COUNTRY REPORT 2011
UNIVERSITY OF TOKYO
JAPAN

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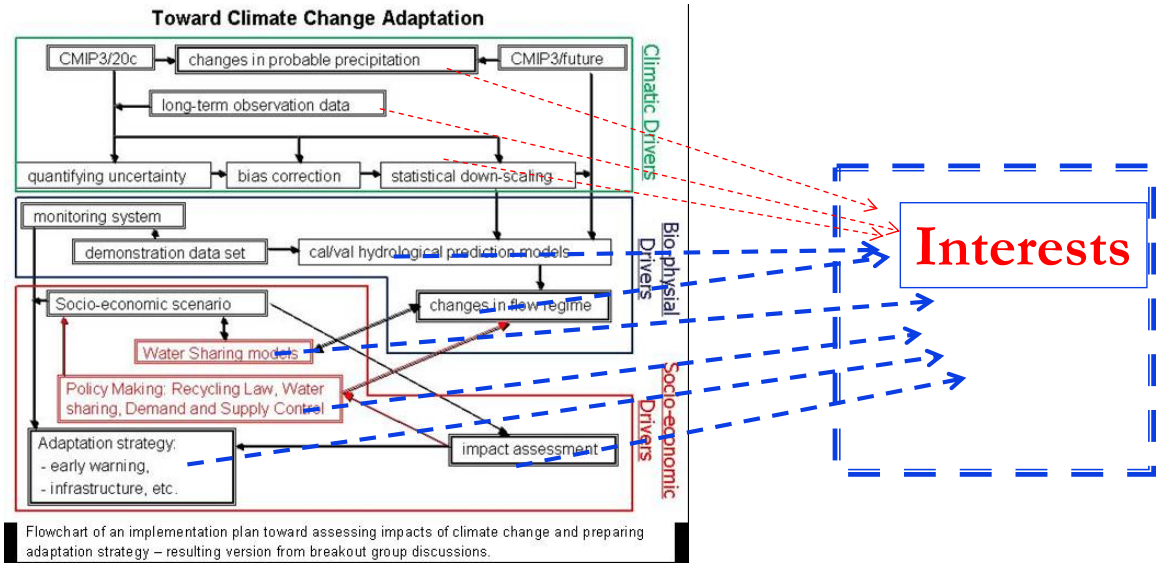
Outline

- Introduction:
- Several Activities
  - Research Metdhology Update
  - Education
  - Community Services
  - National Policy

INTRODUCTION

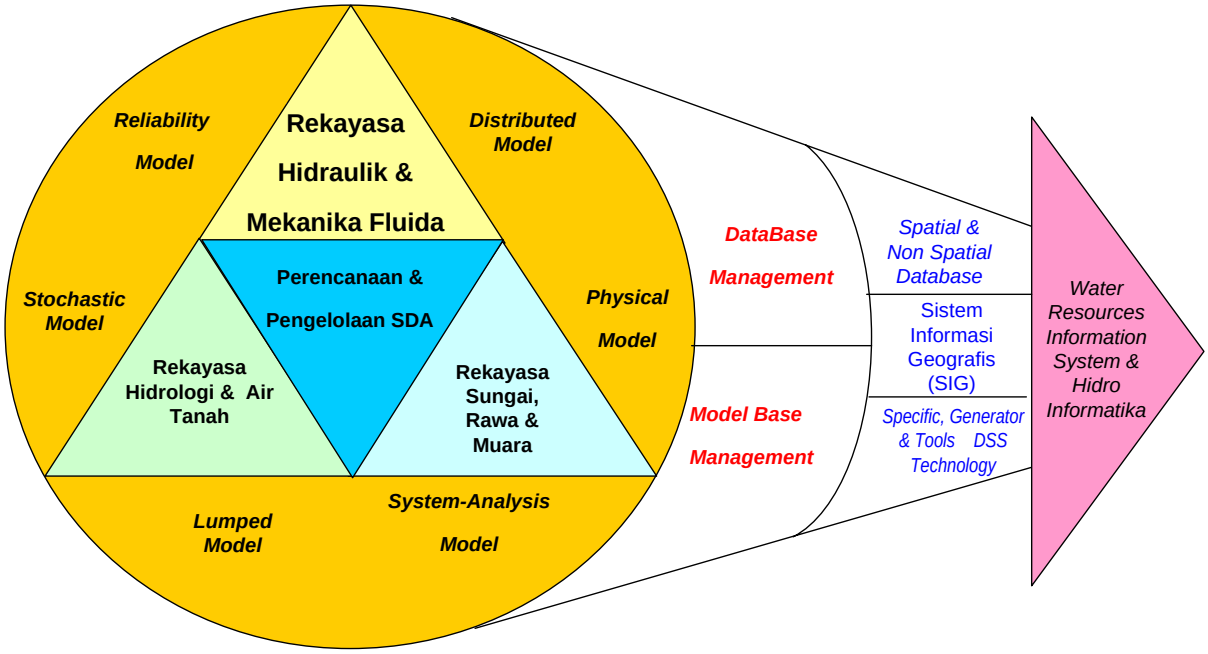
Introduction : Road Map



Flowchart of an implementation plan toward assessing impacts of climate change and preparing adaptation strategy – resulting version from breakout group discussions.

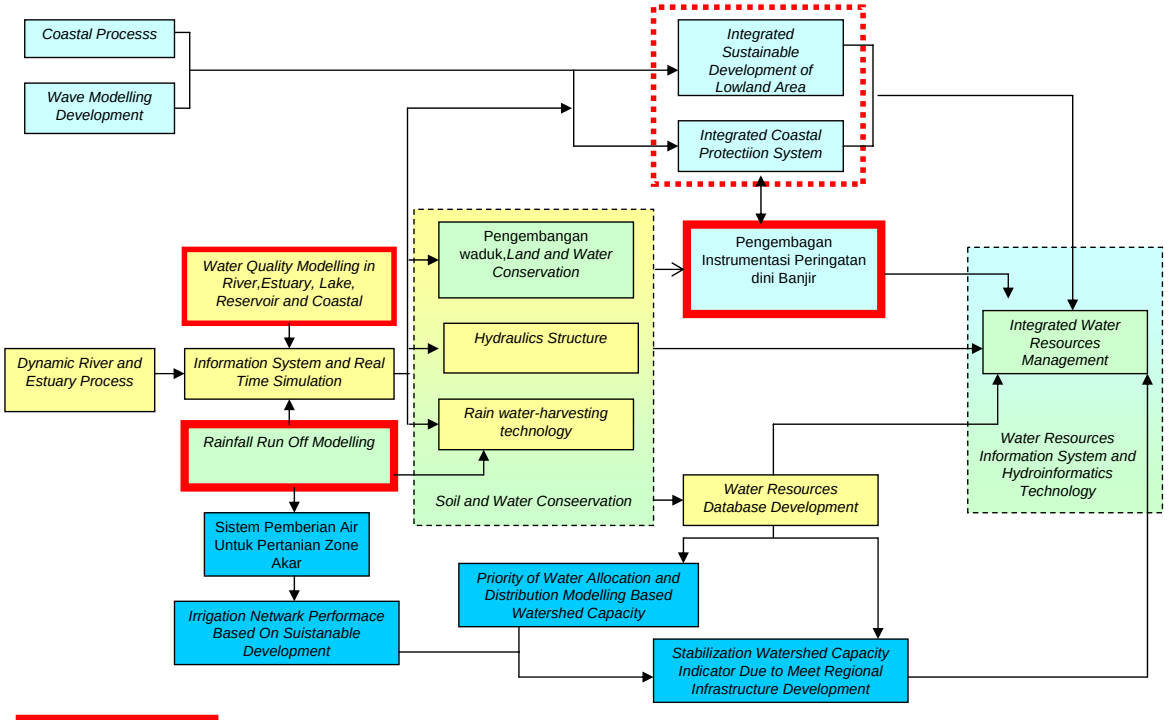
- White paper of Climate Chang Adaptation Scenario (Koike T, Univ of Tokyo, AWCI, Nov 2010)

Introduction : Road Map



Working Group

Introduction : Road Map



Working Group

Introduction : Road Map

- Water Resources Engineering
  - Hydrology, Hydraulic, Environmental, GIS and Socio Economic
- Sustainibility
  - Research and Education : University and research center
  - Community Services (local government and people)
  - Policy → Regional and Development Planning (ministry public work, Local Government, BAPPENAS, Association, Private Partners)

Several Activities

Flood Event






Atas Banjir Bandung Kiri di Bale Endah, Februari 2010 (Lap LPPM, msbadrik, 2010), tengah Kiri Jalan Dago (msbadrik nov 2010), Kanan Jalan Cicalengka MSbadrik, Februari 2010).

