RAPID SURVEY ON
TSUNAMI JAWA 17 JULY 2006

9-21 July 2006
BPDP-BPPT & ITS

Widjo Kongko, Suranto, Chaeroni, Aprijanto, Zikra, Sujantoko

pict by sujantoko July 2006
Survey Route

- 38 GPS Waypoints Record
- 10 Transects of Ground Profile
- 20 Points of Flowdepth

Java tsunami survey report, widjo et.al. 2006
### GPS Record

#### Wapoints Record

<table>
<thead>
<tr>
<th>Header</th>
<th>Description</th>
<th>Position</th>
<th>Flowdepth (cm)</th>
<th>Water direction (deg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waypoint 821</td>
<td>19-JUL-06 12:50:08PM</td>
<td>S8 01 27.5 E110 20 08.1</td>
<td>Max tsunami r.up (Hz) at parang endok</td>
<td>90</td>
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<tr>
<td>Waypoint 822</td>
<td>19-JUL-06 12:59:08PM</td>
<td>S8 01 29.8 E110 20 07.1</td>
<td>Tsunami deposit 2 cm at parang endok</td>
<td>155</td>
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<tr>
<td>Waypoint 823</td>
<td>19-JUL-06 1:22:55PM</td>
<td>S8 01 33.9 E110 20 06.7</td>
<td>Watermark on the wall at parang endok</td>
<td>20</td>
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<td>Waypoint 824</td>
<td>19-JUL-06 1:27:04PM</td>
<td>S8 01 36.6 E110 20 06.0</td>
<td>Coastline at parang endok</td>
<td>20</td>
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<td>Waypoint 825</td>
<td>19-JUL-06 1:39:49PM</td>
<td>S8 01 33.3 E110 20 06.2</td>
<td>Tsunami deposit 5 cm at parang endok</td>
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<tr>
<td>Waypoint 826</td>
<td>19-JUL-06 2:32:46PM</td>
<td>S8 01 03.0 E110 18 13.9</td>
<td>Coastline at Parang Kusuma-Depok</td>
<td>36</td>
</tr>
<tr>
<td>Waypoint 827</td>
<td>19-JUL-06 2:43:59PM</td>
<td>S7 51 15.4 E109 54 47.3</td>
<td>Watermark on the wall at Prg Kusuma-Depok</td>
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<td>Waypoint 828</td>
<td>19-JUL-06 5:19:22PM</td>
<td>S8 01 03.0 E110 20 28.3</td>
<td>Max tsunami r.up (Hz) at Prg Kusuma-Depok</td>
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<td>Watermark on the wall at Prg Kusuma-Depok/Tsunami deposit</td>
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<td>Waypoint 830</td>
<td>20-JUL-06 9:20:46AM</td>
<td>S7 45 23.2 E109 28 13.9</td>
<td>Watermark on the wall at Suwuk Kebumen/Tsunami deposit</td>
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<td>Waypoint 831</td>
<td>20-JUL-06 9:34:24AM</td>
<td>S7 45 24.5 E109 28 13.9</td>
<td>Watermark on the wall at Suwuk Kebumen</td>
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<td>Waypoint 832</td>
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<td>S7 45 27.7 E109 28 13.2</td>
<td>Watermark on the wall at Suwuk Kebumen</td>
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<td>S7 45 32.5 E109 28 10.9</td>
<td>Coastline at Suwuk Kebumen</td>
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<td>S7 45 22.8 E109 28 16.0</td>
<td>Watermark on the wall at Suwuk Kebumen</td>
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<td>S7 43 24.8 E109 23 36.9</td>
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<td>S7 43 25.2 E109 23 40.7</td>
<td>Watermark on the wall at Ayah Kebumen/Tsunami deposit</td>
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<tr>
<td>Waypoint 837</td>
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<td>S7 43 27.5 E109 23 38.8</td>
<td>Watermark on the wall at Ayah Kebumen/Tsunami deposit</td>
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</tr>
<tr>
<td>Waypoint 838</td>
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<td>S7 43 29.2 E109 23 36.0</td>
<td>Coastline at Ayah Kebumen</td>
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<tr>
<td>Waypoint 839</td>
<td>20-JUL-06 3:56:42PM</td>
<td>S7 41 55.8 E109 15 53.3</td>
<td>Coastline at Widarapayung Adipala Cilacap</td>
