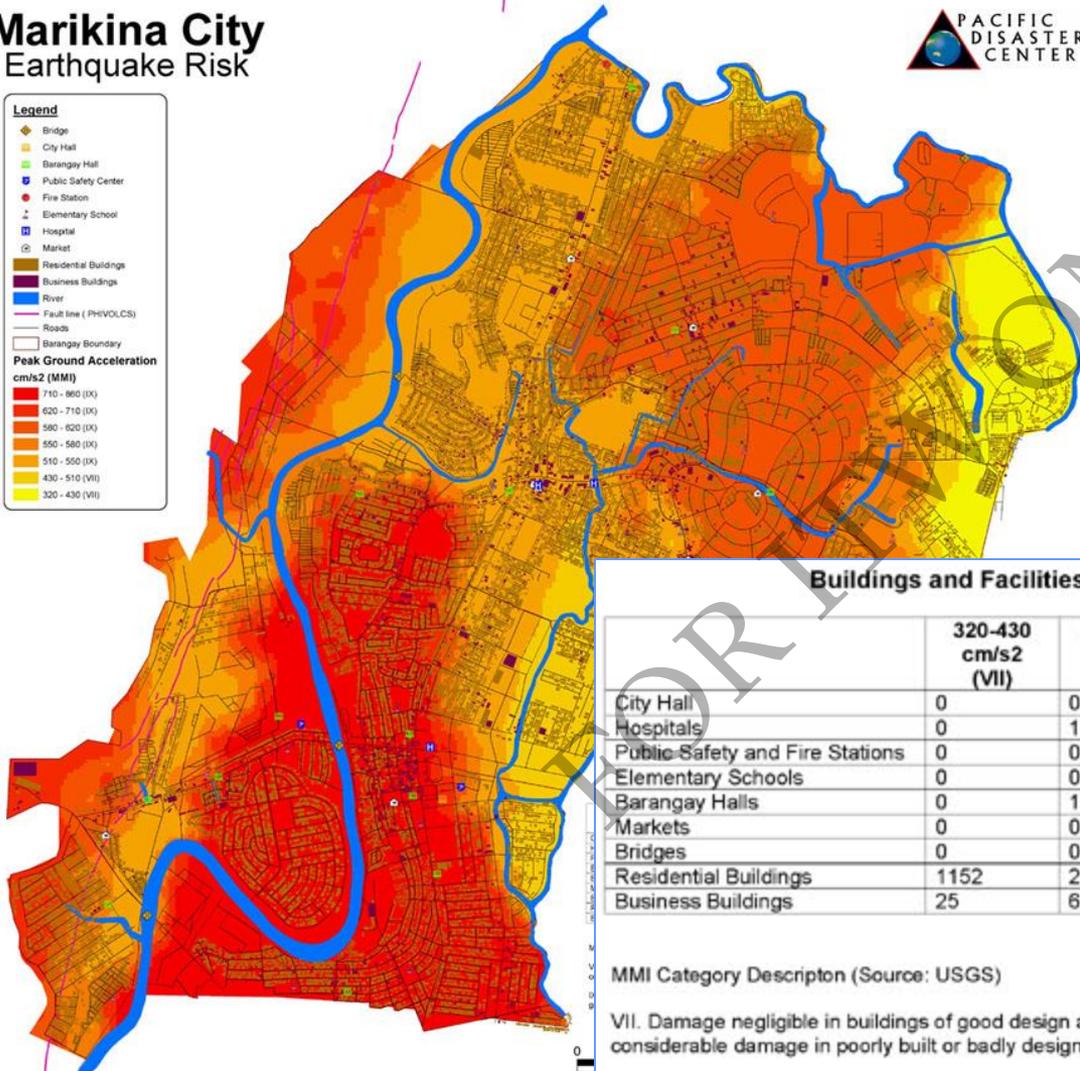
Legend

- ◆ Bridge
- City Hall
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- Residential Buildings
- Business Buildings
- River

- Fault line (PHIVOLCS)
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Peak Ground Acceleration cm/s2 (MMI)