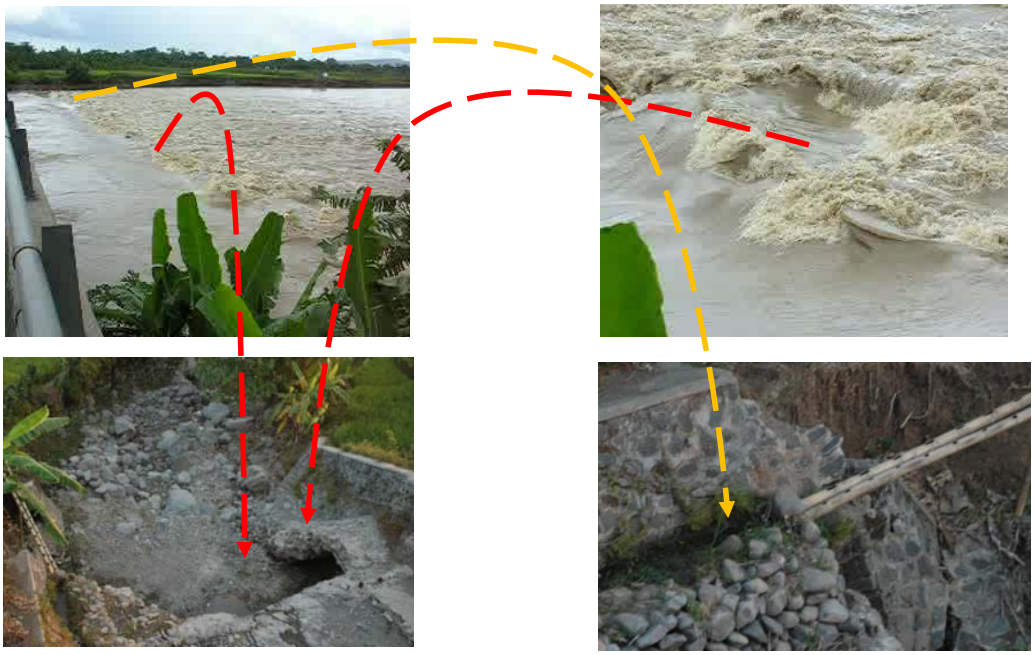
Bawah Banjir Jakarta Kiri Okt. 2010, Kompas.Com, Tengah Banjir Feb 2010, BukitDuri, Kompas.Com, kanan Oktober 2010, Kompas.com

Potential Erosion




Atas : kanan dan kiri, Lahan rawan erosi akibat abu merapi di cangkringan, jogjakarta, msbadrik 2010. Bawah Sungai korban lahar dingin merapi, jgjakarta, msbadrik 2010, kanan sebarabn sedimen hasil erosi lahan akibat hujan, palu, msbadrik, november 2010)

Flood: Scouring Problem



Atas Banjir pad jembatan Serayu, msbadrik Des 2005)
Bawah gerusan pilar jembatan kreta api, Cilacap-Purwokert, msbadrik, Agt, 2008)

Flood : Scour Problem

Atas gerusan pilar jembatan kreta api, Cilacap, msbadrik, Nov, 2010)
Bawah gerusan pada badan sungai, Lariang, msbadrik nov 2010)

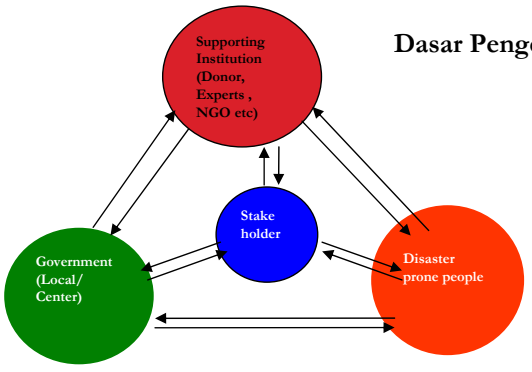
Flood and Dam Breaks



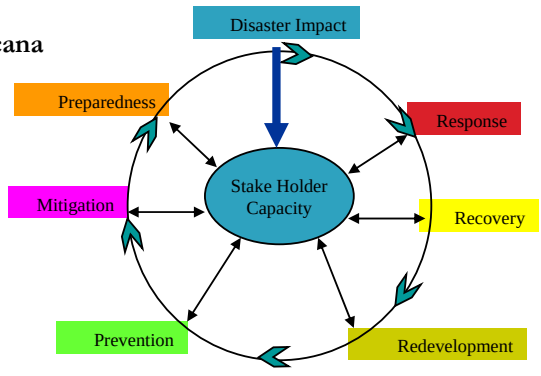



Dam Break, atas Situ Gintung, Maret 2009, Bawah kiri (lurah randu belatung) dan tengah (msbadrik agustus 2008) embung keruk, blora, Juni 2006 , kanan wasior, 2010 (kompas.com)

Floods : Policy on Flood Control



Dasar Pengelolaan Bencana



- Pada umumnya untuk banjir akibat hujan dan bersifat struktural. Peringatan dini tsunami. Peringatan dini banjir akibat dambreak belum berkembang
- Penyertaan masyarakat sebagai stake holder minim→ dominasi pemerintah dan belum ada adaptasi terhadap kapasitas stakeholder sesungguhnya
- Integrasi dengan pengembangan wilayah belum ada
- Akurasi analisis parameter banjir rendah → data dan metoda

Flood and Dam Breaks

Gambar 15 Atas Kiri Pintu polder ancol dan Pompa Polder S Ciliwung Gunung Sahari, Jakarta (msbadrik, 2008). Bawah kiri pintu pengendalian kanal banjir semarang (msbadrik, 1996).

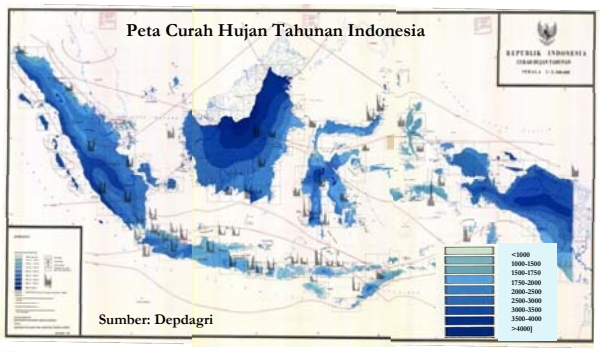
Flood and Dam Breaks

20 ha Pengendalian Banjir : 20 juta penduduk
110 MW Listrik 10 000 MW
!,2 Km Panjang Dam 2 Km
100 m Tinggi Dam 200 m ?

