



**UN-GGIM:Americas**  
REGIONAL COMMITTEE OF UNITED NATIONS  
ON GLOBAL GEOSPATIAL INFORMATION  
MANAGEMENT FOR THE AMERICAS

# 9° SESSION

## UN-GGIM: Americas

### *Geoinformation management in response to disasters in Ecuador, case study: the actions of the IGM in the Earthquake 06/2016*

*Gestión de geoinformación en atención a los desastres en Ecuador, caso de análisis: el accionar del IGM en el Terremoto 06/2016*

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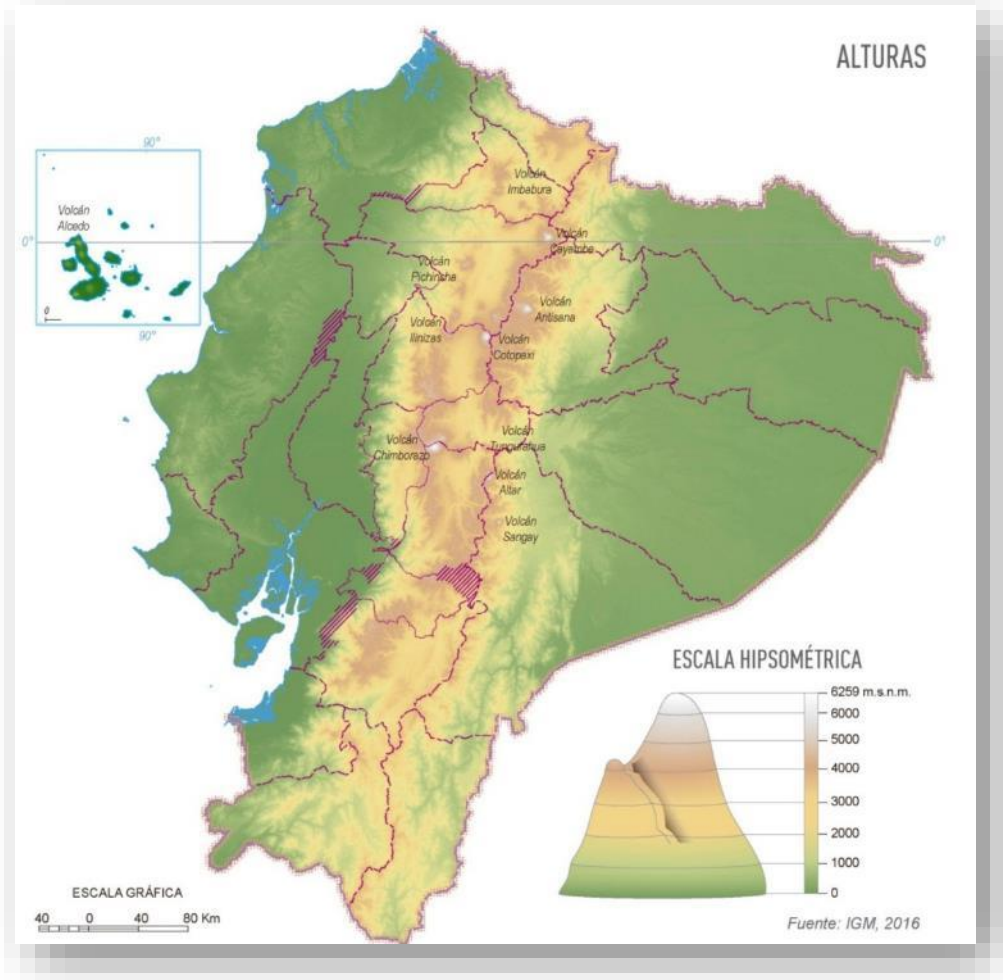
Session Marco Estratégico de Información y Servicio Geospaciales para Desastres



