

Rising Temperatures, Rising Tides

Low-lying coastal areas such as Navotas are at risk to rising sea levels brought about by global warming and land subsidence

BY GERALD A. GALGANA, SERGIO C. ABAD II,
EMMI B. CAPILI, MAY CELINE T. M. VICENTE,
JOSE RAMON T. VILLARIN AND JOEL D. DE MESA

Coastal areas are continually being threatened by rising sea levels brought about by global warming. In Manila bay, land subsidence (sinking of land) due to excessive ground water extraction aggravates the situation.

Climate change or global warming, according to the United Nations Framework Convention on Climate Change (1992), refers to the rapid increase of global temperature in a certain period due to man-made activities. The planet earth allows itself to maintain a certain range of temperature essential to life. This is through the greenhouse effect, which serves as a blanket that keeps the earth warm. However, industrialization has disturbed this natural process and increased the greenhouse gas concentrations in the atmosphere. The increased concentrations trap the heat in the atmosphere, making the planet warmer.

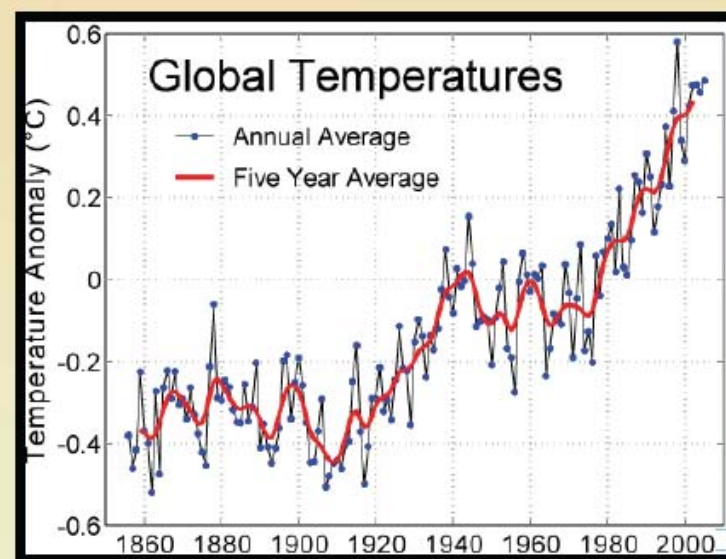


Warm temperatures causes water bodies to expand, raising water levels.



PHOTOS BY AMILAH S. RODIL

Places like Tanza, Navotas are vulnerable to flooding.



Global temperatures have been rising steadily from 1860 to 2005. The year 2005 was the second warmest year on record after 1988. (SOURCE: Climatic Research Unit of University of East Anglia Hadley Centre of the UK Meteorological Office, 2003)

Climate change affects all systems on earth: forests, agriculture, water, coastal resources and even the health of the people. In coastal areas, climate change can cause the sea level to rise because of thermal expansion. Heat causes water bodies to expand. For example, boiling water expands itself, then transforms into water vapor. The melting of glaciers in the Antarctic region also contributes to sea-level rise.

Being an archipelago, the Philippines is vulnerable to rising sea levels. A study by Galgana et al. (2004) projected the impact of the rise of sea level in Navotas, Metro Manila using Geographic Information Systems (GIS) and Terrain Modeling (tools that project scenarios through time and space). The study focused on these barangays found in Navotas: Tangos, San Roque, Daang Hari, San Jose, Navotas West, Navotas East, and Bagumbayan North and South. The range of elevation of these areas is about average sea level to about two meters above average sea level, comprising an estimated area of 200 hectares. Results of the study show that a one meter rise in sea level will submerge about 50 percent of the

study area. Although the parameters of the model may not be complete, it is substantial enough to show us what may happen in Navotas in the advent of rising sea levels.

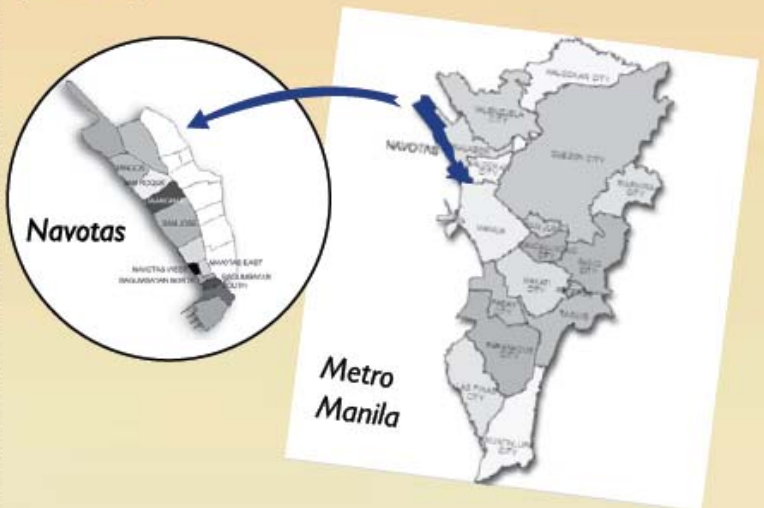
Another study by Siringan et al. (2005) also shows that rising sea levels in Manila Bay are caused by excessive ground water extraction rather than mere effects of global warming. If this water management problem will not be addressed, chances are this will aggravate the effects of climate-change related sea-level rise.