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<tr>
<td>Waypoint 840</td>
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<td>S7 41 45.5 E109 15 51.3</td>
<td>Watermark on the wall at Widarapayung Adipala Cilacap</td>
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<tr>
<td>Waypoint 841</td>
<td>21-JUL-06 7:20:51AM</td>
<td>S7 41 24.2 E109 08 34.6</td>
<td>Watermark on the wall at Bunton Adipala Cilacap</td>
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<td>Waypoint 842</td>
<td>21-JUL-06 8:03:46AM</td>
<td>S7 41 14.9 E109 08 29.2</td>
<td>Watermark on the wall at Bunton Adipala Cilacap</td>
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<tr>
<td>Waypoint 843</td>
<td>21-JUL-06 8:11:23AM</td>
<td>S7 41 16.1 E109 08 33.6</td>
<td>Debris on Pandan Tree at Bunton Adipala Cilacap</td>
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<tr>
<td>Waypoint 844</td>
<td>21-JUL-06 8:23:45AM</td>
<td>S7 41 11.6 E109 08 36.8</td>
<td>Debris on th tree at Bunton Adipala Cilacap</td>
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<tr>
<td>Waypoint 845</td>
<td>21-JUL-06 8:26:34AM</td>
<td>S7 41 09.4 E109 08 36.9</td>
<td>Max tsunami r.up at Bunton Adipala Cilacap</td>
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<tr>
<td>Waypoint 846</td>
<td>21-JUL-06 2:57:13PM</td>
<td>S7 41 00.9 E108 36 41.7</td>
<td>Debris on the Fence at Cikembulan Ciamis</td>
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<tr>
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<td>S7 41 03.6 E108 36 45.4</td>
<td>Coastline at Cikembulan transect 1 Ciamis</td>
<td>40</td>
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<td>Waypoint 848</td>
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<td>S7 40 57.8 E108 36 46.2</td>
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<td>S7 40 53.5 E108 36 46.7</td>
<td>Watermark on the wall at Cikembulan transect 1 Ciamis</td>
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<td>S7 40 46.6 E108 36 47.0</td>
<td>Watermark on the wall at Cikembulan transect 1 Ciamis</td>
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<td>Waypoint 851</td>
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<td>S7 41 06.5 E108 37 25.9</td>
<td>Max tsunami r.up at Cikembulan transect 1 Ciamis</td>
<td>40</td>
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<tr>
<td>Waypoint 852</td>
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<td>S7 40 59.5 E108 37 26.4</td>
<td>Max tsunami r.up at Cikembulan transect 1 Ciamis</td>
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<td>21-JUL-06 4:59:48PM</td>
<td>S7 40 53.1 E108 37 28.6</td>
<td>Max tsunami r.up at Cikembulan transect 1 Ciamis</td>
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<tr>
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<td>21-JUL-06 5:23:29PM</td>
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<td>Coastline at Pengandaran transect 1 Ciamis</td>
<td>40</td>
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<td>S7 41 32.6 E108 39 01.9</td>
<td>Watermark on the wall at Pengandaran transect 1 Ciamis</td>
<td>40</td>
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<tr>
<td>Waypoint 856</td>
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<td>S7 42 01.0 E108 39 20.4</td>
<td>Watermark on the wall at Pengandaran transect 1 Ciamis</td>
<td>40</td>
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<td>Waypoint 857</td>
<td>21-JUL-06 5:52:21PM</td>
<td>S7 42 00.4 E108 39 23.0</td>
<td>Watermark on the wall at Pengandaran transect 2 Ciamis</td>
<td>40</td>
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<td>Waypoint 858</td>
<td>21-JUL-06 5:54:27PM</td>
<td>S7 42 00.4 E108 39 23.8</td>
<td>Watermark on the wall at Pengandaran transect 2 Ciamis</td>
<td>40</td>
</tr>
</tbody>
</table>