**INSTITUTO  
GEOGRÁFICO  
MILITAR**

November 28, 29 and 30  
Santiago de Chile, ECLAC

# NATIONAL CONTEXT



Area : 257.217,07 km<sup>2</sup>

Population : 18'000.000

**Ecuador has exposed spaces:**

- Earthquakes
- Volcanic eruptions
- Floods
- Landslides
- Fires
- Droughts and desertification

# EARTHQUAKES: ECUADOR- PEDERNALES (2016)

- **Earthquake** registered on Saturday, April 16 at 6:58 p.m. (local time), of magnitude 7.8 (Mw moment magnitude), whose hypocenter was located in front of Pedernales (Manabí), Source: IG-EPN
- **Executive Decree 1001:** State of exception for sixty days in the provinces of: Esmeraldas, Manabí, Santa Elena, Santo Domingo de los Tsáchilas, Los Ríos and Guayas, due to the adverse effects of this natural disaster. April 17, 2016.
- **Executive Decree 1002:** Extend Executive Decree 1001, in the sense that the mobilization is for the entire national territory. April 18, 2016.

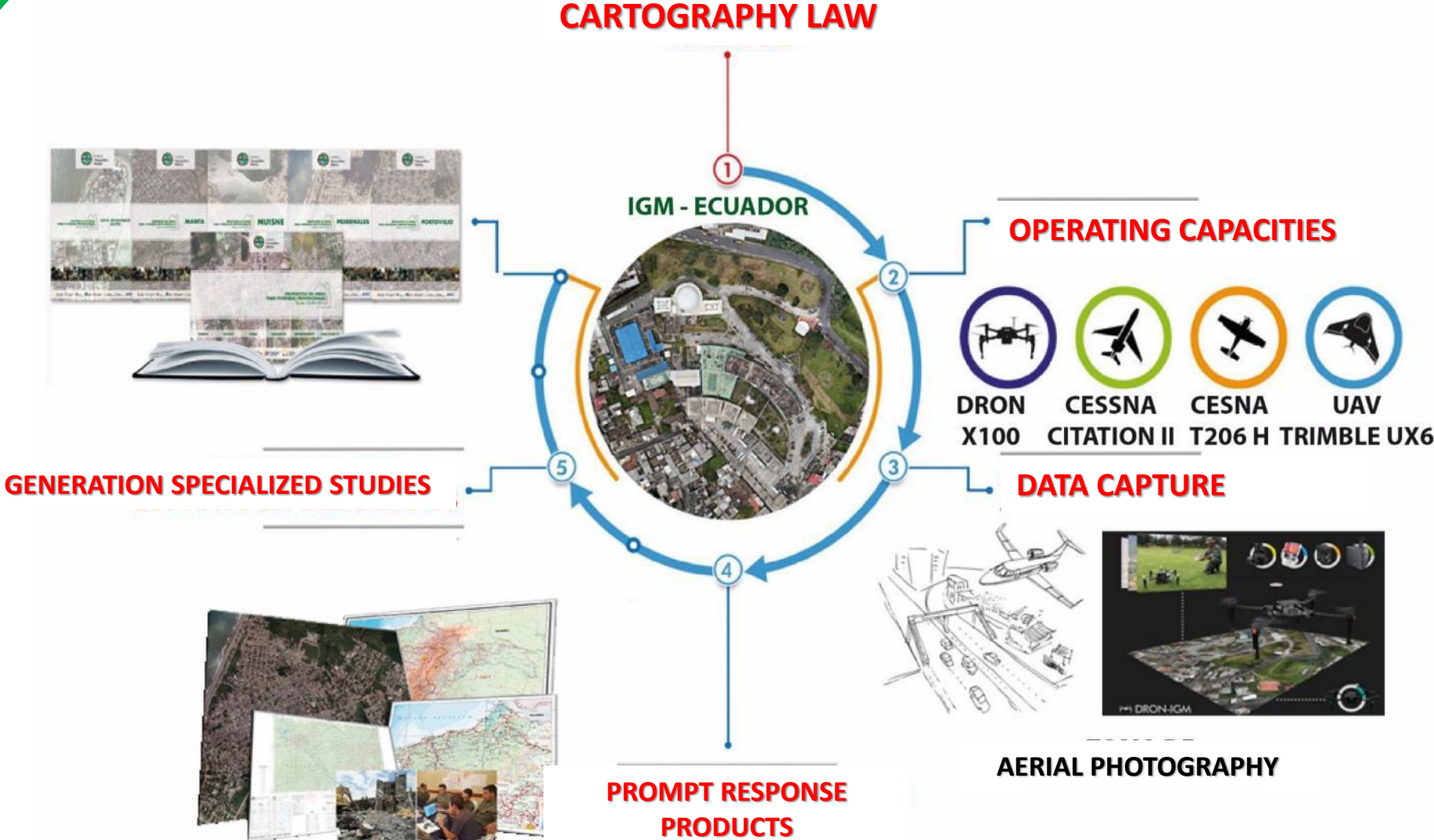


The Military Geographic Institute, manages, approves and controls all the activities aimed at: **elaboration of the official cartography and the archive of geographic and cartographic data of the country and studies of geomatic application**; prepares valued species and security documents as the only authorized body; and carries out research and dissemination of geospatial sciences, contributing to the defense of sovereignty and territorial integrity, support for national development and in support of the actions of other State institutions.

