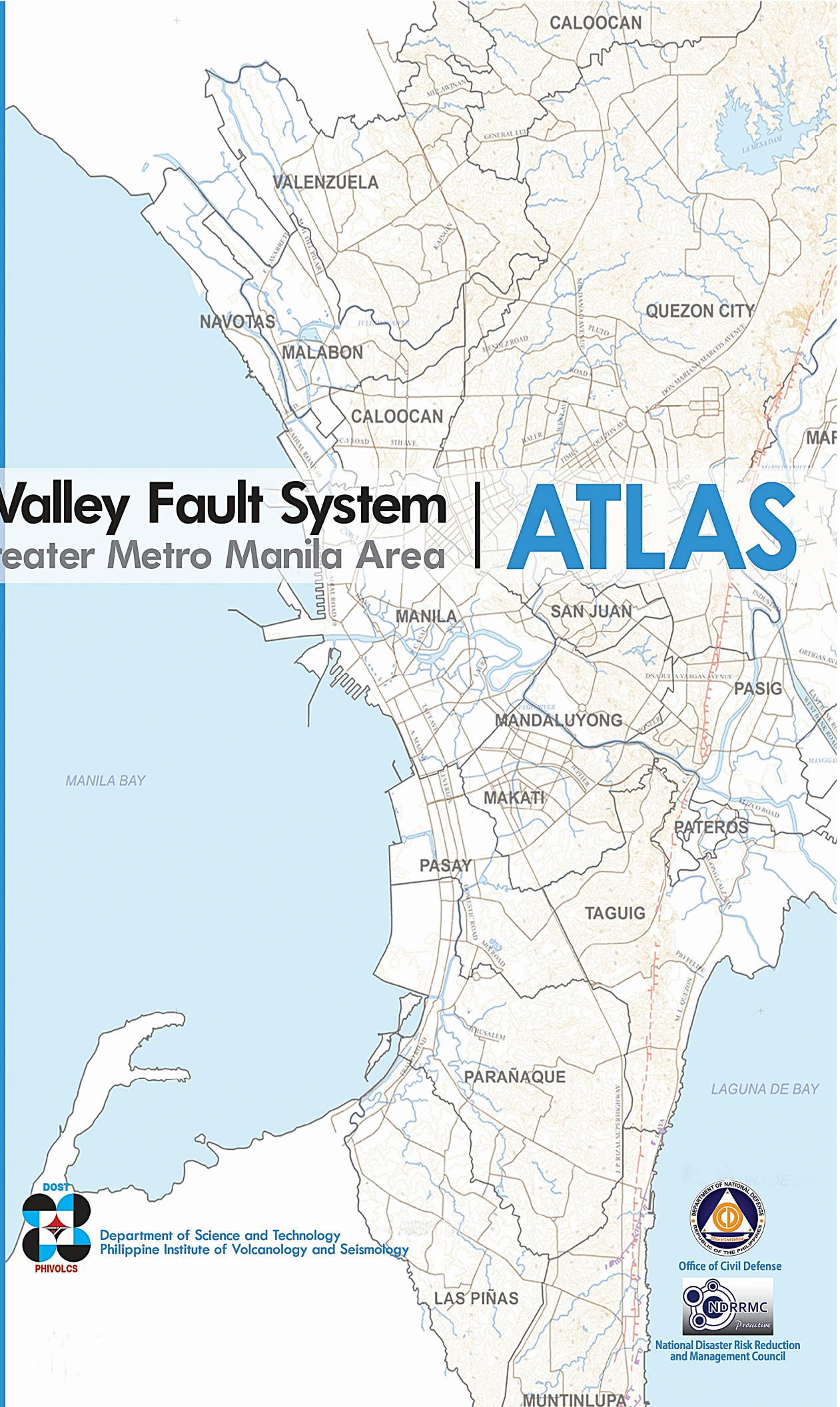


The Valley Fault System | ATLAS

in Greater Metro Manila Area



Department of Science and Technology
Philippine Institute of Volcanology and Seismology



Office of Civil Defense



National Disaster Risk Reduction
and Management Council

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Volcanology and Seismology**



**National Disaster Risk Reduction
and Management Council**



REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF NATIONAL DEFENSE
 Camp General Emilio Aguinaldo, Quezon City, Metropolitan Manila



National Disaster Risk Reduction and Management Council



THE Greater Metro Manila Area (G MMA) including the adjacent regions of Central Luzon and Calabarzon, the country's economic, political, socio-cultural and educational hub, and home to more than a third of its population, is transected and traversed by the active Valley Fault System (VFS).