- 710 - 860 (IX)
- 620 - 710 (IX)
- 580 - 620 (IX)
- 550 - 580 (IX)
- 510 - 550 (IX)
- 430 - 510 (VII)
- 320 - 430 (VII)



Buildings and Facilities within Peak Ground Acceleration (PGA) Categories

	320-430 cm/s2 (VII)	430-510 cm/s2 (VII)	510-550 cm/s2 (IX)	550-580 cm/s2 (IX)	580-620 cm/s2 (IX)	620-710 cm/s2 (IX)	710-860 cm/s2 (IX)
City Hall	0	0	0	0	0	1	0
Hospitals	0	1	2	0	1	0	1
Public Safety and Fire Stations	0	0	1	0	2	0	1
Elementary Schools	0	0	8	3	5	1	5
Barangay Halls	0	1	3	1	3	1	5
Markets	0	0	3	2	2	0	1
Bridges	0	0	3	0	1	0	1
Residential Buildings	1152	2329	10298	6476	7672	1525	7255
Business Buildings	25	68	759	297	424	90	631

MMI Category Description (Source: USGS)

VII. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.

IX. Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.

Consequence Assessment



Viet Nam Dyke Breach Assessment Report

1 Purpose

The purpose of this case study is to better understand the inundation and resulting impacts from hypothetical breaching of dykes along the Black and Red Rivers in northern Viet Nam. These scenarios approximate plans by D even larger impacts to lives and flooding conditions. Impact analysis mitigation options and evaluate procedures. The scenario was infrastructure and asset data collection Disaster Management Committee

2 Background

Water Diversion Location
Thuong Nong
Thach Dong
Dong Luan

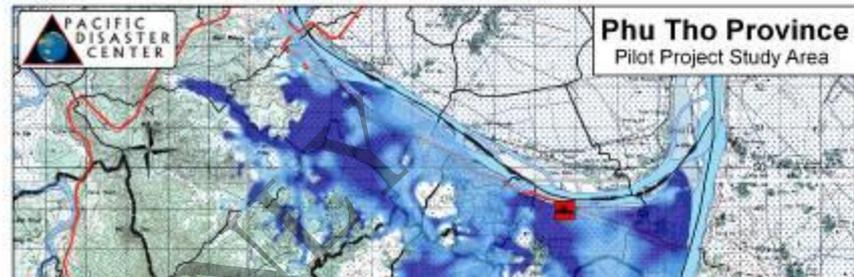
3 Consequence Analysis

3.1 Scenario Parameters

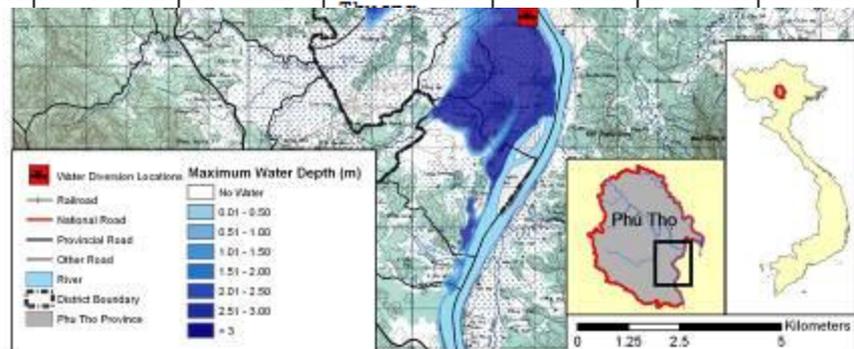
Dyke #1
River:
Height:
Rate Discharge:
Estimated Breach Size:

Dyke #3	Model Assumptions
River:	Black River
Height:	5 meters
Rate Discharge:	550 cubic meters/second
Estimated Breach Size:	137 meters

Dyke #4	Model Assumptions
River:	Red River
Height:	5 meters
Rate Discharge:	300 cubic meters/second
Estimated Breach Size:	55.5 meters