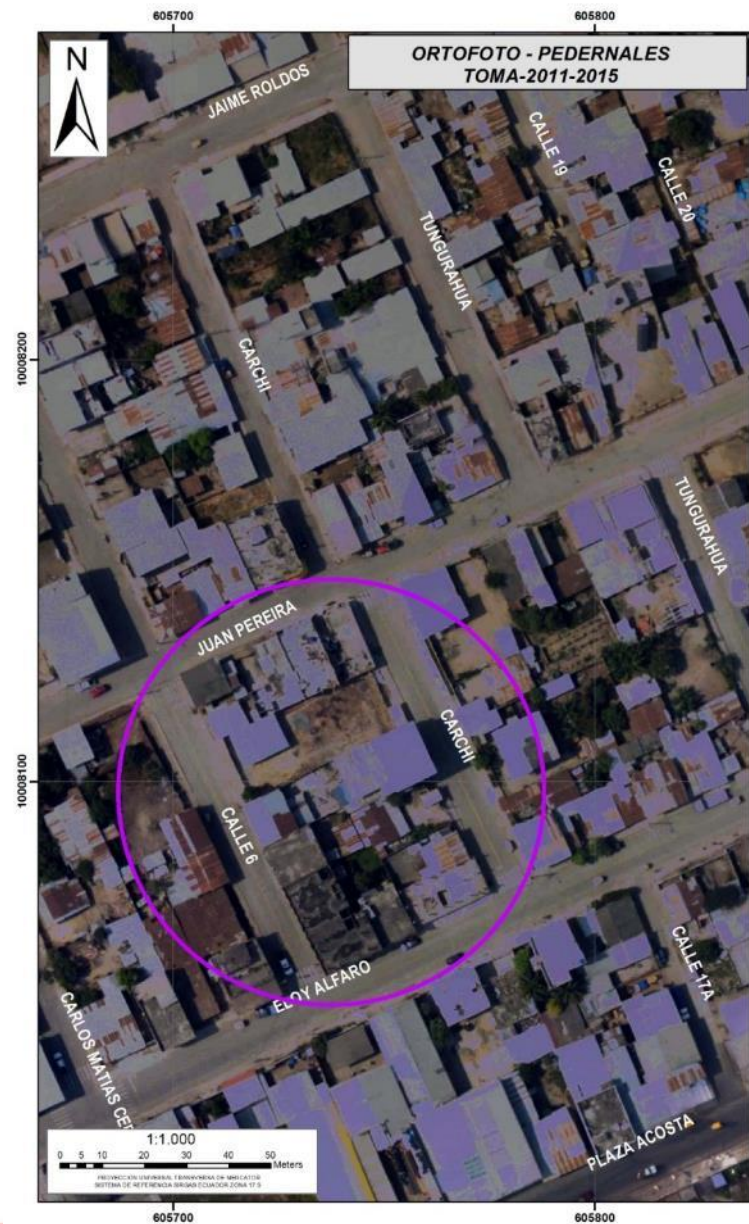
## INSTITUTIONAL MISSION



# SPACE INFORMATION MANAGEMENT IN DISASTER RESPONSE



# EXAMPLE OF RESULTS



**AFTER AND BEFORE  
THE EVENT**

# EXAMPLE OF RESULTS

## GENERACIÓN DE CARTOGRAFÍA Y ESTUDIOS GEOGRÁFICOS DE PRONTA RESPUESTA

Estimación provisional de edificaciones destruidas y afectadas



	Manita	Porto Viejo	Montecristi	El Carmen	Orone	Baha de Caraquez	Caliceta	Jaramijó	Pedernales	Tocagua	Roca fuerte	San Vicente	Flavio Alfaro	Jama	Musine	San Isidro	Colmies	San José de Charrang	El Metal	Caroa	TOTAL
Total de construcciones destruidas y afectadas	6391	2897	1480	1206	1622	3277	725	1274	597	403	846	388	299	1226	218	701	53	674	620	294	<b>25 191</b>
Afectadas	5675	2336	1361	1031	1312	2 822	624	1186	0	361	770	266	272	768	0	656	26	374	450	0	<b>20 290</b>
Destruidas	716	561	119	175	310	455	101	88	597	42	76	122	27	458	218	45	27	300	170	294	<b>4901</b>
Total construcciones analizadas	82 922	78 023	23 158	20 519	16 643	9482	7779	6649	5995	5325	5100	4528	3096	2692	1957	1677	1277	920	750	677	<b>279 169</b>
% Afectadas	6,84	2,99	5,88	5,02	7,88	29,76	8,02	17,84	0,00	6,78	15,10	5,87	8,79	28,53	0,00	39,12	2,04	40,65	60,00	0,00	
% Destruidas	0,86	0,72	0,51	0,85	1,86	4,80	1,30	1,32	9,96	0,79	1,49	2,69	0,87	17,01	11,14	2,68	2,11	32,61	22,67	43,43	
% Total	7,71	3,71	6,39	5,88	9,75	34,56	9,32	19,16	9,96	7,57	16,59	8,57	9,66	45,54	11,14	41,80	4,15	73,26	82,67	43,43	

Número de construcciones afectadas y destruidas por localidad. 16/04/16

## DESTROYED BUILDINGS BY LOCATION

El gráfico de barras muestra el número de construcciones totales, destruidas y afectadas que han sido fotoidentificadas, comparando fotografía aérea existente con fotografía aérea nueva, tomada después del terremoto ocurrido el sábado 16 de abril. Los valores corresponden a las construcciones en cada una de las localidades.

Ejemplo:

En Jama se analizó un total de 2962 construcciones, de ese valor, 1226 han sido destruidas y afectadas. Un total de 768 se consideran afectadas y 458 destruidas