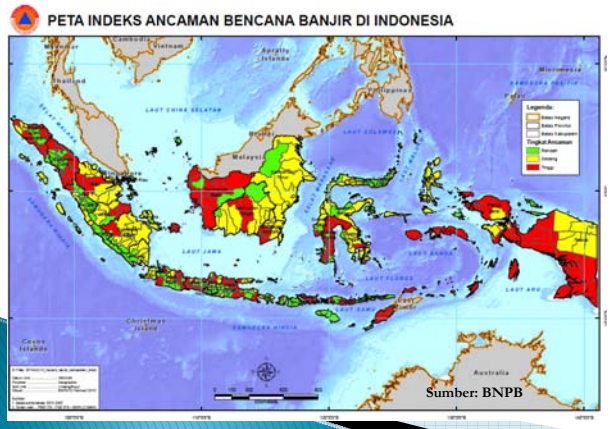
Waduk multi fungsi yang salah satu fungsinya sebagai pengendali banjir

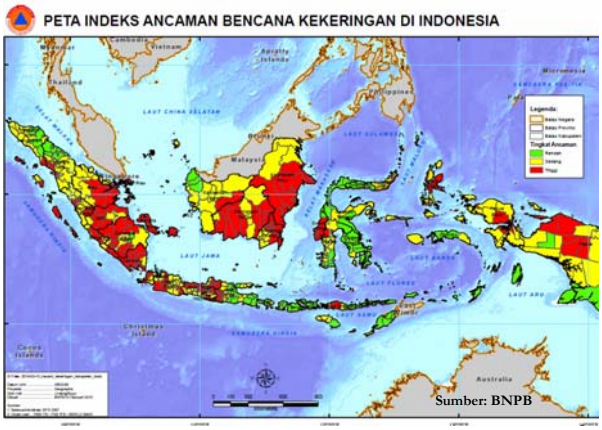
Atas : kiri : Jatiluhur, Jawa Barat, Indonesia (Msbadrik, 2007), kanan Three Gorges Dam, Yichang, China (msbadrik, 2007)
Bawah Pada Tahap Pembangunan Kiri, Jatigede, Jabar, Indonesia (msbadrik, Maret 2009), Tengah dan Kanan Erfurt, Jerman (msbadrik, Nov 2009)

Flood: Early Warning System

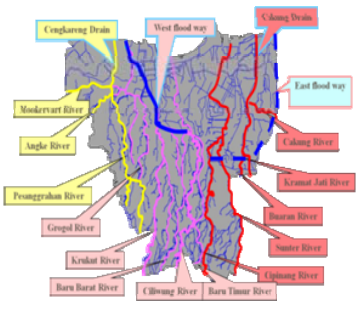


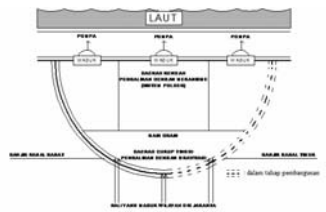
Peta Indeks ancaman banjir dan kekeringan saat ini





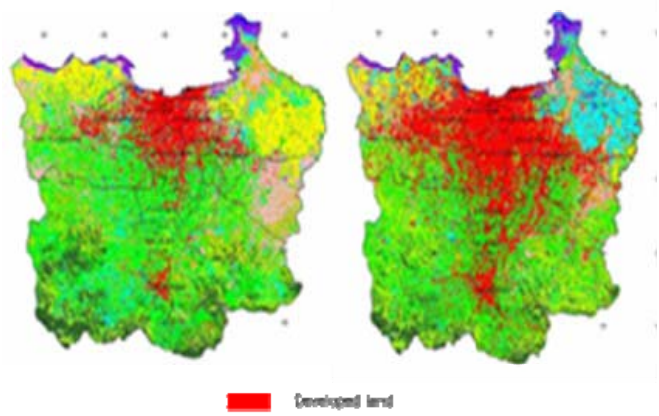
Flood: Jakarta Flood Early Warning System





Sistem koordinasi pengendalian banjir dan tata Sungai DKI Jakarta dan ir (Sumber Pemda DKI Jakarta, 2007) dan Skema pengendalian banjir Jakarta (sumber Dinas Pengairan PU Jakarta, 2005)

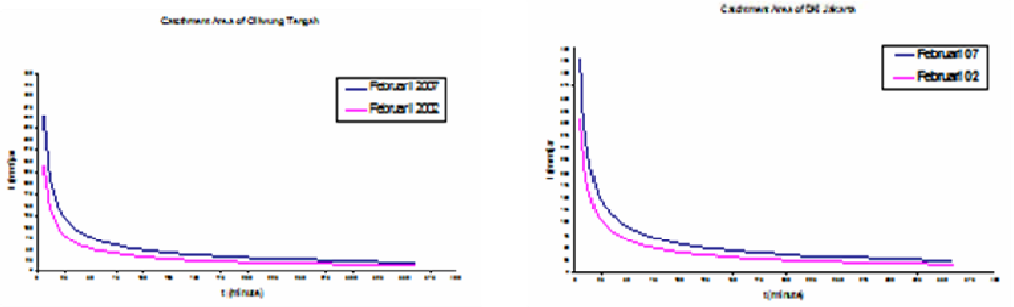
Flood: Jakarta Flood Early Warning System



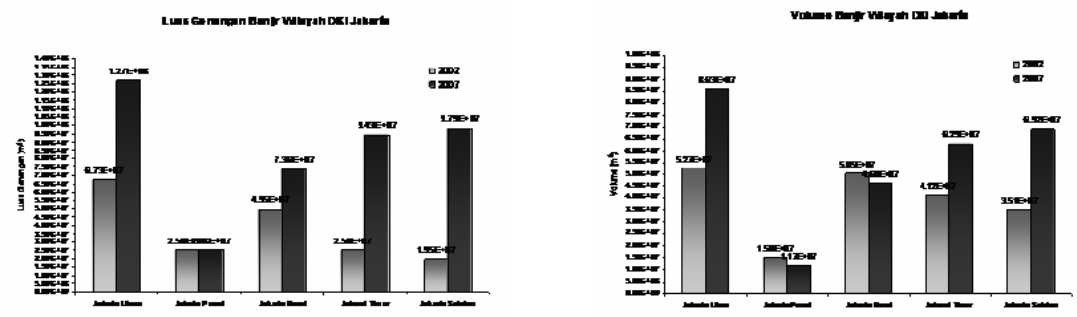
Perubahan Tata Guna Lahan DKI dari 1995 (kiri) ke 2005 (kanan) (Pemda DKI, 2005).

Sampah dan Bantaran kumuh di S Ciliwung DKI Jakarta (Pemda DKI, 2005)

Flood: Jakarta Flood Early Warning System

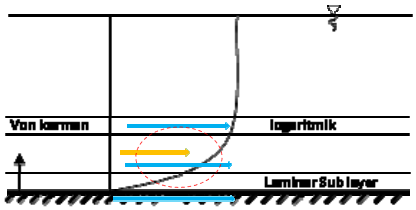


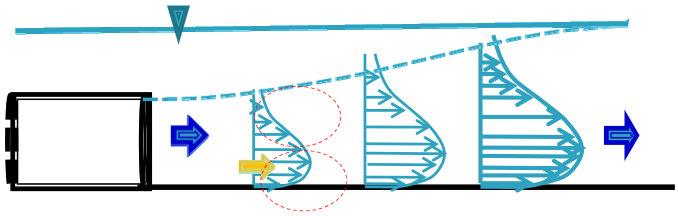
24 Kurva Intensitas Hujan DKI Jakarta pada Banjir 2002 dan 2007 *(M. Syahril BK etal, 2007)*



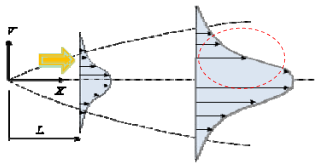
Luas (kiri) dan Volume (kanan) Daerah Genangan *pada Banjir 2002 dan 2007 (MSBadrik dan Rommy, 2007)*

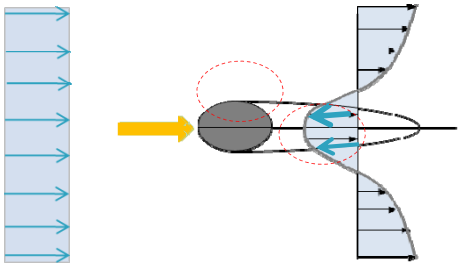
Research :
Updating Methods of Analysis





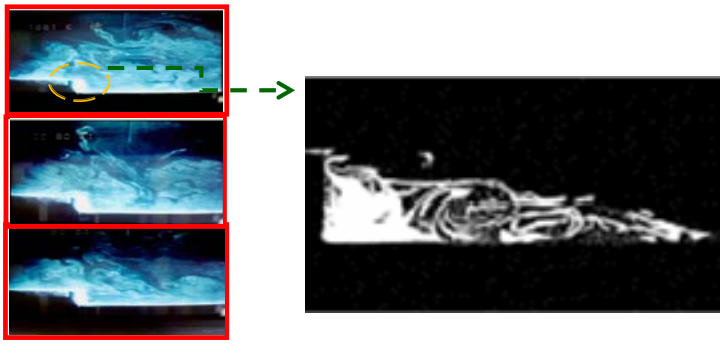
Turbulen : ketidakastabilan aliran akibat besarnya perbedaan (gradien) kecepatan antar massa air yang berdekatan→ pengaruh media pengalirannya (dinding/fluida sekeliingnya)→ inersia melebihi rekatan antar massa air (skala molekul dan/atau kelompok massa air) (bilangan ***Reynold).***