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**Java tsunami survey report, widjo et.al. 2006**
Parang Endok DIY

- Damaged houses & farmfield
- Flowdepth 90 cm
- Flowdepth less than 150 cm
- Wave direction 20 deg
- Tsunami Deposit 2 cm
- Tsunami Deposit 5 cm
- Damaged Shelter

Budi, ds. Mancingan Prg Endok:
- No shaking, only heard explosions before tsunami
- Receding wave 50-100m
- 3-4 waves came after 30-40 min from earthquake time

NO TRANSECT

Java tsunami survey report, widjo et.al. 2006
Java tsunami survey report, widjo et.al. 2006

*) above Mean Sea Level
Keburuhan - Purworejo

Aprijanto, Suranto, Sujantoko, Zikra, Chaeroni, Widjo K. BPPT&ITS Survey Tim

Fisherman Boat 50m Inland

Beachsand Deposit 17cm

Watermark on the Wall 28cm

Max. Vr. Run-up >2.5m

*) above Mean Sea Level

Java tsunami survey report, widjo et.al. 2006
Suwuk - Kebumen

Sudimo, Fisherman, Suwuk:
- Weak shaking, heard explosions before tsunami
- Receding wave more than 100m
- 3 waves came, 2nd was the biggest

*) above Mean Sea Level

Max. H. Run-up >304m

Java tsunami survey report, widjo et.al. 2006
Serka Suwarto & Sertu Naswan, at Naval Base, Ayah:
- No shaking or Slightly shaking
- 4-5 waves came, 1st was the biggest
- 1st wave came 45 min after earthquake time
- Hear twice explosions before wave coming
- 25 cm of tsunami deposit on the office floor
- Escaped to the hill
- Hasn't knowledge of tsunami

*) above Mean Sea Level
Widarapayung - Cilacap

Beach Swimming Pool Ruins

Tsunami Reached >250m of River Inland

1.6m Scoured by Tsunami Turbulence

Beach Profile Leveling

Debris on the trees

Watermark on the wall

Tsunami Reached >250m of River Inland

Shelter Topelled by Tsunami

Max.Vf.Run-up >4.58m *)

*) above Mean Sea Level

Max.Hz.Run-up >219m

Java tsunami survey report, widjo et.al. 2006
Marianto, Seller (warung), Bunton:
- High waves (-5m) but breaking into 1-1.5m small waves
- 2 waves came, 1st was the biggest
- 1st wave came 50 min after earthquake time
- Explosions were not heard before wave coming

*) above Mean Sea Level
**Cikembulan 1 - Ciamis**

Annameous, Citizen, at Cikembulan:
- Wave came 16:15 (55 min after earthquake time)
- Some exploitations before wave coming

*) above Mean Sea Level

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Java tsunami survey report, widjo et.al. 2006
Cikembulan 2 - Ciamis

Max.Vr. Run-up 3.56m *)

Max.Hz.Run-up >422m

JAVA tsunami survey report, widjo et.al. 2006

ELEVATION (mm)

DISTANCE (mm)