CONSTRUCCIONES AFECTADAS  
**20 290**

CONSTRUCCIONES DESTRUIDAS  
**4901**

TOTAL AFECTADAS  
**25 191**

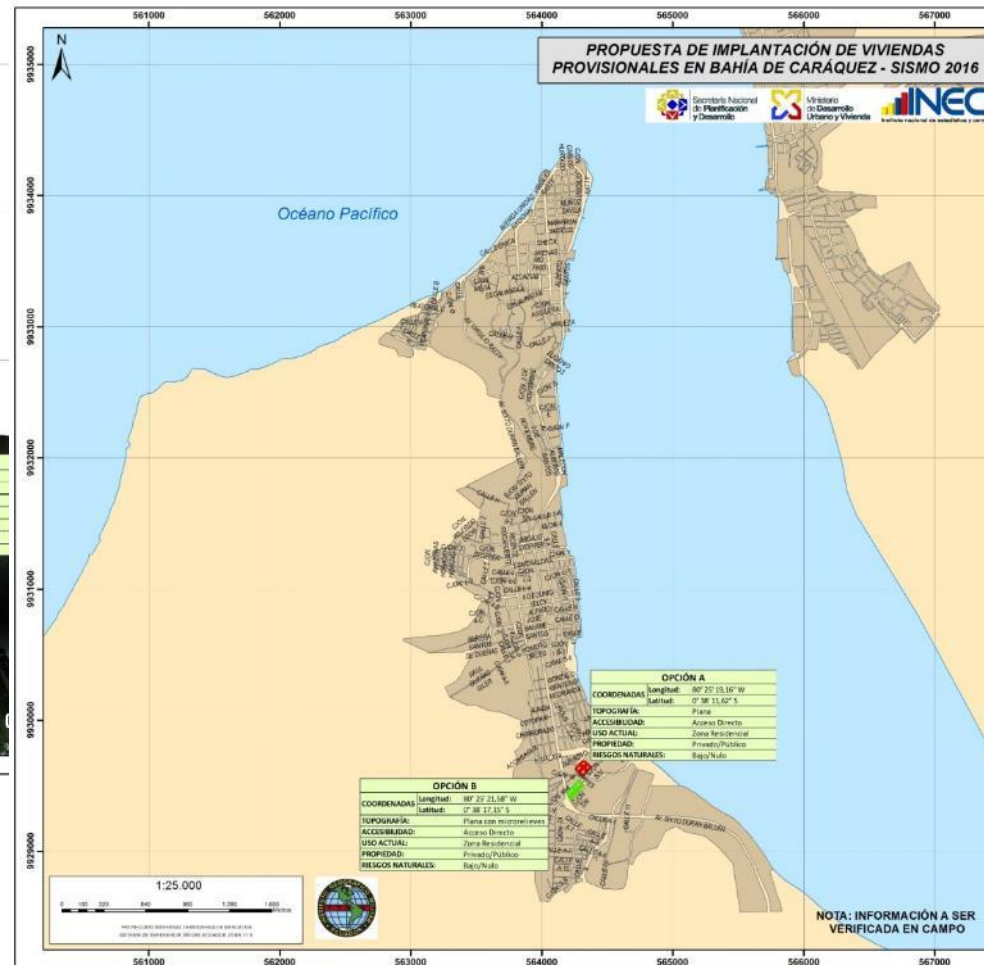
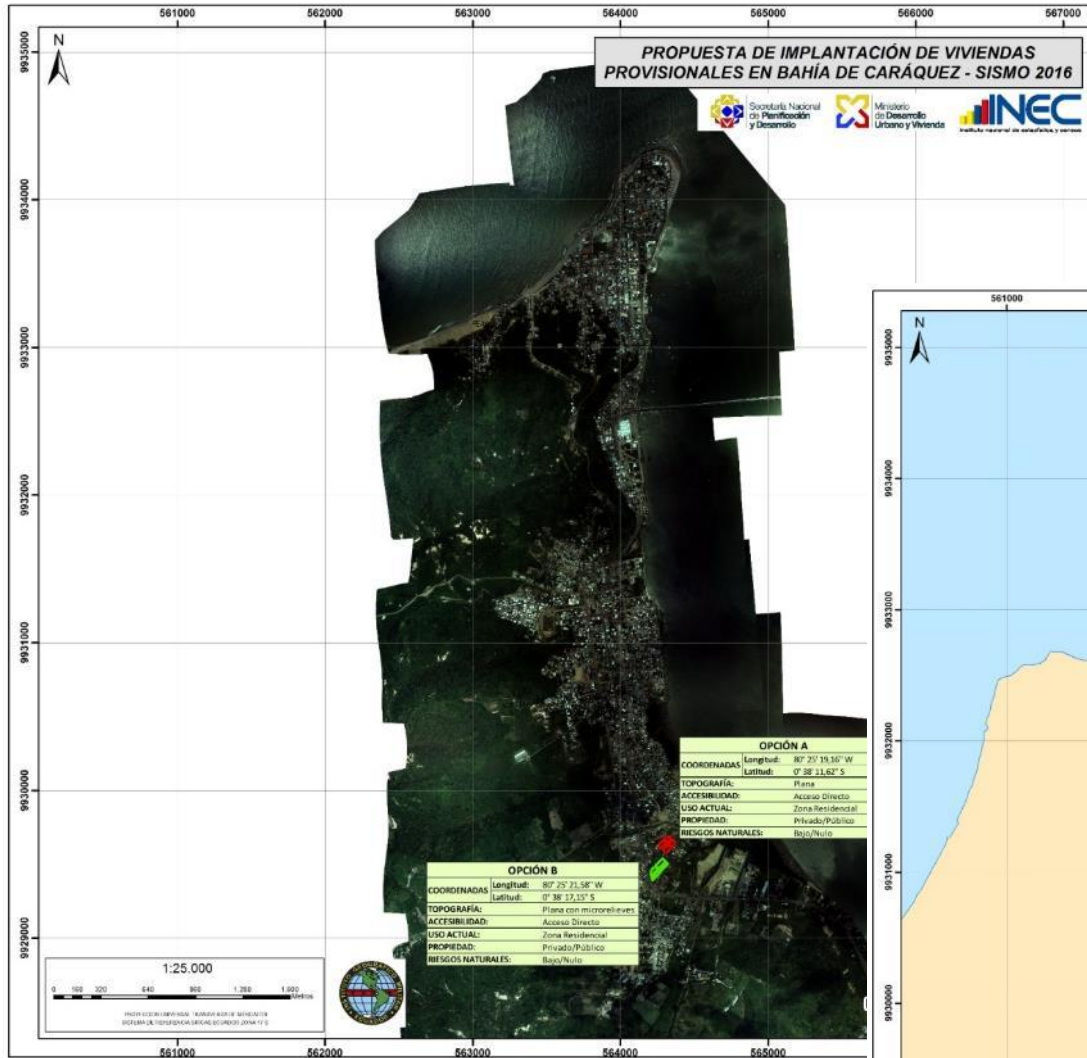
50 580