Another thing to consider is the onslaught of typhoons and monsoon rains. The clogged drainage system of Metro Manila and the increase of concrete surfaces (which are impervious to water), increases the discharge or flow of rainwater at shorter times. This enhances the potential for "inland flooding."

Based on recent climate studies, global temperatures are continuously rising and climate change is real and happening. Sea-level rise is inevitable. The Philippines has numerous coastlines that are vulnerable to sea-level rise. Therefore, proper planning is vital for adaptation and mitigation. Various tools can be utilized to project future scenarios (such as modeling and mapping) whereby results of such analyses can be integrated in development plans. Foresight and long-term initiatives are more relevant as opposed to short-lived solutions. Most importantly, the local people and stakeholders should be well-informed and educated to promote awareness, behavior change, coordination and disaster preparedness. Also, there is a need to strengthen local capacities so that the community will have a sense of belonging and protect their areas of responsibility. Climate change or global warming entails a unified effort among all individuals, stakeholders, communities and even nations. The time to act is now. Let us start protecting the climate and our future. ■

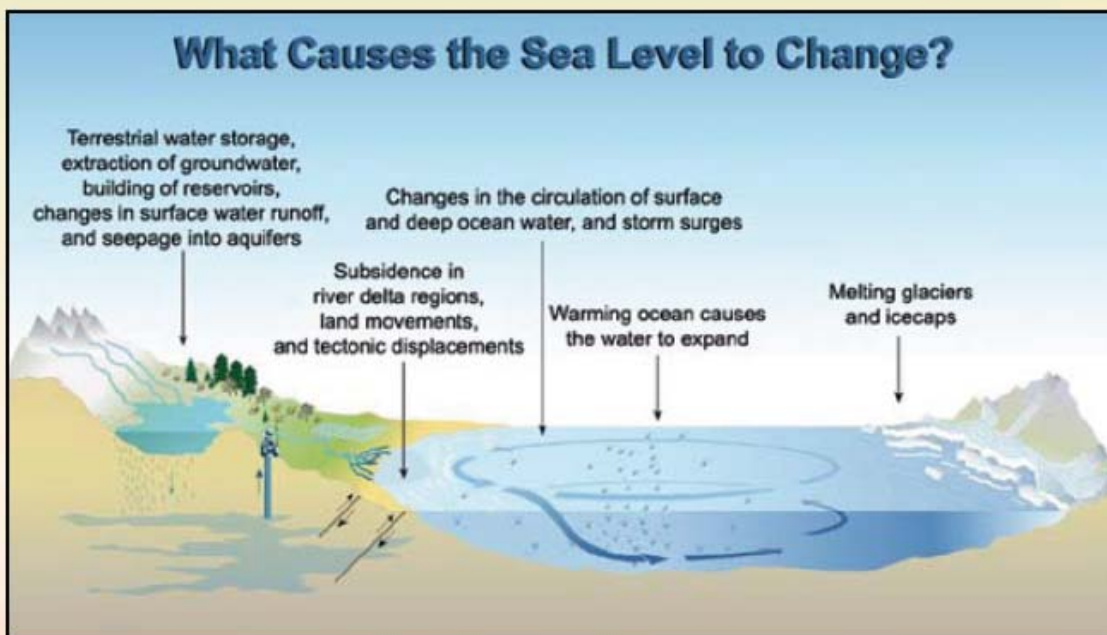


Navotas before and after a projected one-meter sea level rise (blue indicates flooded areas).



REFERENCES: Galgana, GA, S.C. Abad II, J.R.T. Villarin and M.C.T.M. Vicente, 2004. "Visualizing Sea-Level Rise in Navotas by GIS and Terrain Modeling."

Siringan, F.P., C. M. Jaraula, R. Berdin, C. Remotique, M.Y. Yacat-Sta. Maria, P. Zamora. 2005. "A Challenge for Coastal Management." Know Risk: A United Nations Publication, pp. 218-219.



THE DYNAMICS OF SEA-LEVEL CHANGE. Causes of sea-level change include excessive groundwater extraction, subsidence, circulation changes, thermal expansion, and water exchange among oceans, ice caps and glaciers. (SOURCE: David Griggs, in *Climate Change 2001: Synthesis report, Contribution of working groups I, II and III to the Third Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge University Press, 2001)

About the authors

- Gerald A. Galgana** is a PhD student at the Geophysics Research Laboratory, Department of Geological Sciences, Indiana University, Bloomington, Indiana, USA.
- Sergio C. Abad II** is the Chief Executive Officer of GeoAnalytika Inc., Rosa Alvero St., Loyala Heights, Quezon City.
- Emmi B. Capili** is a Program Research Assistant at the klima Climate Change Center, Manila Observatory, Ateneo de Manila University.
- May Celine T. M. Vicente** is a Program Manager of the Center for Environmental Geomatics, Manila Observatory, Ateneo de Manila University.
- Jose Ramon T. Villarin** is the President of Xavier University, Corrales Avenue, Cagayan de Oro City.
- Joel D. De Mesa** is a Research Assistant at the Center for Environmental Geomatics, Manila Observatory, Ateneo de Manila University.