Infrastructure Type	Commune	Distance to Nearest Breach Location (km) *	Time to First Arrival (hours)	Name of Nearest Breach Location	Maximum Water Depth (m)	Latitude	Longitude
Pumping Station	X. DỄU DING	0.87	2.57	Thuong Nong	3.44	21.2476	105.3134
School	X. DỄU DING	2.11	8.98	Thuong Nong	1.02	21.2453	105.3008
School	X. DỄU DING	1.90	8.34	Thuong Nong	1.00	21.2415	105.3031
Clinic	X. DỄ NẾU	5.79	46.20	Thuong Nong	0.11	21.2425	105.2653
Commune Office with Police	X. DỄ NẾU	5.89	42.35	Thuong Nong	0.54	21.2409	105.2644
Post Office	X. DỄ NẾU	5.78	42.99	Thuong Nong	1.83	21.2413	105.2655



Hypothetical Scenario

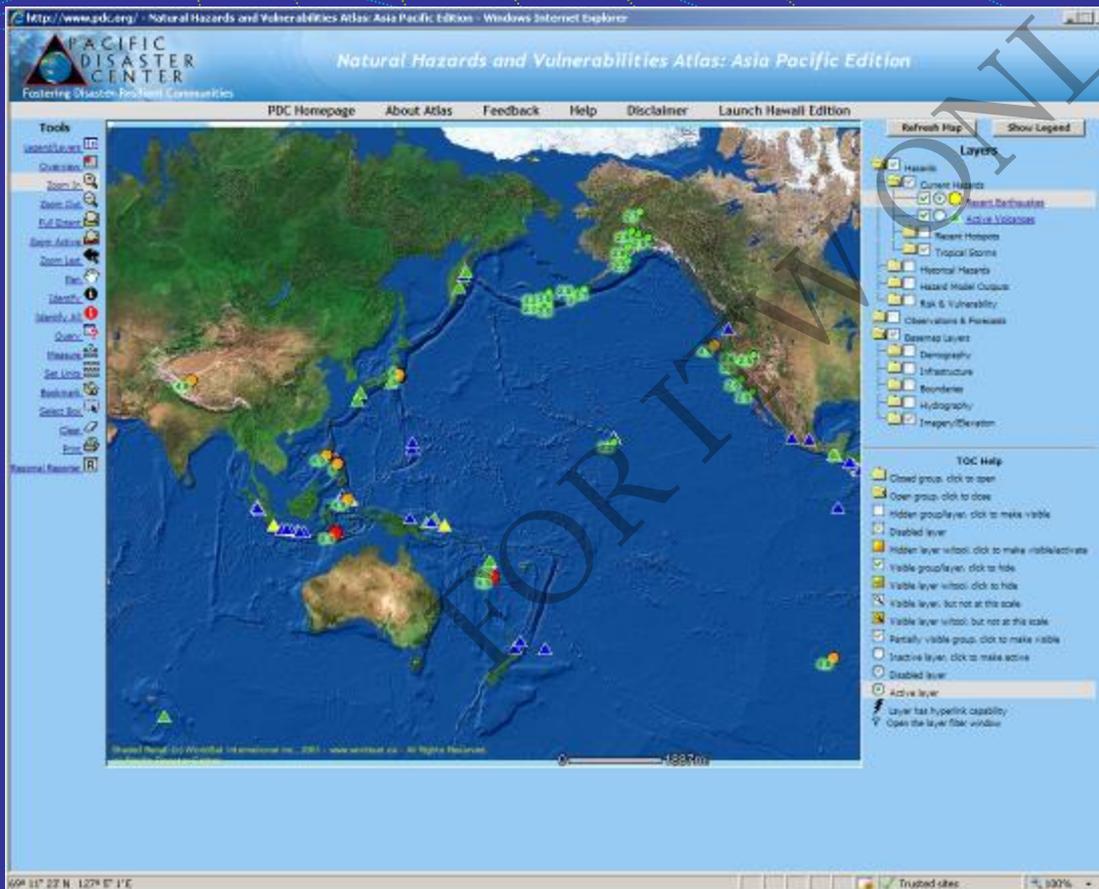
Vietnam Dyke Breach Scenario

11/3/2007



Asia Pacific Natural Hazards Atlas

Web-based, Geospatial Information Application Supporting Regional Hazard and Vulnerability Assessments