*) above Mean Sea Level
Pengandaran 1&2 - Ciamis

Collapsed Wall

Flattened Shelters on the beach

Boat on the top of pylar

Watermark 70cm on the wall

TRANSECT 9

Max.Vr.Run-up >112m

Ground Profile

TRANSECT 10

Max.Vr.Run-up >107m

Ground Profile

*) above Mean Sea Level

Java tsunami survey report, widjo et.al. 2006
Tide charts

Tide Constant of Cilacap
7.7deg South ; 109.0deg East ; Time GMT +07:00

<table>
<thead>
<tr>
<th>Const</th>
<th>M2</th>
<th>S2</th>
<th>N2</th>
<th>K2</th>
<th>K1</th>
<th>O1</th>
<th>P1</th>
<th>M4</th>
<th>MS4</th>
<th>Z0</th>
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<tbody>
<tr>
<td>Amp (cm)</td>
<td>50</td>
<td>25</td>
<td>10</td>
<td>7</td>
<td>19</td>
<td>12</td>
<td>5</td>
<td>-</td>
<td>-</td>
<td>110</td>
</tr>
<tr>
<td>360-g (deg)</td>
<td>125</td>
<td>57</td>
<td>154</td>
<td>56</td>
<td>85</td>
<td>103</td>
<td>90</td>
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<tr>
<td>g (deg)</td>
<td>235</td>
<td>303</td>
<td>206</td>
<td>304</td>
<td>275</td>
<td>257</td>
<td>270</td>
<td>-</td>
<td>-</td>
<td>360</td>
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</tbody>
</table>

(Source 2005 Tide Tables DISHIDROS)

Tide Chart Prediction
Cilacap S7.7 E109 gmt+07.00

Generated by Mike21, IOC Method
Tide charts

Tide Constant of Benoa
8.7deg South ; 115.2deg East ; Time GMT +08:00

<table>
<thead>
<tr>
<th>Const</th>
<th>M2</th>
<th>S2</th>
<th>N2</th>
<th>K2</th>
<th>K1</th>
<th>O1</th>
<th>P1</th>
<th>M4</th>
<th>MS4</th>
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<tbody>
<tr>
<td>Amp (cm)</td>
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<td>33</td>
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<td>10</td>
<td>25</td>
<td>12</td>
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<td>130</td>
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<tr>
<td>360-g (deg)</td>
<td>53</td>
<td>5</td>
<td>-</td>
<td>5</td>
<td>59</td>
<td>84</td>
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<td>276</td>
<td>301</td>
<td>-</td>
<td>-</td>
<td>360</td>
<td>360</td>
</tr>
</tbody>
</table>

(Source 2005 Tide Tables DISHIDROS)

Tsunami Arrival Time at Benoa
Approx. 18:00 WITA or 17:00 WIB
(1 hour 41 minutes of Traveling Time)
Map & Its Tsunami Run-up Height
Resume

• Rapid survey on Tsunami Java 17 July 2006 has been carried out which consists of 38 points of GPS record, 10 transects, 11 tsunami run-up heights, and several eyewitnesses' interview.

• The maximum tsunami run-up is 1.6m, 3.4m, 2.5m, 1.1m, 1.45m, 4.6m, 1.5m, 3.1m, 3.6m, 2.9m, and 2.7m for Parang Endok, Parang Kusumo, Keburuhan, Suwuk, Ayah, Widarapayung, Bunton, Cikembulan 1&2, and Pengandaran 1&2 respectively.

• The tsunami inundation is 250m, 80m, >102m, >304m, 214m, >219m, 457m, >325m, 422m, >112m, and >107m for Parang Endok, Parang Kusumo, Keburuhan, Suwuk, Ayah, Widarapayung, Bunton, Cikembulan 1&2, and Pengandaran 1&2 respectively.

• Tsunami deposits were found in Parang Endok (2cm-5cm), Keburuhan (17cm), and Ayah (3cm-4.5cm).

• Based on interview to eyewitnesses, associate with earthquake/tsunami, there was slightly shaking/no shaking, some exploations heard before wave coming, wave was receded 50-100m to the sea, there were 2 - 5 number of waves which the 1st or the 2nd was the biggest one, and 30-55 minutes for tsunami to reach land.

• Costal communities do not know tsunami well, how and what they have to do if the disaster come.

• Tide record at Benoa showed, tsunami reached at Benoa approx. 1 hour 41 minutes.
Thank you