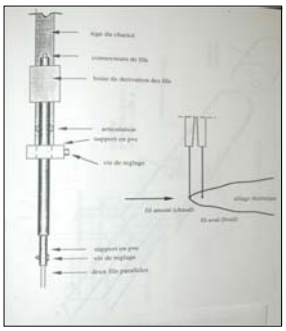




Tipe aliran pembangkit daya rusak air : Atas kiri Lapisan batas, kanan wall ... Bawah Kiri Jet, kanan wake

Research :
Updating Methods of Analysis





Kiri : turbulensi pada zona resirkulasi dibalik terjunan saluran dan kanan Two Paralel Hot Wire sebagai alat ukur kecepatan ulang alik (msbadrik, 1992)

Cited by :

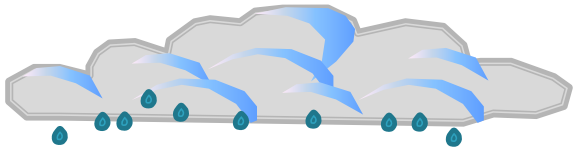
1). N.N Bouda, R. Schiestel, M. Amielh, C. Rey and T. Benabid, Experimental Approach and Numerical Prediction of a Turbulent Wall Jet Over Backward Facing Step, International Journal of Heat and Fluid Flow, Vol 29, Issue 4, August 2008, P 927-944

2). N.N Bouda, C. Rey, J.M. Rosant and T. Benabid, Turbulent Wall Jet Iteraction with Backward Facing Step, Proceeding of International Coneference, Engineering Turbulence Modelling and Experiments 6, Vol 29, Issue 4, August 2005, P 471-480

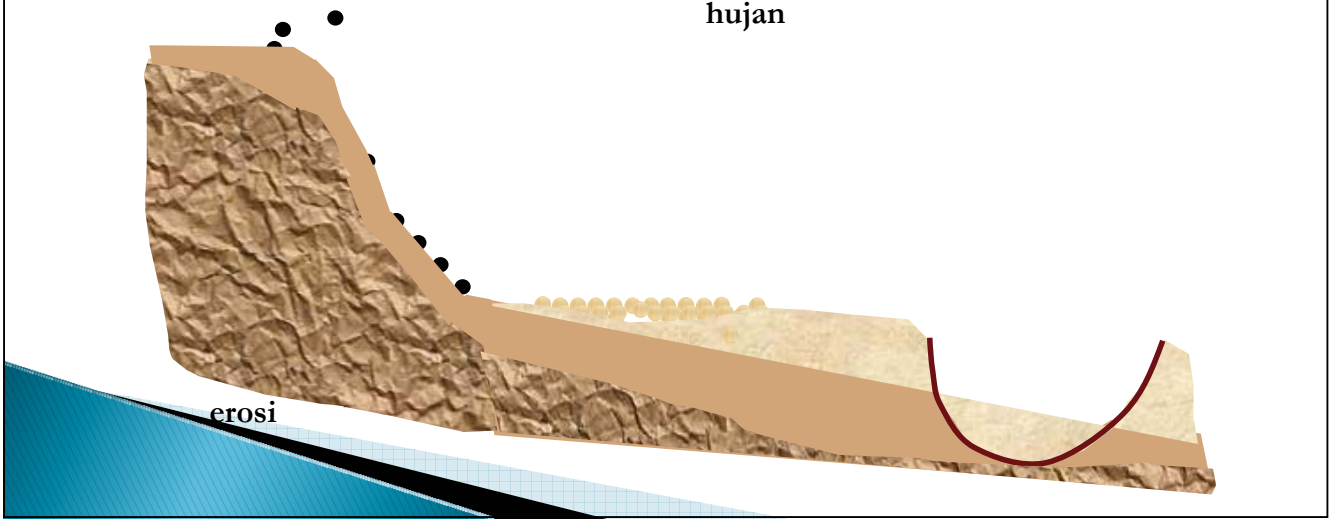
3). Numerical Study on Characteristic of Vehicle Emission Pollutan in Turbulence Boundary Layer City, Plateau Meteorology, 2005, Vol 24 No.2 P 167-172

4). F. Savory and A. Abdelqari The Effect of Large-Scale Turbulent Structures on a Simple 2-D Canyon-Type Flow, Environmental Monitoring and Assessment , Springer link, Vol 65, No 1-2, pp 397-405

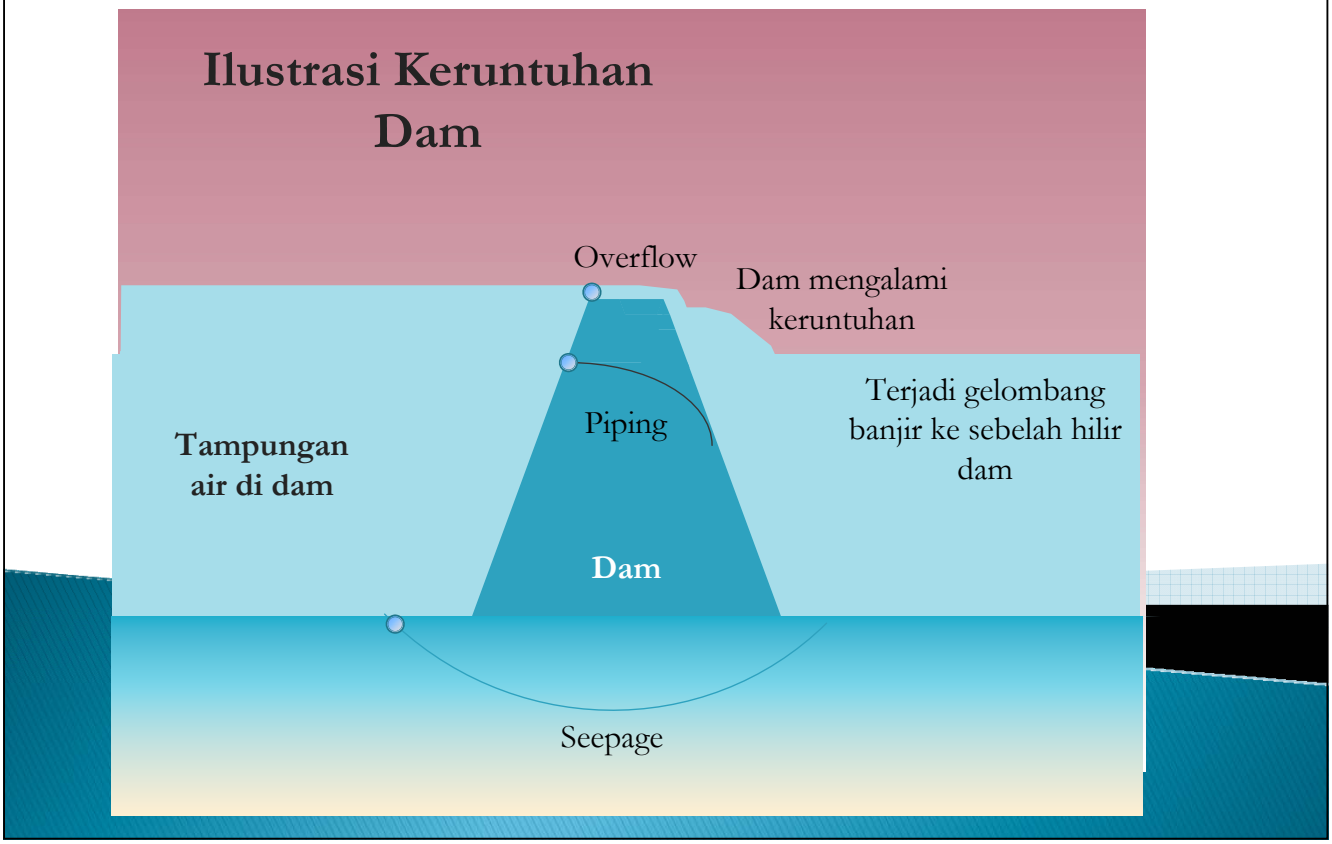
Research :
Updating Methods of Analysis → Slope Stability



