

E-Science Support for Disaster Mitigation in Indonesia

basuki@itb.ac.id

Directorate of Information System and Technology, Institut Teknologi Bandung ISGC 2016

outline



- Iinfrastructure operation, capacity building activities
- national scientific prioritiess
 - Firewatch Movement
- community engagement and support
- Main challenges

Infrastructure operation (NREN/Internet)



TEIN4 Connectivity to NREN (622 Mbps – 1 Gbps)



Inherent/ID-REN connectivity





Infrastructure Updates

Eduroam Setup 2016

- ITB(itb.ac.id) as A NRO (National Roaming Operator)
- Release on April 2016 (operational)
- Inherent/IDREN updates
 - Running on 'emergency mode'
 - Current Backbone on 1 Gbps connected 10 University as Core Backbone
 - In 2016 , 100 Universities will be connected





Infrastructure operation

- Data are downloaded manually from data provider (government agencies)
 - Temperature
 - Humidity
 - Wind Speed
 - Wind Direction
- Data processing done by each institutions (government, and Universities), not integrated and not shared (no web services infrastructure)
- Lack of sensors
 - Earthquake sensor (seismic networks)
 - Automatic Weather Sensor Network
 - CO, CO2, and Particulate matters (2,5 micron and 10 micron)
- No middleware server (web services) for collecting , analyzing , dan deliver the data from specific area



National Scientific Priorities

- Disaster Mitigation
 - Tsunami Early Warning System (INATEWS)
- Disaster Reduction
 - E.g: Flood
- Climate Change Impact

Using data available in some government agencies:

- LAPAN (Indonesian National Institute of Aeronautics and Space)
- BMKG (Indonesian Agency for Meteorology, Climatology, and Geophysics)
- Geological Agency for Volcano Monitoring
- LIPI (Indonesia Research Institute)
- BNPB (National Diaster Management Authority)
- Fire Hazard on Forestry
 - the Ministry of Forestry in Indonesia, in coordination with he Western Australian Government's Land Information Agency, Landgate, and the Indonesian space agency, LAPAN.

Tsunami Early Warning System (INA TEWS)



Indonesia Tsunami Early Warning System (INATEWS)http://inatews.bmkg.go.id/new/latest_eq.php?eventid=201603 07184731&tab=1





- Climate-related research at several institutions (LAPAN, BPPT, Research and Agriculture) with funding and human resources are still very limited
- The density of weather and climate observation stations is still limitedClimate and weather data is very difficult to obtain from official agencies (BMKG)

Collaboration with Community (Garda Caah)

- There is Citarum river along 300 km cross Bandung
- Every year , there were flood around the Citarum River (Bandung)
- There is community called "Garda Caah" (Guard of Flood) who help community around Citarum river for mitigation
- Put Weather station near river and the data sen to ITB
 - Rainfall
 - Wind Direction
 - Temperature/humidity

http://www.citarum.org







Community in Bandung



We've helped the community Majalaya Caah Guard members of the community in the provision of "Early Warning System" flooding that often occurs in the region but the program does not continue due to lack of resources.

Weather Station on river side Citarum



- Location : Kertasari , Bandung
- Deliver data :
 - Rainfall rate
 - Temperature
 - Humidity
- Run by ITB's team





Flood on Bandung (12/3/2016

- Worse in 10 years
- Effect on 15 sub district in Bandung
- Almost 35.000 house effected by flood
- No Early warning system

http://regional.kompas.com/read/201 6/03/13/14044831/Banjir.di.Kabupate n.Bandung.Terparah.dalam.10.Tahun.T erakhir



LAPAN



SADEWA (Satellite Disaster Early Warning System) -<u>http://sadewa.sains.lapan.go.id/</u> (<u>http://60.253.114.151/</u>)



Geology agency for Mitigation, Ministry of Energy and Mineral Resources



Monitoring of Volcanos in Indonesia



PENINGKATAN AKTIVITAS GUNUNG LOKON

Tingkat Aktivitas G. Lokon dinaikkan dari Level II (Waspada) menjadi Level III (Siaga) terhitung mulai tanggal 8 Maret 2016 pukul 02:00 WITA.



Peringatan Dini Gerakan Tanah

Maret 2016

Publish Date : 29 Feb 2016



LAPORAN KEGIATAN STAND PAMERAN KOLOKIUM PUSAT SUMB...





