Developing Software to Support Disaster Risk Management: InaSAFE

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Acknowledgements

Colleagues at AIFDR & Geoscience Australia
Partners at World Bank & BNPB
Open source enthusiasts at HOT OpenStreetMap & Kartoza
Belum Makan Kalau Belum Makan Nasi
Not Yet Eaten If Not Yet Eaten Rice

Image credits: Jonathan McIntosh, 2004 - CC
AIFDR and the Risk and Vulnerability Program

(A) Develop InaSAFE

(B) SDC OSM InaSAFE

(C) Credible Science In DRM

(D) Real Time EQ

(E) Tsunami Warning

(F) EQ Risk Jakarta

(G) Volcanic Ash

(H) GREAT ITB

(I) Support Response

Merapi Eruption 2010
InaSAFE is free software that produces realistic natural hazard impact scenarios for better planning, preparedness and response activities.

InaSAFE Concept

Hazard

Exposure

InaSAFE combines one set of exposure data with one hazard scenario.

InaSAFE

Impact Functions

Damage Curves

Maps

Actions

Reports

InaSAFE produces maps, reports & actions.

InaSAFE can have multiple impact functions for each hazard or exposure data type.
Keywords Wizard

InaSAFE step by step

Keywords creation...

By following the simple steps in this wizard, you can assign keywords to your layer: Buildings. First you need to define the category of your layer.

- exposure
- hazard
- aggregation

An exposure layer represents people, property or infrastructure, flood, earthquake, volcano etc.

InaSAFE

Layer keywords:

The following keywords are defined for the active layer:

- **Category** exposure
- **Subcategory** structure
- **License** Open Data Commons Open Database License (ODbL)
- **Title** Buildings
- **Source** OpenStreetMap - www.openstreetmap.org
- **Date** 04-06-2014 08:06
Impact Function Wizard

InaSAFE step by step
Guided impact assessment wizard...

This wizard will guide you through the process of running an InaSAFE assessment. The assessment will combine hazard data (such as a flood layer) with exposure data (such as population, roads or buildings) to help you to understand the potential impact of such an event. To start, please select the hazard and exposure you want to use by clicking a cell in the matrix below.

Hazard

<table>
<thead>
<tr>
<th></th>
<th>Earthquake</th>
<th>Flood</th>
<th>Tsunami</th>
<th>Volcanic ash</th>
<th>Volcano</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Road</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Structure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Available functions: Classified Hazard Building Impact Function, Flood Building Impact Function

InaSAFE step by step
Guided impact assessment wizard...

Please ensure the following information is correct and press Run.

- **Impact function**: Flood Building Impact Function
- **Hazard layer**: Flood like Jakarta - 18 Jan 2013
- **Exposure layer**: Buildings
- **Aggregation layer**: no aggregation
- **Threshold [m]**: 1.0
- **Postprocessors**: BuildingType: on: True

[Button options: Cancel, Back, Run]
In the event of a specific flood scenario, how many people will be affected & how many people may need to be evacuated.

InaSAFE combines one set of exposure data with one hazard scenario.

InaSAFE can have multiple impact functions for each hazard or exposure data type.

- Flood
- Population

InaSAFE

Maps

Number of people affected x age x gender
Minimum needs: rice, water, hygiene kits ...

Post processing

Actions

Be affected or need evacuation
InaSAFE – Jakarta Flood

Exposure: Buildings - OSM

Hazard: Jakarta Flood January 2013 – BPBD DKI Jakarta

Action Checklist:
- Are the critical facilities still open?
- Which structures have warning capacity (e.g. sirens, speakers, etc.)?
- Which buildings will be evacuation centres?
- Where will we locate the operations centre?
- Where will we locate warehouse and/or distribution centres?

Breakdown by building type:

<table>
<thead>
<tr>
<th>Building Type</th>
<th>Count 1</th>
<th>Count 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinic/doctor</td>
<td>25</td>
<td>184</td>
</tr>
<tr>
<td>Fire station</td>
<td>4</td>
<td>27</td>
</tr>
<tr>
<td>Government</td>
<td>97</td>
<td>696</td>
</tr>
<tr>
<td>Hospital</td>
<td>8</td>
<td>108</td>
</tr>
<tr>
<td>Other</td>
<td>3,924</td>
<td>26,667</td>
</tr>
<tr>
<td>Place of worship - islam</td>
<td>255</td>
<td>1,814</td>
</tr>
<tr>
<td>Police station</td>
<td>9</td>
<td>54</td>
</tr>
<tr>
<td>Residential</td>
<td>0</td>
<td>25</td>
</tr>
<tr>
<td>School</td>
<td>162</td>
<td>1,334</td>
</tr>
<tr>
<td>Sports facility</td>
<td>7</td>
<td>93</td>
</tr>
<tr>
<td>University/college</td>
<td>14</td>
<td>133</td>
</tr>
</tbody>
</table>
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Hazard: Maumere Tsunami Inundation Model – AIFDR (25m)
Exposure: Population Model – WorldPop (100m) | Buildings - OSM
Global Minimum Needs

Each person should be provided with 2.8 kilograms of Rice weekly.
Each person should be provided with 17.5 litres of Drinking Water weekly for drinking.
Each person should be provided with 67 litres of Clean Water weekly for washing.
Each family of 5 persons should be provided with 1 Family Kit per week.
A Toilet should be provided for every 20 persons.

Provenance: The minimum needs are based on Perka 7/2008.
InaSAFE – success factors

- Developed iteratively with specific target audience
- Informs decisions that were already being made
- Free and open source
- Combines scientific data with local knowledge and local data
- Easy to use!
- Codifies government regulations