Natural Hazards

- Tropical Storms
- Wildfires
- Earthquakes
- Tsunamis
- Volcanoes
- Floods

Risk Exposure

- People
- Infrastructure

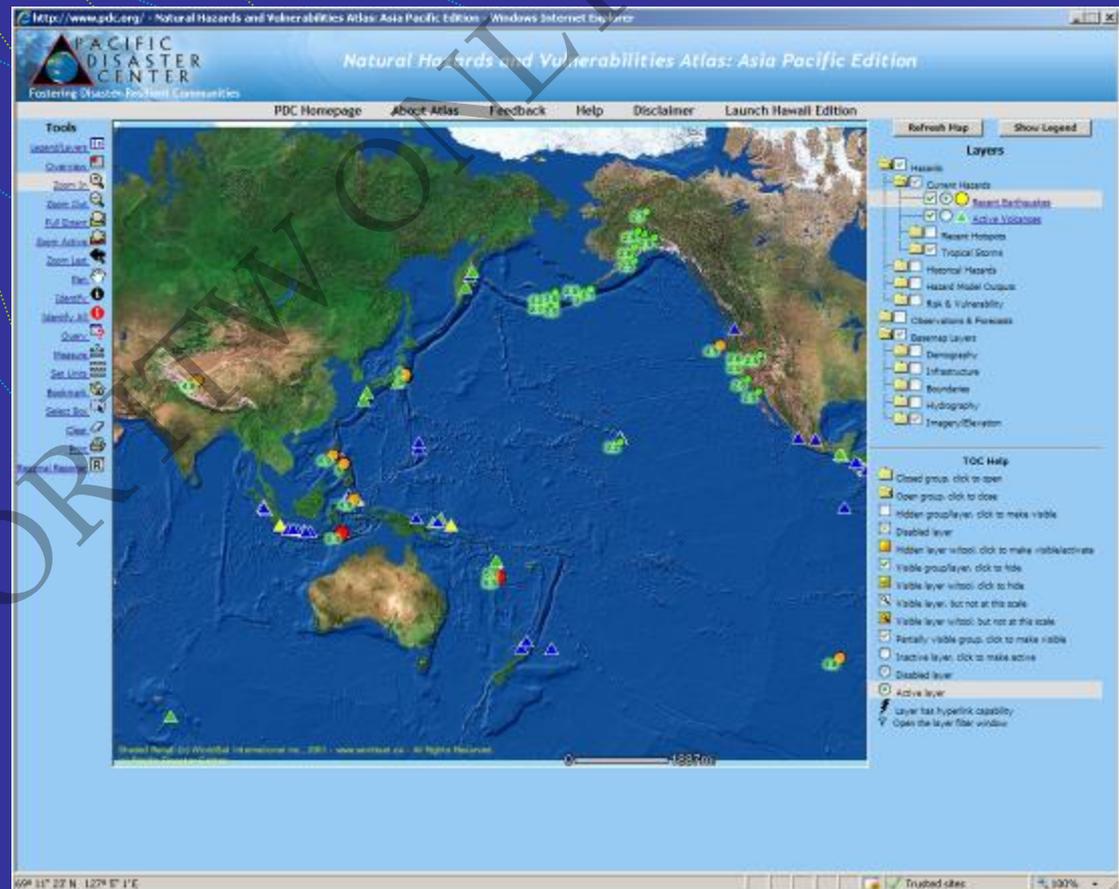
<http://atlas.pdc.org>

Global Natural Hazards Atlas

Web-based, Geospatial Information Application Supporting World-Wide Hazard and Vulnerability Assessments

The Global Edition expands upon the Asia Pacific Atlas by including Global Coverage plus...

- International Charter Activations
- GLIDE numbers
- Tsunami Travel Time
- Sea Surface Temperature
- USGS ShakeMap
- Avian Flu Cases
- And much more...