BMKG



Last weather at the airport

http://aviation.bmkg.go.id/web/observation.php

BADAN METEOROLOGI, KLIMATOLOGI, DAN GEOFISIKA Bidang Meteorologi Penerbangan											
	Но	ome	Tentang Kami	Kontak Kar	ni Po	ersetujuan	Cari arti	kel	<mark>ا</mark>		
Peringatan	🕼 Home > Pengamatan > Cuaca Terakhir Bandara 📃 🗰										
SIGMET	Cuaca Terakhir Bandara										
Pengamatan Jum'at, 11 Maret 2016 08:46 UTC											
Cuaca Terakhir Bandara METAR/SPECI & Trend Forecast	No	Ba	andara/Stasiun	Waktu Pengamatan	A Arah (dari)	ngin Kecepatan (km/jam)	Jarak Pandang (km)	Cuaca	Suhu (°C)	Titik Embun (°C)	Tekanan Udara (hPa)
Infra Red Visible Water Vapor Cloud Type	1.	Maimu	n Saleh - Sabang	13:00 WIB	Timur Laut	9.3	8.0	Berawan	31	25	1013
Prakiraan Prakiraan Cuaca Bandara TAF	2.	Sultan Banda	Iskandar Muda - Aceh	15:00 WIB	Timur Laut	13.0	≥10	Berawan	33	24	1009
Wind/Temp SIGWX • High Level SIGWX • Medium Level SIGWX	3.	Cut Ny Meulai	vak Dien Nagan Raya - ooh, NAD	13:00 WIB	Barat Daya	9.3	≥10	Cerah - berawan	32	27	1010
Lain-lain Artikel Stasiun	4.	Maliku: Lhokse	ssaleh - eumawe	15:00 WIB	Barat Laut	13.0	6.0		31	25	1009

National Diaster Management Authority (BNPB)



Geospatial data

(http://geospasial.bnpb.go.id/)

HOME	WEB GIS	PETA DASAR	PETA TEMATIK	RENCANA NASIONAL	LAIN-LAI	N PETUNJUK	Q, Search	Select Language V
BN	P B B		SPAS DNAL PENANG	GULANGAN BENC	CANA	PETA TERKINI Peta Indeks Rawan Peta Intensitas Gen Info Bencana Terkii Info Bencana Terkii	Bencana Indonesia 2012 npabumi P. Sumba, NTT ni Gempabumi Pulau Sumb ni Gempabumi Buru Selata ni Gunungapi Soputan, Suli	ia, NTT n, Maluku awesi Utara
						Map Satellite for Male	d aysia Indonesia Map da	a S Contactor Sea A S Contacto
 Provide Provide			Image: Section of the section of t	eseluruhan penduduk yang teranc an panas, lava, gas beracun atau li eluruh KRB berjumlah 1.054 oran ebar di 6 desa, terdiri dari 505 oran k laki-laki dan 549 orang penduduk	am [ahar [g h ng [k h F	Daftar KML Bencan http://geospasial.bnpb.go Daftar GeoRSS Ben http://geospasial.bnpb.go Map Services Peta Dasar Peta Tem	a 9.id/kml/ Cana 9.id/rssbencana/ 1atlik	
Info Be Gunur Ierus r Peta di atas	ncana Terkin g Egon - Akhvitas meminikat sehingga memiliki resolusi n	i Gunungapi Eg vultanik Gunungapi Eg vultanik Gunung Egon di Pusat Vulkanologi dan endah dan mengalami d	on, NTT Kabupaten Sikka Nusa Ten Mitgan Bencana Geologi Istorsi mformasi Untuk n	ogara Timur (PVMBG) nendapatikan peta dalam ukurar		Download Shakema Shakemap Gempabumi Aplikasi Geospasia Feed Geospasial Par Coogle play	ap Gempabumi Terba Terbaru (PDF) I BNPB di Android ntauan Bencana Andrew ay in • Coogle play	ru
part at the part of the	Ande ne e mende	anana na probata di	Sen ston var inv Anunio	za ustil ens vete hia ken		Komentar Terbaru	ecantikan on Peta Sebaran	Jumlah Kejadian Bencana

- November 2014
- Tempat Wisata di Jawa Barat on Peta Sebaran Jumlah Kejadian Bencana



