

Indonesia by this paper. Data of flood parameters (especially the geospatial data) indeed is not expensive as it was; it is just a matter of willingness after all.

As mentioned, we propose institutions in charge of geospatial data in order to support good flood models for better adaptation and mitigation as well as for quick disaster response. The leading institution notices involved Indonesia Geospatial Agency (BIG), Ministry of Public Works (Kementrian PU), LAPAN, and National Disaster Management Authority (BNPB) with help from other institutions. Our neighbor country, like the Philippines, can be an example. They are already doing the LiDAR for all Islands and measuring river geometry for all main rivers, etc.

ACKNOWLEDGMENT

Many thanks and appreciation to the government institutions who help to collect documents needed for research and also for students in geodesy ITB who helped the investigation in the field and especially to the local people for kindly sharing the information and experience relating flood since indeed most of them are experiencing direct impact from the flood disaster.

REFERENCES

- [1] Deltares, 2010. Project report Flood Early Warning System (FEWS) Jakarta, 2010.
- [2] Deltares, 2010a. Project report Flood Hazard Model Bandung Basin (FHMBB) Bandung, 2010.
- [3] OCHA, 2010. Indonesia: Snapshot on flood (January 2000-October 2010), web resources <http://ochaonline.un.org/indonesia>
- [4] BNPB 2010. Peta kejadian bencana banjir di Indonesia tahun 1979-2009; Peta produksi BNPB 22 September 2010, www.bnpb.go.id
- [5] H. Z. Abidin, H. Andreas, I. Gumilar, Y. Fukuda, Y. E. Pohan, and T. Deguchi, "Land subsidence of Jakarta (Indonesia) and its relation with urban development," *Nat. Hazards*, vol. 59, no. 3, pp. 1753–1771, Dec. 2011.
- [6] H. Z. Abidin, H. Andreas, I. Gumilar, T. P. Sidiq, and Y. Fukuda, "Land subsidence in coastal city of Semarang (Indonesia): characteristics, impacts and causes," *Geomatics, Nat. Hazards Risk*, vol. 4, no. 3, pp. 226–240, Sep. 2013.
- [7] H. Andreas, D. Pradipta, H. Z. Abidin, and D. A. Sarsito, "Early pictures of global climate change impact to the coastal area (North West of Demak Central Java Indonesia)," 2017, p. 090002.
- [8] IPCC Climate Change Report 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, edited by: Stocker, T. F., Qin, D., Plattner, G.-K., Tignor, M., Allen, S. K., Boschung, J., Nauels, A., Xia, Y., Bex, V., and Midgley, P. M., Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 2013.
- [9] H. Z. Abidin, H. Andreas, R. Djaja, D. Darmawan, and M. Gamal, "Land subsidence characteristics of Jakarta between 1997 and 2005, as estimated using GPS surveys," *GPS Solut.*, vol. 12, no. 1, pp. 23–32, Jan. 2008.
- [10] Abidin, H., Andreas, H., Gumilar, I., Sidiq, T., Gamal, M., Murdohardono, D., et al. (2010). Studying land subsidence in Semarang (Indonesia) using geodetic methods. FIG Congress, Facing the Challenges—Building the Capacity, Sydney, Australia.
- [11] F. N. Koudogbo, J. Duro, A. Arnaud, P. Bally, H. Z. Abidin, and H. Andreas, "Combined X- and L-band PSI analyses for assessment of land subsidence in Jakarta," 2012, p. 853107.
- [12] Ng, A.H.-M., L. Ge, X. Li, H.Z. Abidin, H. Andreas, K. Zhang (2012) Mapping land subsidence in Jakarta, Indonesia using persistent scatterer interferometry (PSI) technique with ALOS PALSAR. *Int. J. Appl. Earth Observ. Geoinf.* 18, 232–242
- [13] E. Chaussard, F. Amelung, H. Abidin, and S.-H. Hong, "Sinking cities in Indonesia: ALOS PALSAR detects rapid subsidence due to groundwater and gas extraction," *Remote Sens. Environ.*, vol. 128, pp. 150–161, Jan. 2013.
- [14] Nurmaulia SL, Fenoglio-Marc L, Becker M (2010) Long term sea level change from satellite altimetry and tide gauges in the Indonesian region, paper presented at the EGU General Assembly 2010, 2–7 May. Vienna, Austria.