Thus, the publication of the **Valley Fault System (VFS) Atlas**, a handbook of large-scale maps detailing the situs of the 100-kilometer-long West Valley and the 10-kilometer-long East Valley segments of the VFS in the Metro Luzon Urban Beltway super region, is a welcome and significant addition to the tools to inform all of our stakeholders' earthquake disaster mitigation, preparedness, and response measures and actions.

Our congratulations, therefore, goes to the "Enhancing Greater Metro Manila's Institutional Capacities for Effective Disaster/Climate Risk Management Towards Sustainable Development" or **G MMA READY Project**, implemented by the Office of Civil Defense-National Disaster Risk Reduction and Management Council (OCD-NDRRMC), through its Collective

Strengthening of Community Awareness on Natural Disasters (CSCAND) partner agency, the Philippine Institute of Volcanology and Seismology (PHIVOLCS), with support from the United Nations Development Programme (UNDP) and the Australian Aid Program, for the development, production, and publication of the **Valley Fault System Atlas**.

Though the challenge of building a safer, adaptive, and disaster-resilient Philippines still remains, let the knowledge and information contained in the VFS Atlas guide us in responding and meeting the aforementioned challenge; thus, ensuring inclusive growth and sustainable development for all our communities nationwide.

Thank you and Mabuhay!

Voltaire T. Gazmin
SEC. VOLTAIRE T. GAZMIN
 Secretary, DND
 and Chairperson, NDRRMC



REPUBLIC OF THE PHILIPPINES
OFFICE OF CIVIL DEFENSE
 DEPARTMENT OF NATIONAL DEFENSE



National Disaster Risk Reduction and Management Council



WARMEST felicitations and congratulations to the officers and corps of experts of the **G MMA READY Project** and the Philippine Institute of Volcanology and Seismology (PHIVOLCS) on the successful creation and publication of the **Valley Fault System (VFS) Atlas**.

The Atlas is one particular DRRM tool which will inform the earthquake preparedness and impact reduction plans, policies, and actions of our local governments in Metro Manila and surrounding provinces of Bulacan, Cavite, Laguna, and Rizal. Through the publication of this Atlas, which specify the position and location of the Valley Fault System in G MMA, we have taken a leap forward to reducing risk from earthquake.

Our gratitude as well to our ever reliable colleagues from the United Nations Development Programme (UNDP) and the Australian Aid Program for their assistance in this endeavor.

May the knowledge compiled in this most valuable tool bring us closer to achieving the goal of our national DRRM effort: to build safer, disaster-resilient and climate-change adaptive communities throughout the country.

Again, our congratulations and Mabuhay!

Alexander P. Pama
USEC ALEXANDER P. PAMA
 Civil Defense Administrator
 and Executive Director, NDRRMC



REPUBLIC OF THE PHILIPPINES
 Department of Science and Technology
PHILIPPINE INSTITUTE OF VOLCANOLOGY AND SEISMOLOGY
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A MAJOR earthquake generated by the Valley Fault System, that runs in the eastern part of Metro Manila and transects portions of Bulacan, Rizal, Cavite, and Laguna, will greatly threaten a large number of population and significant amount of economic assets. To minimize its effect, the Philippine Institute of Volcanology and Seismology-Department of Science and Technology (PHIVOLCS-DOST) conducted detailed hazard mapping and assessment of the VFS with the support from the United Nations Development Programme (UNDP) and the Australian Aid Program (AusAid) under the "Enhancing Greater Metro Manila Areas (G MMA) Institutional Capacities for Effective Disaster/Climate Risk Management towards Sustainable Development" or the **G MMA READY Project**. An output of the project is the publication of the **Valley Fault System Atlas** in **G MMA**.

This atlas provides comprehensive information and a more detailed map of the VFS that shows areas transected by the active fault.

We firmly hope that this atlas will be utilized by different stakeholders as an important tool in preparing comprehensive land use plans, disaster risk reduction (DRR) and mitigation programs, and different activities that can help strengthen the resiliency of each community.