FireWatch Indonesia and environment effect in Indonesia



Firewatch in Forestry

- Iniatiatited by Ministry of Forestry in the early 2001
- In 2009 collaboration between Indonesia and Australia (Landgate) for reducing the fire and hazard smoke
 - Ministry of Forestry , Ministry of Environment and Indonesia National Insitute of Aeronautics and Space (LAPAN)
 - Australia , LANDGATE
- Deliver the Data from satellite through Network (Inherent/NREN in 2010 2012)
 - Ministry of National Education
- In 2014
 - Burning from the Land in Sumatra and Kalimantan causes Haze to other country
- In 2015
 - Iniatiated by community \rightarrow made big environment impacts



Firewatch Initiatives

MODIS-Data

Socialize Firewatch application

- Facebook
- Twitter



Indofire (2010)





MODIS Data – NASA

- Source Data from MODIS Data- NASA
- https://earthdata.nasa.gov/ earth-observationdata/near-realtime/firms/active-fire-data
- Updates every days
- Deliver using KML (google earth)
- With the KML format , directly we can used the exact information where the fire's came from



Google with KML's data from MODIS NASA









Capture on 30-10-2015





Earth.nullschool.net

- a visualization of global weather conditions forecast by supercomputers updated every three hours
- The indicators :
 - COsc , Carbon Monoxide surface concentration
 - Wind directions and speed
- Good as a models



29-10-2015



10.09 WIB



15.57 WIB





30-10-2015



Community Engagement and Support



- Government Support
 - Ministry of National Education
 - Ministry of Forestry and Environment
- University Support
 - Weather Modelling
 - Sekolah Bebas Asap (Reduce pollution index in Classroom)
- Community Support
 - Garda Caah for Flood Reduction
 - Indonesia bebas asap (Smoke-Free Indonesia)



Installation for reduce Polution Index in Classroom

Zeily Nurachman , Department of Chemistry ITB

Background



- The smoke from wildfire in Sumatra and Kalimantan (peat land)
- The effect of the fire in Foresty effected untill more than 300 km from the source
- For example ; the source from the fire in South Sumatra and the effect of the smoke , CO and particulate matters (PM) until West Sumatra
- When haze came , school dismissed the students. This dangeorus because they do not come to safe places
- Several researcher from ITB initiatives to build safe class in class and building the haze protection system

Principle



	TERBUKTI (Proven)	Reduce air polution Index		
Haze	MUDAH (Simple)	Simple implementation and maintenance		
protection System	MURAH (Cost effectiveness)	Cheap mateial , easy to install		
	EDUKASI (Education)	The education's media for pupil /students		
	MUMPUNI dan KONTINYU	Can be used continuously after		

(Reliable and Sustainable)

Can be used continuously after the smoke problem is finished





Location : SD Percobaan – Kota Padang timeline : 27 – 28 Oktober 2015



Installation system







Results



Reduce Air Polution Index

✓ Index on City (Padang) = 288
 ✓ Index on the class room after installation = 78



President's visited to School with Haze protection





Main Challenges



Data sharing

- Data are available only in web based information systems
- Need to develop web services to make those data available to others
 - http://weather.meteo.itb.ac.id/aws.php is one example that have some of their data available to others using web service (by request)
- Build the model for reduce impact on Disaster
 - Fire on Forestry / Land fires
- Build the Sensor Network
 - AWS (Automatic Weather Station)
 - Carbon Monoxide (CO)
 - Carbon Dioxide (CO2)
 - Particulate Matter
- Map server
 - **1:25.000**
 - Geotag
- Simuation on Environment impact
- Dissemination via Social Media (FB , Twitter)

Next Action Plan



- ITB's will inisiated again the firewatch movement
 - Build the webservice models
 - Build environtment sensor in
- The weather models such WRF Could be for next prediction for the firewatch and haze on the Indonesia and region
- Thank You [©]

References



- http://inatews.bmkg.go.id/new/index.php
- http://sadewa.id/
- http://pvmbg.bgl.esdm.go.id/#
- http://aviation.bmkg.go.id/web/observation.php
- http://weather.meteo.itb.ac.id/aws.php
- http://meteo.bmkg.go.id/prakiraan/streamline
- http://weather.meteo.itb.ac.id/wam.php?id=6
- <u>http://geospasial.bnpb.go.id/category/rencana-nasional/peta-risiko/</u>
- http://indofire.dephut.go.id/