InaSAFE Version 4.0 Architecture

Input Layers

Vector Layer …or… Raster Layer

Exposure ID
Population (PIB & Census Areas)
Cost (unit price e.g. for buildings)
Rate (e.g. price per m2 e.g. for buildings / landcover)
Currency abbreviation
Feature Type
Exposure Layer
InaSAFE Keywords
#3177
Women / Age Count

Vector Layer …or… Raster Layer

Hazard Layer
InaSAFE Keywords
Hazard ID
Hazard Class
Hazard Value

Vector Layer with some selected features or not …or… Bounding Box

Aggregation layer provided?
No
Yes
#3179
Convert BBOX aggregation to polygon layer with keywords
Aggregation ID
Aggregation Name
Women / Age Ratio
Aggregation polygon layer
InaSAFE Keywords

Parameters

Youth Default
Adult Default
Elderly Default
Gender Default
Age Default
Pregnancy Ratio Default
Lactating Women Ratio Default
Female Hygiene Packs Ratio
Low Hazard Buffer Distance
Medium Hazard Buffer Distance
High Hazard Buffer Distance
Where do these come from? Definitions.py
Global Defaults
IF Thresholds
Minimum Needs Profile
IF Buffer Zones

Keyword change: update field references using InaSAFE preferred field names

Hazard Preparation

This should come before continuous vector check as points will get converted into classified polys

Vector Hazard? (No / Yes)
Field remapping
* hazard_id
* hazard_value
* remove columns
Continuous Raster? (Yes / No)
Polygon Hazard? (Yes / No)
#3165 Add buffering (e.g. volcano point)
Keyword change: none (geometry type is dynamically read)
Continous Vector? (Yes / No)
Keyword change: data_type changes to classified
#3180 Classify Continuous Hazard (e.g. flood depth) and assign **class names**
Keyword change: attribute field set to type
Assign class names based on class id (**safe.gis.attributes.class_mapper**)
#3178 Assign classes based on value_map
Keyword change: attribute_field set to type

User:
* 1
* 2
* 3
* 4

InaSAFE:
* low
* medium
* high

(from definitions.py)

Use value map to map own classes to inasafe hazard concept

or (post v4.0):

Run analysis and report based on users classes? (in a future version we could look at this, We would also need to make the user specify which classes represent affected and which don't).

#3182 Classify continuous raster hazard (e.g. flood depth)
safe.gis.reclassify_gdal.reclassify
Keyword change: continuous to classifed

#3184 Polygon classified raster hazard
Assign class names based on class id (**safe.gis.attributes.class_mapper**) #3178
Pixel based
Contiguous areas
safe.gis.reclassify_gdal.reclassify_polygonize

This is an open question as to whether we use one approach always or select the approach based on exposure data. Contiguous areas make more 'natural' looking hazard areas but are more CPU intensive for processing. Pixel based areas are more CPU efficient but suffer from poor visualisation and the Aggregate Hazard area will have high geometric complexity.

Classified polygon hazard with keywords
Output fields:
* hazard_id
* hazard_class_name

#3183 Project to CRS of Exposure
Keyword change: none

User:
* 1 = moderate
* 2 = high
* 3 = very high
* 4 = total

Aggregate Hazard Preparation

Field remapping
* aggregation_id
* aggregation_name
* gender_ratio
* age_ratio
* etc.

#3183 Project to CRS of Exposure
Keyword change: none

#3186 Vector Clip and mask hazard to aggregation
Keyword change: none

Intersect hazard polygons with aggregation areas and assign hazard class
Keyword change: 1) change purpose to aggregate_hazard 2) set the type attribute

For Future?

Should we be using UNION rather here? We keep everything and then report only on those areas that have an aggregation id.
* get rid of clip step
* if hazard if bigger than exposure we will keep the non overlapped areas

Perhaps as a second path based on options - in some cases user may have large hazard dataset but only want reporting for a specific area in which case we may want to stick with the clip and mask approach…

The risk with this approach is that exposure data may be huge beyond the aggregation area. This idea is on hold for now.

Comments from Charlotte:

Be sure to leave original datasets untouched.

Reports should still show e.g. input data was continuous hazard, cell size etc

Where does user get told that their data was turned into polygons.

Add message explaining the step name to progress callbacks.

Exposure Preparation

RFC #2473

User:
* 1 = rice
* 2 = wheat
* 3 = maize
* 4 = urban

InaSAFE:
* agricultural
* urban

For now we deal with this the same way as with hazard classified rasters…

Do we remap these to InaSAFE' terms? Possibly second round of development for this?

Raster exposure? (Yes / No)
Continuous? (Yes / No)
Densities (No / Yes)
Keyword change: none
Raster clip and mask exposure to aggregate hazard

Raster landcover classes
We need to describe the mechanism for doing these class mappings
#3184 Polygon classified raster hazard
Assign class names based on class id (**safe.gis.attributes.class_mapper**) #3178
Contiguous areas
#3181 Calculate counts per cell
#3190 Zonal stats on intersected hazard / aggregation data

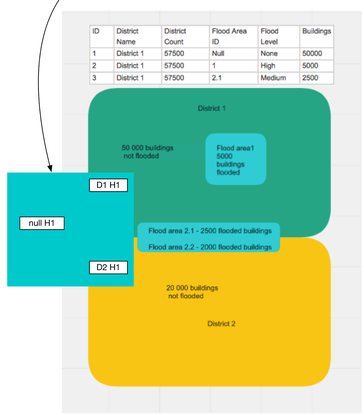
Field remapping
* exposure_id
* exposure_value
* remove columns
#3187 ??
Classified exposure with keywords