Ilustrasi erosi akibat butiran hujan



Research :
Updating Methods of Analysis → Dam Break



Research :
Updating Methods of Analysis → Scouring

Bridge 1751

Konsep Pengendalian :

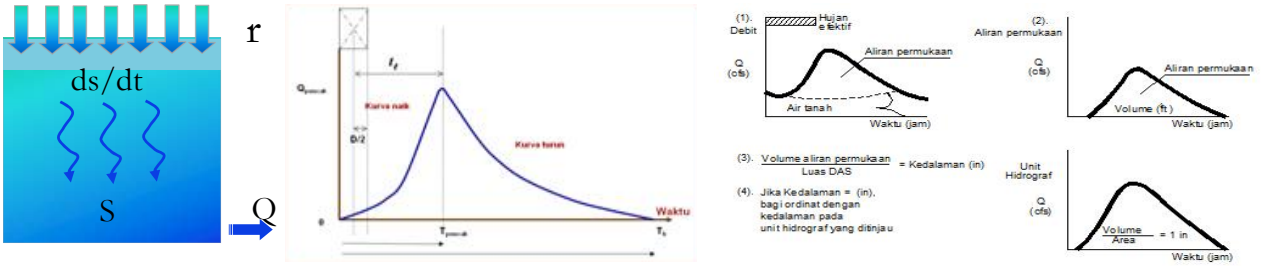
- Pengendalian pola aliran
- Perlindungan/proteksi bangunan

Research :
Updating Methods of Analysis → Scouring

- Perlindungan gerusan jembatan Kreta Api Atas : Jembatan Bumi Ayu-Purwokerto 1120

Research :
Updating Methods of Analysis → Flood Hydrograph

Analisis Hidrograf Banjir



Konsep hidrograf banjir sintetis (kiri : bak hidrologi, tengah: hidrograf dari bak hidrologi dan kanan hidrograf satuan

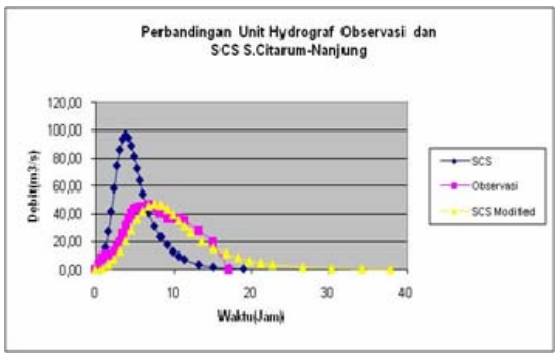
Konsep dasar analisis hidrograf sintetis banjir Q (debit direct run off):

- Tampungan DAS dianggap sebagai bak hidrologi parameter karakteristik tampungan K
  - Banjir pada musim hujan→das dianggap jenuh.
  - Hujan dalam DAS merata (seragam dalam fungsi ruang)
  - Hubungan Q dan tampungan DAS S dianggap linear Q= k S sehingga:

    Kurva naik $Q(t) = r\,(1-e^{Kt})$ dan Kurva turun dQ= K ds

Research :
Updating Methods of Analysis → Flood Hydrograph

Analisis Hidrograf Banjir



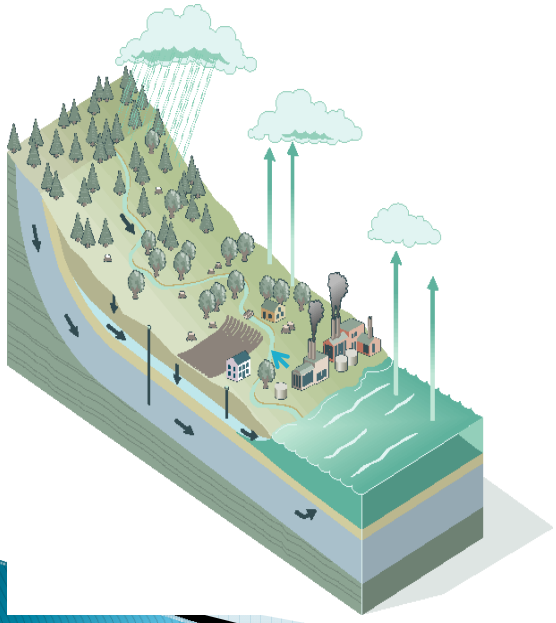
Contoh Hidrograf Satuan (HS) DAS Citarum Hulu Kiri : distribusi hujan pada 25-11-2001, Kanan : perbandingan HS untuk beberapa tanggal berbeda (Ariani, 2010 berdasarkan data BBWSC)

Konsep dasar analisis hidrograf sintetis banjir Q (debit direct run off):

- Kenyataannya
  - hujan tidak merata terhadap ruang
  - K tidak linear dipengaruhi permeabilitas tanah dan rambatan aliran permukaan

Research :
Updating Methods of Analysis → Flood Hydrograph

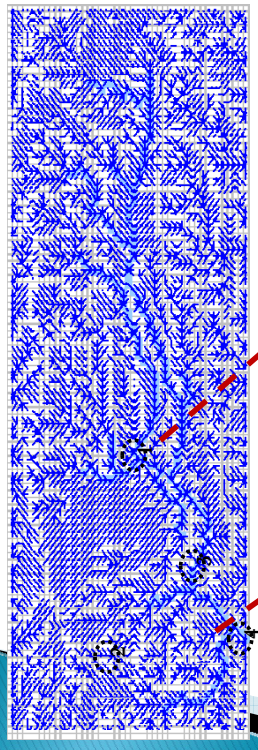
Analisis Hidrograf Banjir

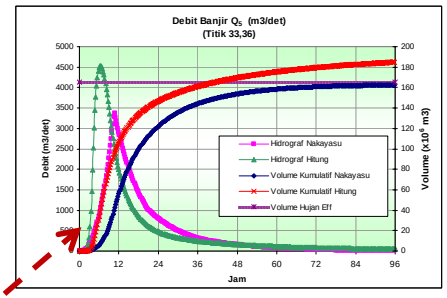


Input data: Hujan, Tata guna lahan, Karakteristik mekanik tanah permukaan, HidrotopografiDAS dan Sejarah banjir

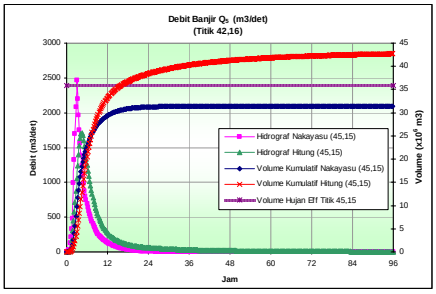
Manfaat : Masukan bagi hidrograf banjir (waktu rambat, kurva dan pengaruh tata guna lahan), potensi erodibilitas DAS dan Flood Warning System

Research :
Updating Methods of Analysis → Flood Hydrograph





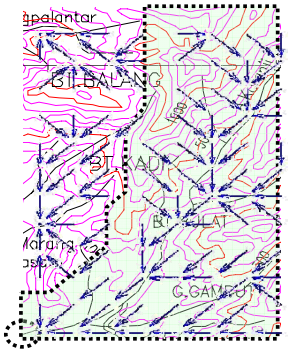
Komparasi hasil :
Sub-DAS Serayu Titik (33,36)
Luas DAS = 1557 km2
L Sungai = 111 km
Koef.Corak = A/L^2 = 0,091



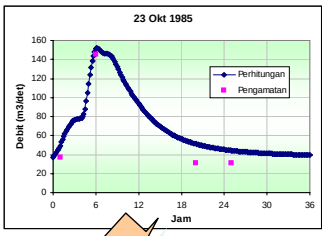
Komparasi hasil :
Sub-DAS Serayu Titik (42,16)
Luas DAS = 324 km2
L Sungai = 23,3 km
Koef.Corak = A/L^2 = 0,597