Hawaii Hazards and Vulnerabilities Atlas

Municipal-level Information for Community-based Risk Assessment, Preparedness and Mitigation

- Hawaii natural hazards and R & V data including:
 - Lava flows, FEMA flood zones, hazardous dams
- Emergency services including:
 - Police and fire stations, hospitals, shelters
- Public facilities including:
 - Schools, hotels, banks
- Transportation networks including:
 - Airports, seaports, bridges
- Elevation data including:
 - Shaded reliefs, 500 foot contours
- Imagery including:
 - Cloud-free Landsat, aerial photography



EMOPS 2.0 Decision Support System

- Local Level Data with access to PDC Integrated Hazards and Products
- Password-protected and restricted to emergency managers and decision-makers

Emergency Operations: EMOPS-2

Powered by PDC's DisasterAWARE: All Hazard Warnings, Analysis, and Risk Evaluation System

PDC Home | Feedback | FAQ | Help | Disclaimer

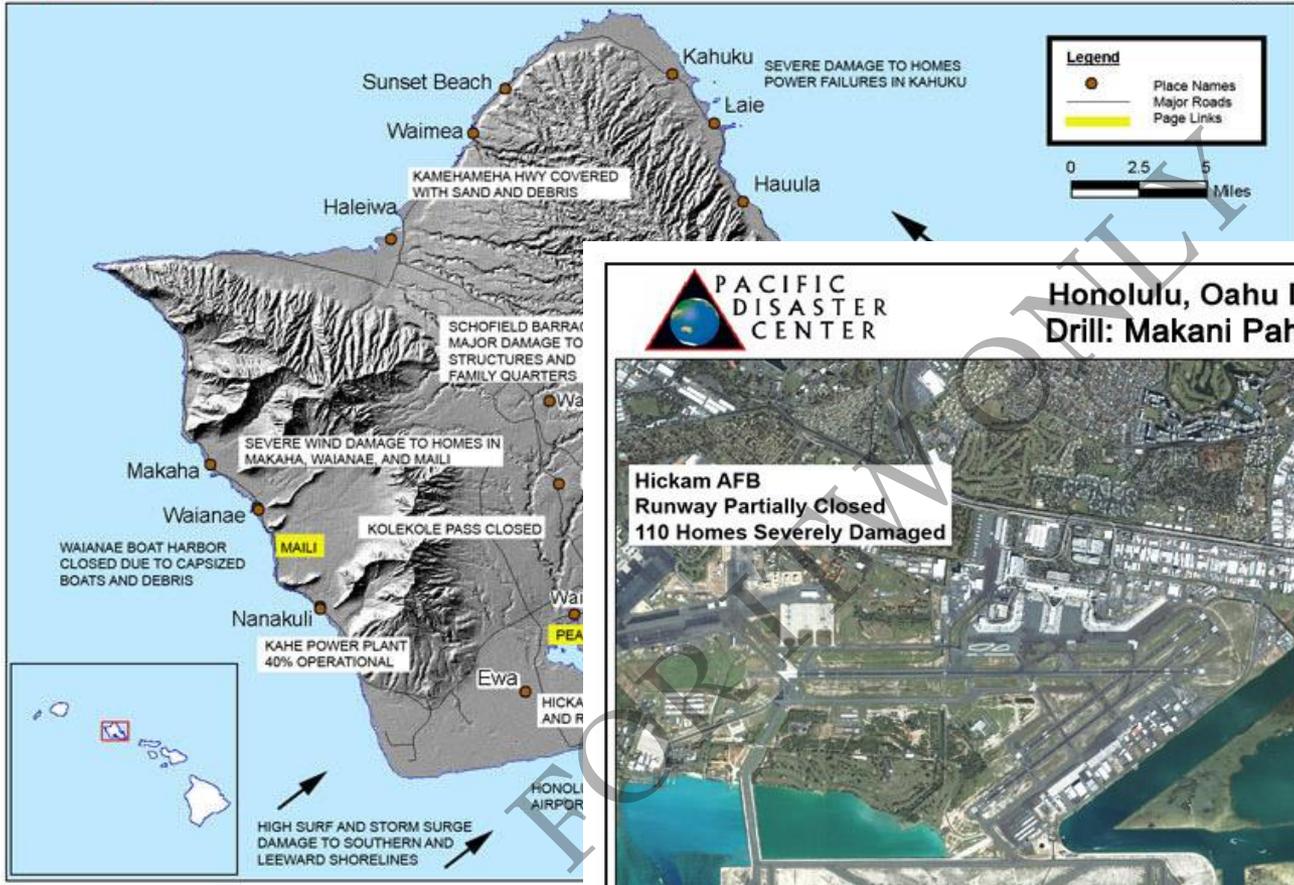
Tools: DisasterAWARE, Legend/Layers, Changeview, Zoom In, Zoom Out, Full Extent, Zoom Active, Zoom Level, Pan, Identify, Identify All, Measure, Set Units, Bookmarks, Select Box, Clear