Renato U. Solidum, Jr.
DR. RENATO U. SOLIDUM, JR.
 Director, PHIVOLCS-DOST

The Valley Fault System in Greater Metro Manila Area Atlas

The **Valley Fault System (VFS)**, an active fault¹ in the **Greater Metro Manila Area (GMMMA)**, consists of two segments: the **East Valley Fault (EVF)** and the **West Valley Fault (WVF)**.

The **EVF** is about 10-km-long and traverses the municipalities of **Rodriguez** and **San Mateo** in Rizal province. This fault can generate an earthquake with a magnitude² of 6.2 that may result to a very destructive ground shaking, with intensity³ VIII on the PHIVOLCS Earthquake Intensity Scale (PEIS)⁴, in the epicentral area.

The **WVF** is approximately 100-km-long and transects portions of **Quezon City, Marikina City, Pasig City, Makati City, Taguig City, Muntinlupa City**, and the provinces of **Bulacan (Doña Remedios Trinidad, Norzagaray and San Jose Del Monte City), Rizal (Rodriguez), Laguna (San Pedro City, Biñan City, Sta. Rosa City, Cabuyao City and Calamba City)** and **Cavite (Carmona, General Mariano Alvarez and Silang)**. This fault can generate an earthquake with a magnitude of 7.2 that may result to a very destructive ground shaking, with intensity VIII on the PEIS, in Metro Manila and nearby provinces.

Movement along the VFS can result to ground rupture⁵ that may be damaging to buildings and structures built directly above the active fault. The minimum distance, or the zone of avoidance, recommended by the **Philippine Institute of Volcanology and Seismology – Department of Science and Technology (PHIVOLCS-DOST)** against ground rupture hazard is at least 5 meters from both sides of the active fault or from the edge of the deformation zone⁶. At present, there is no engineering design available to withstand ground rupture. Hence, these areas may be developed as recreational spaces, such as parks, parking spaces and playgrounds or built with low-occupancy structures⁷. Impacts of other earthquake hazards (ground shaking, liquefaction, earthquake-induced landslides and tsunami) can be reduced by proper engineering designs and mitigating measures.

PHIVOLCS has been studying the VFS since the 1990s and published maps in 2000, in the following map scales: 1:10,000 for Metro Manila and 1:50,000 for nearby provinces. In 2012, PHIVOLCS revisited the VFS as part of the project entitled, “Enhancing Greater Metro Manila Areas (GMMMA) Institutional Capacities for Effective Disaster/Climate Risk Management towards Sustainable Development”, or the GMMMA-READY Project, supported by the United Nations Development Programme (UNDP) and the Australian Aid Program (AusAid). The result of this endeavor is





presented in this atlas that provides more detailed information about the VFS. It can be used for land-use planning, engineering and construction, scientific research, disaster risk reduction and mitigation programs, and other activities geared towards the promotion of safer and more resilient communities.

This atlas contains 33 map sheets of varying scales, arranged from north to south, showing areas transected by the VFS. For Metro Manila, it uses 1:5,000 scale maps (22 map sheets), while for Laguna and Cavite, 1:10,000 (10 map sheets), and Bulacan, 1:50,000 (1 map sheet) scale maps were used.


In addition, this atlas shows fissures⁸ that are manifestation of ground subsidence. These are largely observed from 1990 to 2000 in Taguig City, Muntinlupa City, San Pedro City, Biñan City and Carmona. They were attributed to massive groundwater extraction and are not potential sources of earthquakes.

PHIVOLCS adopts the following convention to represent the location of the active faults and fissures:

Active faults

-  **Solid line:** active fault with clear surface manifestation of displacement identified in aerial photographs; some of this surface manifestation may not be observable on the ground at present due to land modification; hachures indicate the downthrown area or the side that moved down relative to the adjacent area;
-  **Orange solid line:** active fault coincides with fissure; hachures indicate the downthrown area;
-  **Dashed line:** active fault whose location is approximate, usually due to ground modifications produced by human activities;
-  **Dotted line:** active fault concealed by sediments or deposits.

Fissures

-  **Solid line:** fissures related to groundwater extraction; hachures indicate subsided area; these are not potential sources of earthquakes.

This atlas is also available for download at <http://www.phivolcs.dost.gov.ph>. For queries about active faults, contact the Geology and Geophysics Research and Development Division (GGRDD) at (+63 2) 426-1468 to 70 local 129 or visit our office at PHIVOLCS Bldg., C.P. Garcia Ave., UP Campus, Diliman, Quezon City.