Features divisible? (Yes / No)
Landcover
Population polygons
Roads
Line features? (Yes / No)
Buildings
Places
#3189 Intersect with aggregate hazard and exclude roads outside

#3191
Maybe we can skip step #3191?
Intersect aggregate hazard layer with divisible polygons
#????
Same applies if we have male/female/ etc. count columns in exposure.
Recalculate population counts based on new polygons size (population = new area / old area * old population)

#???? Exlude all polygons not intersecting aggregate hazard

ID	District Name	District Count	Flood Area ID	Flood Level	Buildings
1	District 1	57500	Null	None	50000
2	District 1	57500	1	High	5000
3	District 1	57500	2.1	Medium	2500



Impact Function Run

(GIS Analysis Only)

Point IF
Indivisible Polygon IF
Line IF
Polygon IF
"4 Princes"

Features divisible? (No / Yes)

#3192 Highest class of hazard is assigned when more than one overlaps

Assign by location aggregation & hazard areas to exposure features

Intermediate Impact Layer

Post-Processing

#3200 ClassRate
e.g. roads or landcover
1. Get rate per m2 per class from definitions.py (parameterised)
2. Create new impact layer field for total value
3. Calculate the total value by multiplying class rate with the area in m2 or distance in m

#3199 ClassValue
e.g. buildings
1. Get cost (value) per unit for each class from definitions.py (parameterised)
2. Create new impact layer field for feature value
ONLY WORKS FOR POINTS AND INDIVISIBLE POLYGONS

#3198 SizeRate
1. Get rate per m2 field
2. Create new impact layer field for total value
3. Calculate the total value by multiplying rate with the area in m2 or distance in m
We need to calculate the value of the area based on m2 (e.g. agricultural land, buildings with a standard cost/m2). We will generate a value field after processing…

#3197 Value
The exposure data already had value of each feature calculated and we need to transpose this data over to the impact layer
1. Get Value field per feature

#3196 FeatureType
1. Get type field
2. Create new field for classes
3. Map type to class

Postprocessors that require Population Count field

#3195 MinimumNeeds
1. Get population field
2. Create new field for each need
3. Calculate total needs per record

#3194 GenderRatio
Only run if count field not populated / null.
1. Get population field
2. If exist, use get gender ratio field. Ratio field original source from exposure (priority 1) or aggregate_hazard (priority 2), else use default
3. Create new field for gender population
4. Calculate gender pop per record using: ratio, hygene pack, additional rice for pregnant and lactating woman
female_count

GenderCount
Just copy count to standardized field (already done in field preparation phase)

#3193 OldAgeRatio
Only run if count field not populated / null.
1. Get population field
2. If exist, use get gender ratio field. Ratio field original source from exposure (priority 1) or aggregate_hazard (priority 2), else use default
3. Create new field for old age population
4. Calculate Old Age Count
elderly_count

OldAgedCount
Just copy count to standardized field (already done in field preparation phase)

YouthRatio
Only run if count field not populated / null.
1. Get population field
2. If exist, use get gender ratio field. Ratio field original source from exposure (priority 1) or aggregate_hazard (priority 2), else use default
3. Create new field for youth population
4. Calculate Youth Count
youth_count

YouthCount
Just copy count to standardized field (already done in field preparation phase)

AdultRatio
Only run if count field not populated / null.
1. Get population field
2. If exist, use get gender ratio field. Ratio field original source from exposure (priority 1) or aggregate_hazard (priority 2), else use default
3. Create new field for adult population
4. Calculate Adult Count
adult_count

AdultCount
Just copy count to standardized field (already done in field preparation phase)

PregnantRatio
Only run if count field not populated / null.
1. Get population field
2. If exist, use get gender ratio field. Ratio field original source from exposure (priority 1) or aggregate_hazard (priority 2), else use default
3. Create new field for adult population
4. Calculate Adult Count
pregnant_count

PregnantCount
Just copy count to standardized field (already done in field preparation phase)

Impact Results

Post processing should be written to aggregate-hazard dataset (e.g. number of females in each area) and to the exposure dataset (e.g. cost per building)

Reporting

Derived Hazard Layer
Reference to Aggregation Layer
Aggregate Hazard Layer
Impact Layer
Impact Metadata
Provenance
ISO 19115 Mandatory Fields
InaSAFE Keywords
Deferred Output Generator
Provenance
Actions & Keywords
Impact Geometries
Impact Table
Aggregate Hazard Geometries
Aggregate Hazard Table
JSON Document
Presentation Logic
Report Filter will use metadata in templates & styles and metadata in impact and aggregate hazard layer to determine which styles and templates can be used
Report Filter

Standards

Aggregate Hazard Table
e.g. This template needs age and types and whether it works on the impact table or aggregate hazard table.
Template Metadata | Template 1
Template Metadata | Template 2
Template Metadata | Template … n

Cartographic Styling
Style 1 | Template Metadata
Style 2 | Template Metadata
Style … n | Template Metadata
e.g. This template needs age and types and whether it works on the impact table or aggregate hazard table.

Reports for different purposes:

***Preparedness**
*** Response**
*** Contingency planning**

Map Reports