Layers: Hazards, Current Hazards, 10000+ Hazards, Recent Earthquakes, Active Volcanoes, Recent Hotspots, Tropical Storms, Historical Hazards, Hazard Model Outputs, Risk & Vulnerability, Observations & Forecasts, Basemap Layers, Demography, Infrastructure, Seismology, Hydrography, Imagery/Deviation

Active Hazards

#	Severity	Type	Hazard Name	Category	# Prods	GMT - Last Update	GMT - 10:00	Status
1	High	Q	5.5 - Banda Sea	EVENT	1	2009-04-20 13:04	2009-04-20 03:04	Active
2	High	Q	5.3 - Volcano Islands, Japan region	EVENT	1	2009-04-20 11:04	2009-04-20 01:04	Active
3	High	Q	5.3 - Ryukyu Islands, Japan	EVENT	1	2009-04-20 08:04	2009-04-19 22:04	Active
4	High	Q	6.1 - Kepulauan Talud, Indonesia	EVENT	2	2009-04-19 11:34	2009-04-19 01:34	Active

Overview of Oahu Damage Drill: Makani Pahili 2008



system

Refresh Map Show Legend

LAYERS

- Hazards
- Current Hazards
- D2P2 - Hazards
- Recent Earthquakes

Honolulu, Oahu Damage Drill: Makani Pahili 2008



SELECTED HAZARD Tropical Depression - Makani | Expired [a](#)

Available Product(s) 4 Products are hidden

- Tropical Depression - Makani
- Sitrep Damage Maps(1)
- Advisornv #26(6)

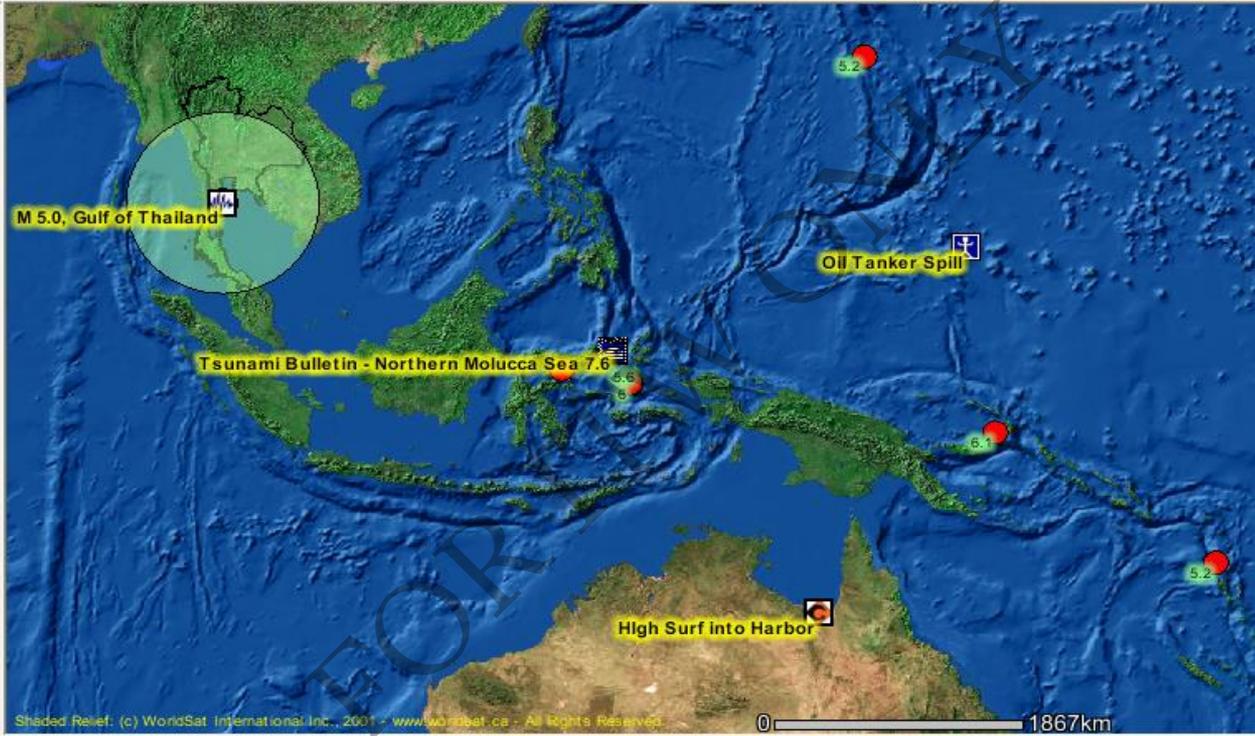
National Disaster Warning Center, Thailand