¹ Active fault – a fault that has moved in the last 10,000 years and may generate earthquakes again

² Magnitude – measure of energy released during an earthquake

³ Intensity – a measure of how an earthquake was felt in a certain locality or area, based on relative effects to people, structures and objects in the surroundings

⁴ PEIS – a 10-point earthquake intensity scale used in the Philippines, represented in Roman Numerals with intensity I being the weakest and intensity X the strongest

⁵ Ground rupture – surface evidence of movement along an active fault

⁶ Deformation zone – in the case of the VFS, this is usually a narrow zone on both sides of the ground rupture, affected by warping or displacement

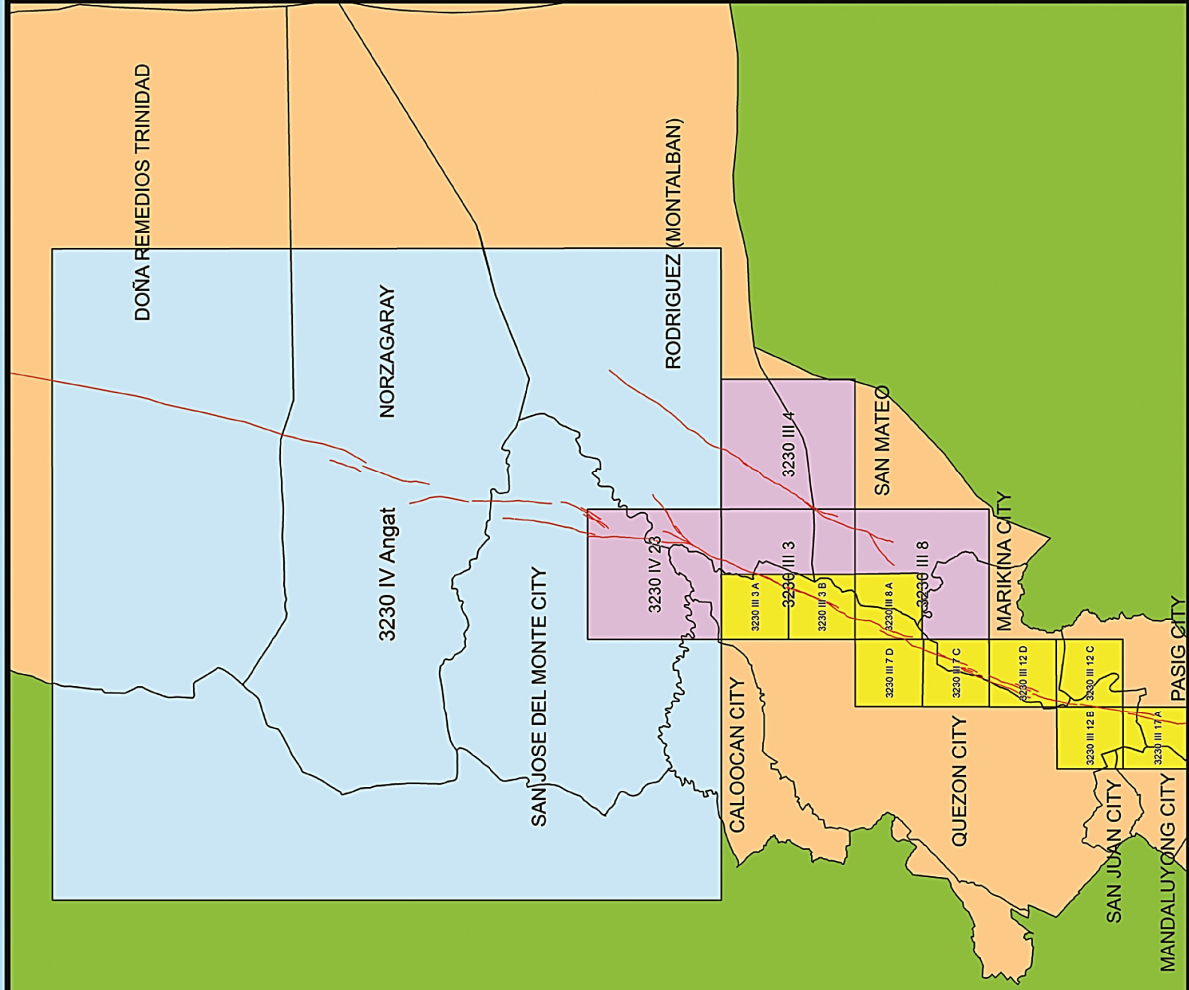
⁷ Low-occupancy structures – buildings that are infrequently used or have low number of users