1084

101 32

# EXAMPLE OF RESULTS

## TEMPORARY HOUSING STUDY



### INSUMOS

- Mosaico fotográfico georeferenciado, IGM, 18 de abril de 2016
- Área amanzanada, INEC, 2014
- Mapa de Multiamenazas del Ecuador, IEE, 2016
- Mapa de Pendientes, IEE, 2016
- Mapa de Uso del Suelo, MAGAP - MAE, 2015
- Plan de Desarrollo y OT del Cantón Sucre, 2012
- Mapa del Sistema Nacional de Áreas Protegidas, MAE, 2014
- Servicio Web Geográfico WMS, Mapa Base Ecuador IGM, 2016

### LEYENDA TEMÁTICA

#### OPCIONES PARA LA IMPLANTACIÓN DE VIVIENDAS PROVISIONALES

- OPCIÓN A
- OPCIÓN B

### PROTOTIPO DE IMPLANTACIÓN DE ALBERGUES



### PARÁMETROS DE DISEÑO BÁSICO

CONSIDERACIONES	Área m <sup>2</sup>	Porcentaje TOTAL m <sup>2</sup>
Número de habitantes en viviendas provisionales		
Área mínima para vivienda por persona	16	1 7 648
Área para seguridad (IPC, salud)	200	1 200
Equipamiento comunal (bicicletas, comedor, caceres)	500	1 500
10% del área para recreación	7 648	10% 764.8
25% del área para vitalidad interna	8 433.8	25% 2 108.2
TOTAL ÁREA REQUERIDA (m <sup>2</sup> )		31 241
TOTAL ÁREA REQUERIDA (ha)		8.146