DisasterAWARE

Powered by Pacific Disaster Center

Tools

- Legend/Layers
- Overview
- Zoom In
- Zoom Out
- Full Extent
- Zoom Active
- Zoom Last
- Pan
- Identify
- Identify All
- Query
- Find
- Measure
- Set Units
- Bookmark
- Buffer
- Select Box
- Clear
- Print



Refresh Map Legend

Reload Hazards

Layers

- Hazards
 - Current Hazards
 - Hazards
 - Recent Earthquakes
 - Historical Hazards
 - Hazard Model Outputs
 - Tsunami Travel Time
 - Possible Earthquake Damage
 - Risk & Vulnerability
 - Historical Weather Data
 - Basemap Layers
 - Demography
 - Infrastructure
 - Hydrography
 - Boundaries
 - Imagery/Elevation

TOC Help

- Closed group, click to open
- Open group, click to close
- Hidden group/layer, click to make visible
- Hidden layer w/tool, click to make visible/active
- Visible group/layer, click to hide
- Visible layer w/tool, click to hide
- Visible layer, but not at this scale
- Visible layer w/tool, but not at this scale
- Partially visible group, click to make visible
- Inactive layer, click to make active
- Active layer
- Open the layer filter window

Rasters cannot be activated

Tools

- [Hazard Listing](#)
- [Automated Hazard Map](#)
- [Message Traffic](#)
- [Model Information](#)
- Administration**
 - [User Preferences](#)
 - [Administration](#)

Updated at 11:57:10 | Auto-refresh in 4:14

[Back](#) [Hazards](#) [Actions](#)

Product listing for: Tsunami Bulletin - Northern Molucca Sea 7.6 **Active**

Products Last Update

Product Name	Update Time
Tsunami Bulletin - Northern Molucca Sea 7.6	01/21/2007 02:32
Tsunami Information Bulletin 002 (PTWC)	01/21/2007 02:32
Tsunami ETA to Forecast Points	01/21/2007 01:53
Tsunami Travel Time Map (Thailand)	01/21/2007 01:53
Pacific Ocean Tsunami Travel Time Map	01/21/2007 01:53
Tsunami Information Bulletin 001 (PTWC)	01/21/2007 01:52

EMOPS Release 3

- Next generation of PDC EMOPS product
- Built on PDC's new Flash Viewer
- Able to integrate multiple sources and data feeds simultaneously

PACIFIC DISASTER CENTER
Fostering Disaster-Resilient Communities

EMOPS Release 3
Powered by PDC's Disaster AWARE

Layers: Hazards, Active Hazards, Historical Hazards, Hazard Model Outputs, Risk and Vulnerability, Observations and Forecasts, Base Map Data, Regional Data, Hawaii Specific Data