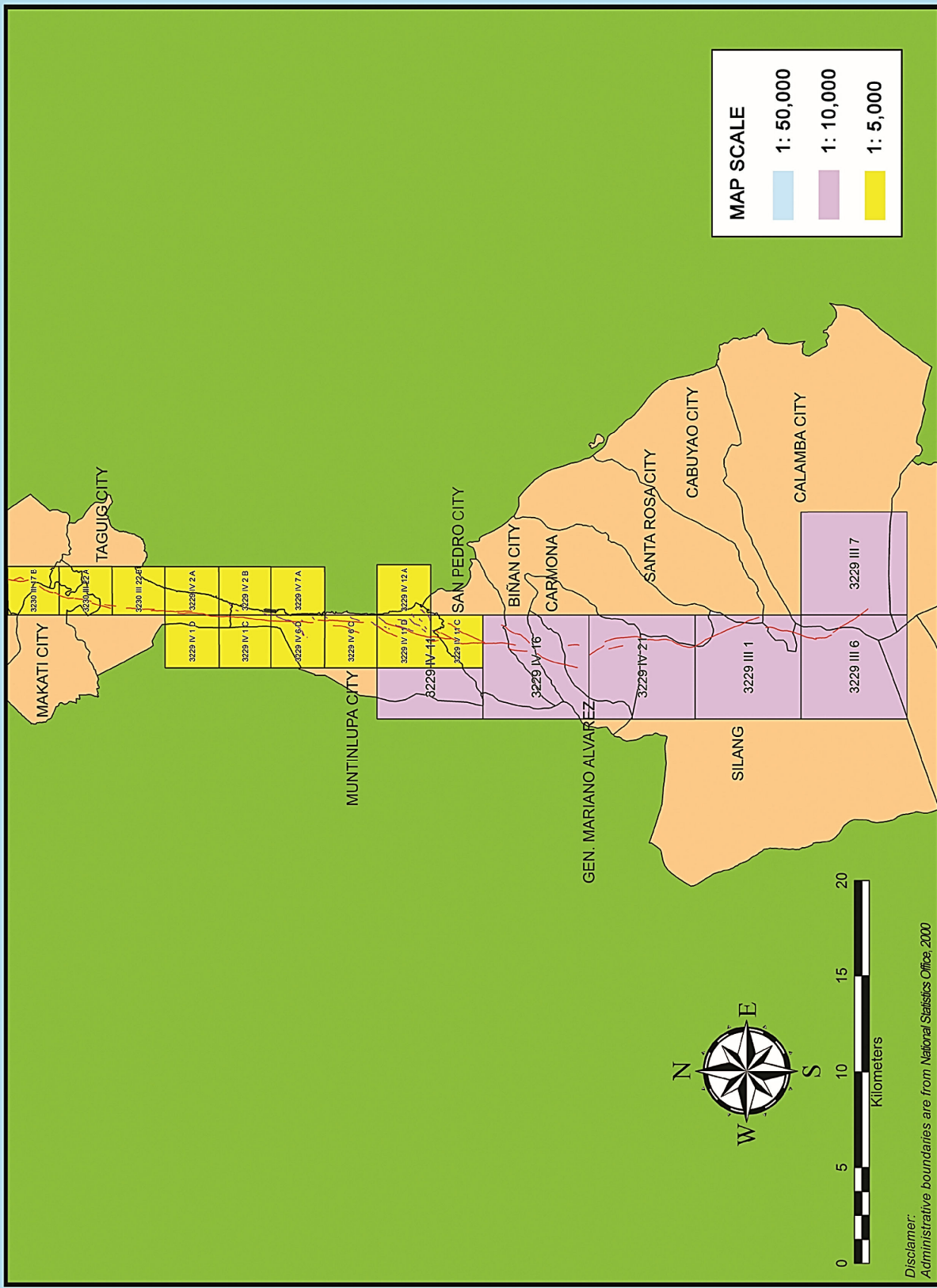
⁸ Fissures – in this atlas are cracks on the ground produced by groundwater extraction

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Disclaimer:
Administrative boundaries are from National Statistics Office, 2000