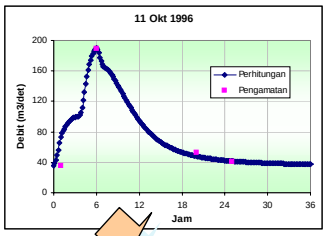
Kinematic Wave, DAS Serayu, Jateng, Hibah Pasca (Hang Tuah, MSBAdriK, Arno, Nazili, 2005)

Research :
Updating Methods of Analysis → Flood Hydrograph

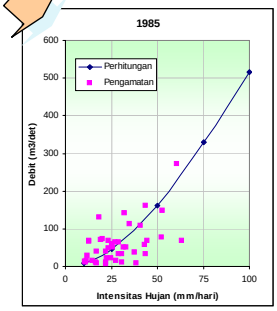


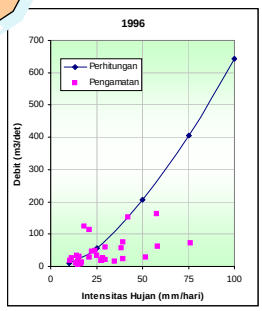
DAS

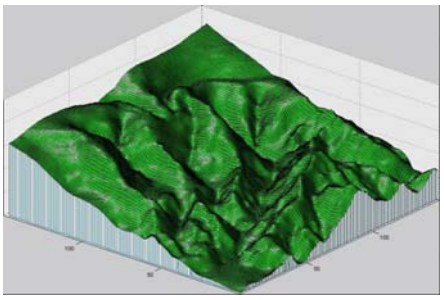




Hidrograf



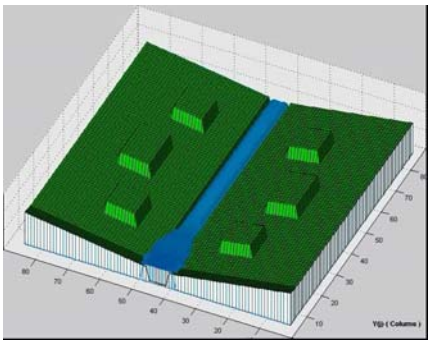


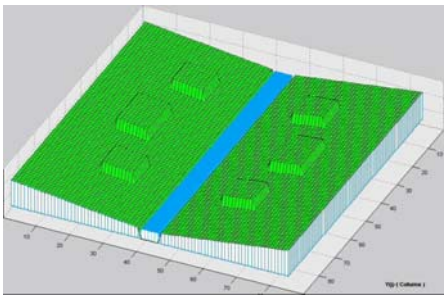


Korelasi Hujan-Debit Banjir

DAS Kuranji, SumBar (Riset ITB, D.KNatakusumah, Msbadrik, M Bagus dan M Farid, 2006)

Research :
Updating Methods of Analysis → Flood Hydrograph an Propagation



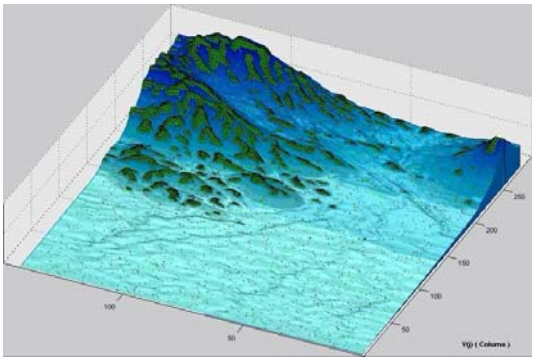


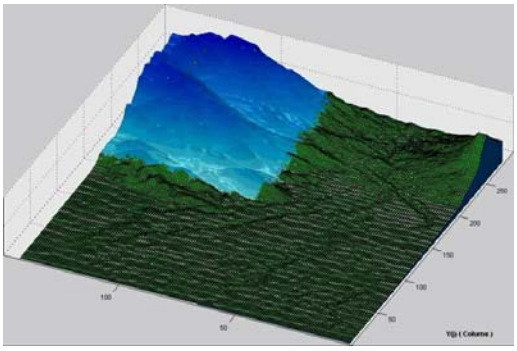
Manfaat

1. Masukan bagi hidrograf banjir→ waktu konsentrasi, kurva dan pengaruh tata guna lahan
2. Masukan bagi Flood Warning System

Hibah Pasca, Rambatan Banjir akibat luapan sungai sekitar bangunan bantaran sungai (M. Syahril B.K., M. Cahyono, M. Bagus dan M. Farid, 2006)

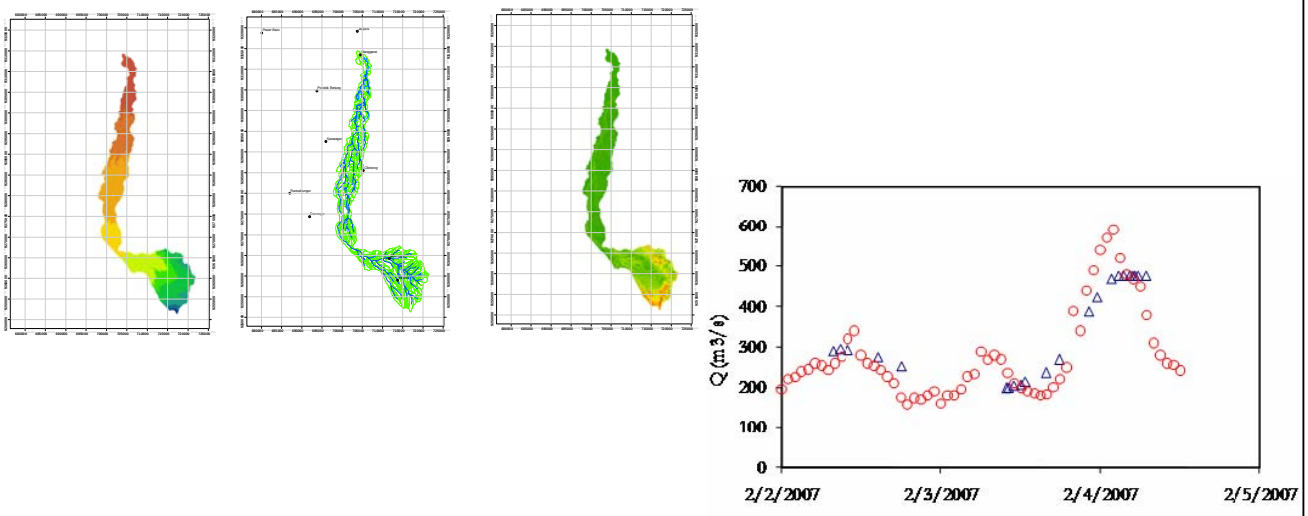
Research :
Updating Methods of Analysis → Flood Hydrograph an Propagation





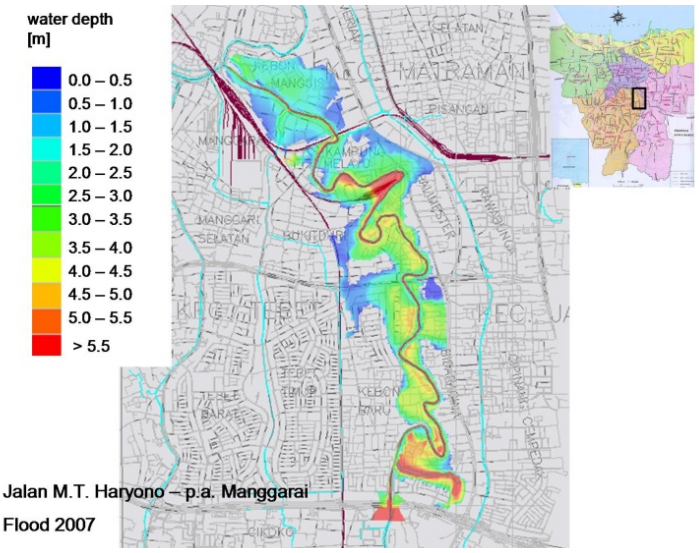
Riset ITB, DAS Ciliwung, Jabobek (Msbadrik, Iwan K, M Bagus dan M Farid, 2006)