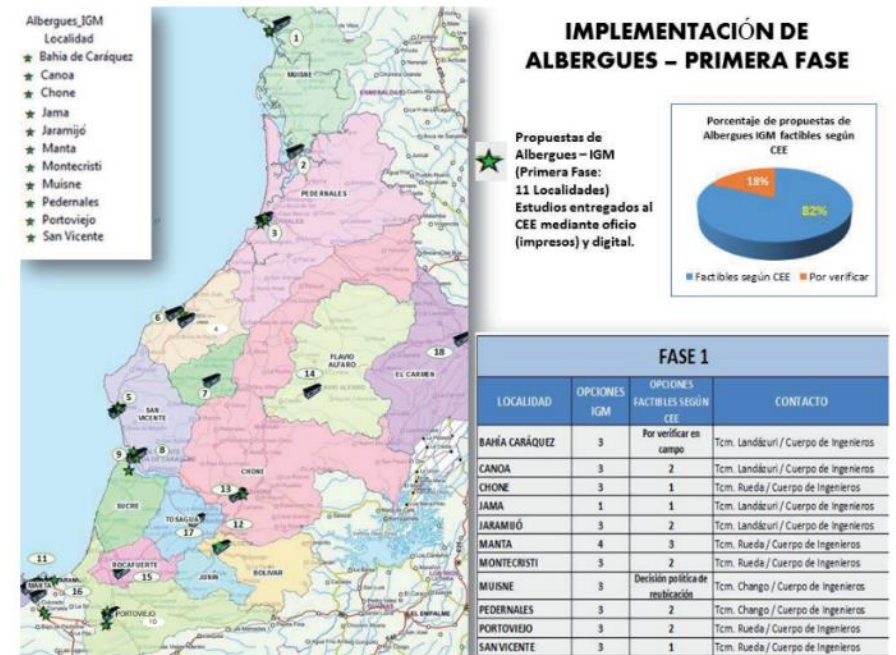
\* Fuente: MAE, Albergues y albergos, 25 de abril de 2016



# EXAMPLE OF RESULTS



## IMPLEMENTATION OF TEMPORARY HOUSING STUDY



# ECONOMIC VALUATION

- Download of more than 700 products on the website (Orthophotos before and after the event, basic cartography, early response cartography, georeferenced photomosaics, etc.)
- Publication of more than 600 layers of information through WMS, WFS, WMTS and/or TMS services to provide direct and interoperable access from multiple sources of information.
- During the months of emergency, 35,000 data were downloaded, exceeding the annual average for the entire Geoportal.
- Direct cooperation processes were established with volunteers generating Orthophotos with drones, for the generation of specific information.
- The collaborative work between OpenStreetMap, the Humanitarian OpenStreetMap Team (HOT) and several volunteers created projects to update the maps in the most affected places.
- All of this generated savings for it of approximately \$550,000 USD in direct generation of geoinformation and also generated an economic benefit to the state of approximately \$12,460,000 USD.

# LEARNED LESSONS

In terms of geospatial information management, the following lessons learned could be deduced:

- The institutional strength of State agencies lies in the ability to articulate their competencies and manage geospatial information, in a scalable way from the National Operational Committees to the Locals in response to Emergencies.
- It is necessary to have an operational instruction, which allows to activate the actions and make available to the authorities and other State agencies all their technological and human capacities of the specialized Institutions.
- The interoperability of geographic information was essential to give timely attention to the requirements of the Institutions in charge of post-event care. (Reconstruction, damage assessment, help bonuses etc.

# JOINT WORK PROPOSALS

- From Ecuador and in coordination with Brazil (leading the Disaster Group) it is proposed to keep everyone's memory alive, making available to the general public a **"Data HUB of good practices in disaster response with geospatial information"** with the purpose of create awareness in the population.
- In addition, with the support of all the countries of the region, we expected to generate a guide document, which will allow the determination of minimum layers of geographic information, in order to give prompt attention to the different natural threats.

**Thanks for your attention**



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