Tools: Home, Back, Forward, Stop, Refresh, Print, Full Screen

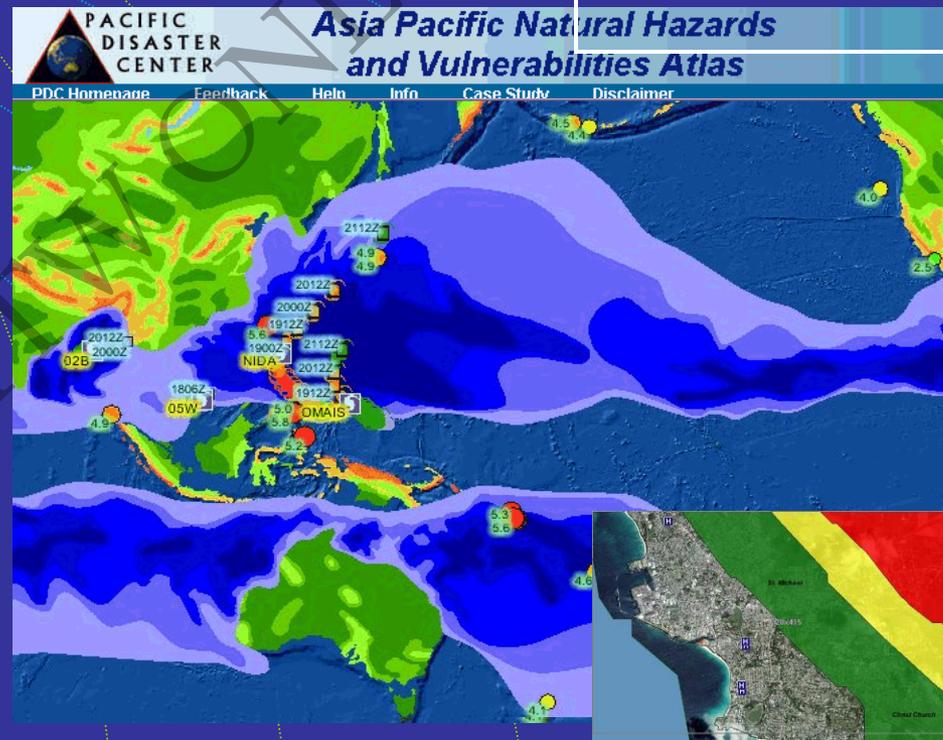
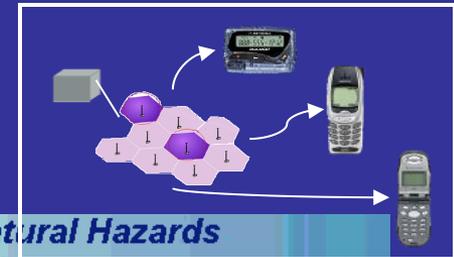
Active Hazards

#	Severity	Type	Hazard Name	Category	# Prods	GMT	Last Update	GMT-10:00	Status
1	5.5	Q	5.5 - Banda Sea	EVENT	3	2009-04-20 13:04	2009-04-20 03:04		Active
2	5.3	Q	5.3 - Volcane Islands, Japan region	EVENT	3	2009-04-20 11:04	2009-04-20 01:04		Active
3	5.3	Q	5.3 - Ryukyu Islands, Japan	EVENT	3	2009-04-20 08:04	2009-04-19 22:04		Active
4	6.7	Q	6.7 - Kepulauan Talaud, Indonesia	EVENT	4	2009-04-19 11:34	2009-04-19 01:34		Active
5	6.6	Q	6.6 - Kuril Islands	EVENT	3	2009-04-18 20:04	2009-04-18 10:04		Active
6		Q	Tsunami Bulletin - Kuril Islands 6.8	EVENT	4	2009-04-18 19:45	2009-04-18 09:45		Active

In Summary ...

Reducing Impacts By:

- Integrate, Simplify, & Expedite Processes
- Understand Dangers and Risks
- Disseminate Warnings
- Decide & Act on Latest Assessments



Multi Hazard Information and Warning