Research :
Updating Methods of Analysis → Flood Warning



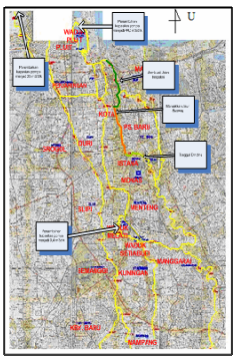
Atas kiri ke kanan, peta Topografi , Sungai, Slope/Arah Aliran dan kanan bawah Hasil Reproduksi Sebuah Kejadian banjir (Riset Asahi Glass Foundation, MSBadrik dan Hadi K, 2009)

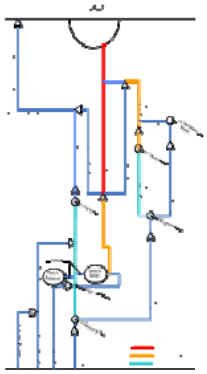
Research :
Updating Methods of Analysis → Flood Risk

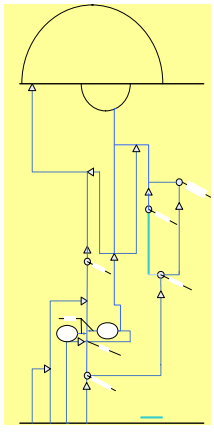


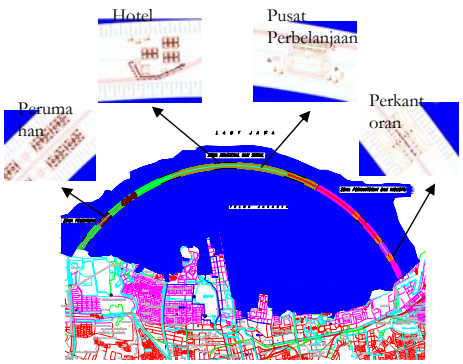
Riset ITB, Analisis Indeks Banjir Cawang Manggarai dengan FESWMS (*Finite Element Surface Water Modeling System*) (MSBadrik, Adam Formanek, H Kardhana, Rasmiati, dan Setiawati, 2010)

Research :
pdating Methods of Analysis → Jakarta Flood Mitigatior



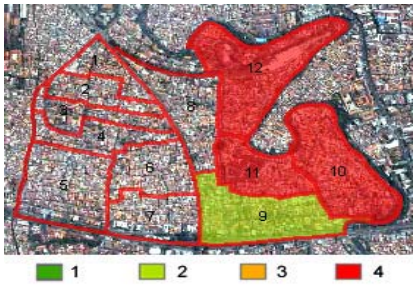




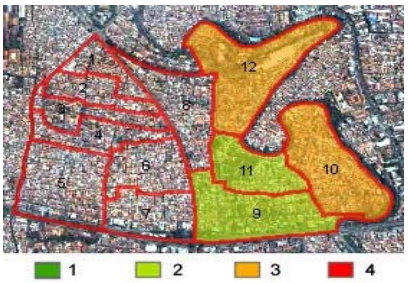


Analisis potensi pemanfaatan waduk bagi penegndalian banjir jakarta wilayah tengah (JTS ITB, MSBadrik, M Bagus dan M Farid, 2005)

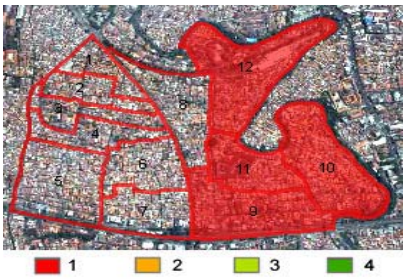
Research :
Updating Methods of Analysis → Jakarta Flood Risk



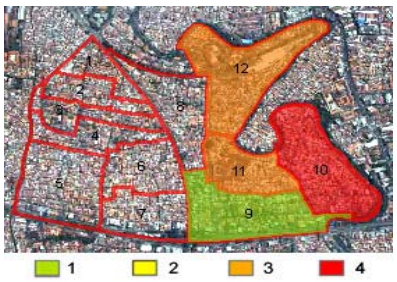
(a) Indeks Hazard.



(b) Indeks Vulnerability.



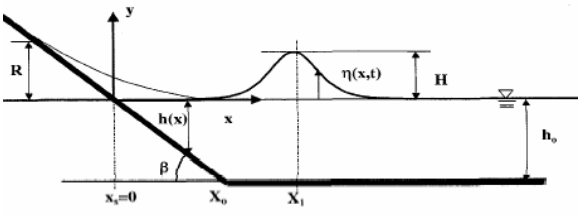
(c) Indeks Capacity.

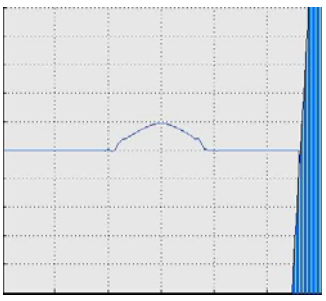


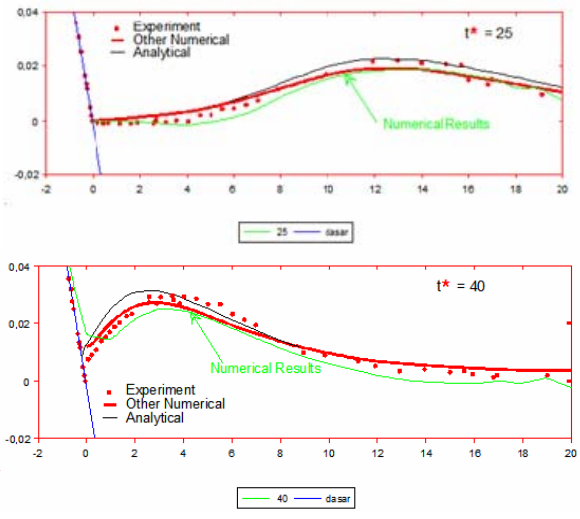
(d) Indeks Resiko

Peta Resiko Banjir Bukit Duri, Hibah Penelitian PROMISE, USAID-ADPC (Rahayu, MSBadrik, M Bagus, M Farid dan Laksmiarti, 2009)

Research :
Updating Methods of Analysis → Flood Dam Break



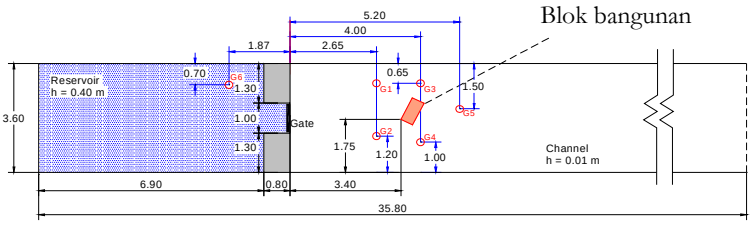


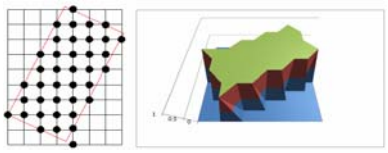


Komparasi model rambatan tsunami run up dengan eksperimen Synolakis (1986) dan model Yung li (2002) dan Synolakis (2002) (msbadrik et al, ICEED 2007)

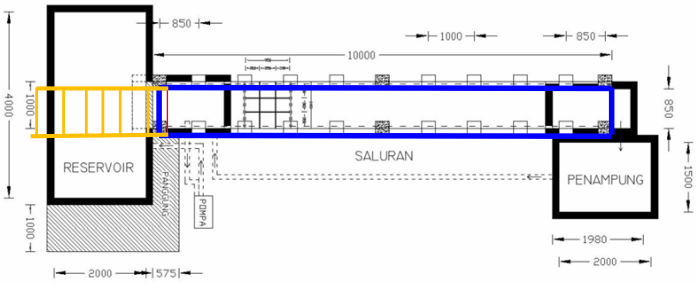
Rambatan Banjir Akibat Long Wave, Hibah Pasca (MSBAdrik, M Cahyono, M Bagus dan M Farid, 2008))

Research :
Updating Methods of Analysis → Flood Dam Break

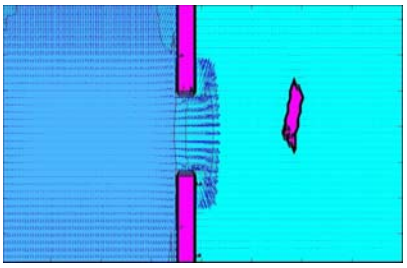




Finite Difference Approach for The Building

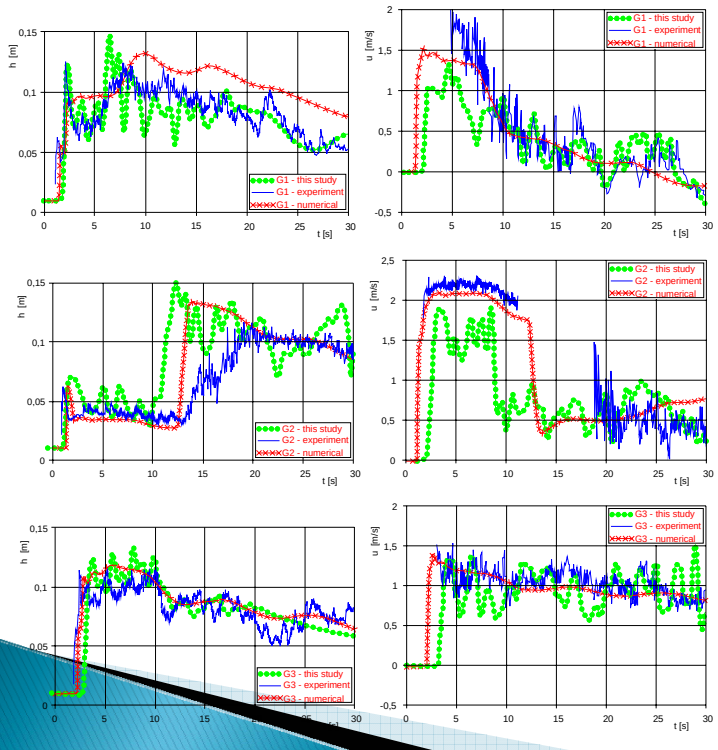


Kiri model fisik dam break atas Soares Frazão et. al., 2002 dan bawah msbadrik (2010)C



Kanan model matematik dam break atas Soares Frazão et. al., 2002 dan bawah msbadrik etal (2008)

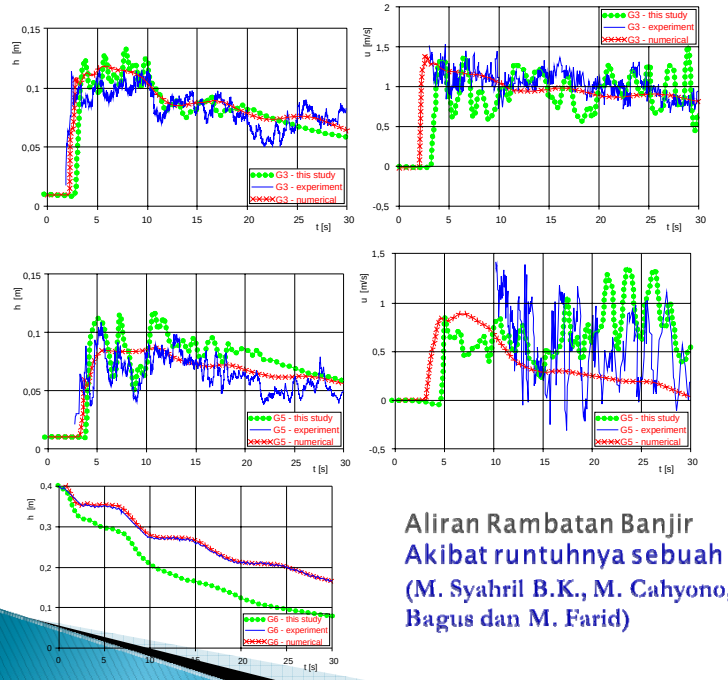
Research :
Updating Methods of Analysis → Flood Dam Break



Aliran Rambatan Banjir
Akibat runtuhnya sebuah dam
(M. Syahril B.K., M. Cahyono, M. Bagus dan M. Farid)

- Water depth (left) and the velocity in control point G1-G3 (downstream of the dam) shows good comparison to both experimental data and other numerical model.

Research :
Updating Methods of Analysis → Flood Dam Break

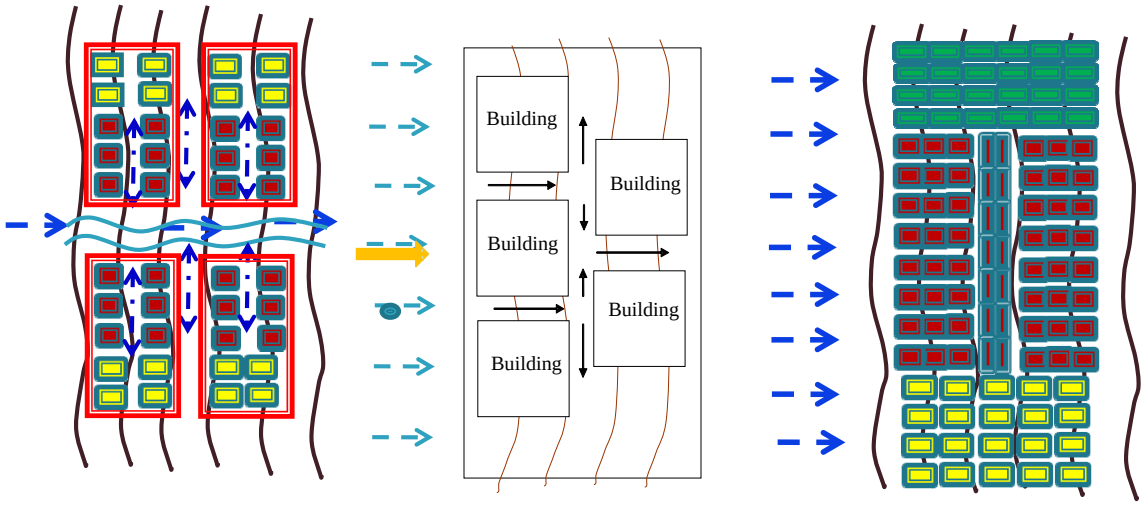


Aliran Rambatan Banjir
Akibat runtuhnya sebuah dam
(M. Syahril B.K., M. Cahyono, M. Bagus dan M. Farid)

Result for G4, G5 and G6

- The water depth (left) and the velocity (downstream of the dam) shows good comparison to both experimental data and other numerical model. However, the water depth tend to increase faster than the experimental data and other model
- The water depth at point G6 decrease faster than the experimental data and other model
- Further effort for improvement: boundary problem, denser grid but.

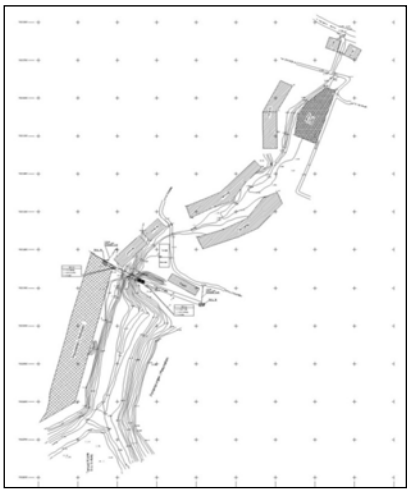
Research :
Updating Methods of Analysis → Flood Propagation



Dari kiri ke kanan, model aliran banjir sekitar bangunan berkompleksitas rendah, sedang dan tinggi

Research :
Updating Methods of Analysis → Flood Dam Break

Kiri :Keruntuhan Embung Blora (Lurah randu belatung, 2006) dan Kanan :Embung keruk baru yang perlu di evaluasi (msbadrik, 2008)



Kontur Daerah Aliran Banjir Keruntuhan Tanggul Situ Gintung

- **Indeks Banjir untuk beberapa waduk/dam : Situ Gintung, Embung Keruk, curug**

Thank You