

Application Form for World Centre of Excellence on Landslide Risk Reduction
2023-2026

1. Name of Organization: Universitas Gadjah Mada
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Core members of the activities:
 - a. Prof. Wahyu Wilopo – Vice Director of Center for Disaster Mitigation and Technological Innovation (GAMA-InaTEK), Geological Engineering Dept. Universitas Gadjah Mada.
 - b. Dr. Agung Setianto - Center for Disaster Mitigation and Technological Innovation (GAMA-InaTEK), Geological Engineering Dept. Universitas Gadjah Mada.
 - c. Dr. Fikri Faris - Center for Disaster Mitigation and Technological Innovation (GAMA-InaTEK), Civil and Environmental Engineering Dept. Universitas Gadjah Mada.
 - d. Dr. Hendy Setiawan - Center for Disaster Mitigation and Technological Innovation (GAMA-InaTEK), Geological Engineering Dept. Universitas Gadjah Mada.
3. Date of Submission of Application : 29 March 2023
4. Activity scale and targeted region.
 - 1) Global, 4) Regional, 5) National
5. Short Title : Risk Management and Technological Innovation for Landslide Mitigation
6. Objectives for the initial 3 years:
 - a. Community-based disaster risk reduction in landslide vulnerable areas, by integrating technical and social networks of landslide early warning system.
 - b. Implementation of the technological innovation for landslide disaster risk reduction.
 - c. Promoting a global standard for the implementation of community-based multi-hazards EWS
7. Background Justification: (10 lines maximum)
Many efforts have been conducted for landslide disaster risk reduction in developing countries, however substantial socio-economical losses as the impacts of landslide disasters remain to occur and significantly

increase. It is also apparent that landslide preparedness and mitigation strategy have not yet been effectively implemented. Poor community awareness, preparedness and participation also poor coordination among stakeholders have been the major reason for such ineffective landslide disaster risk reduction. Moreover, most of the technology applied for landslide mitigation and early warning is also not easy to be operated and maintained by the local authority/community. Therefore, the need to develop a disaster risk management strategy and technological innovation for landslide mitigation is urgently required.

8. Resources available for WCoE activities

Personnel, Facilities, Budgets, and Affiliation and Contribution to ICL/IPL-GPC.

- a. Researchers with multidiscipline backgrounds, such as engineering geologist, civil engineers, environmental specialist, and social scientist
- b. Research facilities in Universitas Gadjah Mada (the Laboratory of Environmental Geology, Soil Mechanics Laboratory, Computing Laboratory, Field station and Field laboratory for landslide early warning system, Field laboratory of laharcic flow and flood early warning system)
- c. Budgets are available annually in the amount of USD 100,000 to USD 200,000.
- d. Contribution to ICL/IPL-GPC: actively participate as a member of ICL/IPL in any scientific meetings and also assist the ICL Office.
- e. Others :
 - i. Having strong linkage with the Indonesian Disaster Management Authority, Ministry of Public Works and Indonesian Meteorological, Climatological, Geophysical Agency (BMKG), as well as the Indonesian central and local government of various provinces and regencies which are vulnerable to landslides.
 - ii. Regularly provide scientific inputs to Indonesian Central and Local Government and also the Parliament at the National and Provincial Levels.
 - iii. As the Host Institution for ASEAN University Network/South East Asian Engineering Education Development Network in the Field of Geological Engineering and Disaster Mitigation, which provides postgraduate training for Master and Doctoral students in Geological Engineering and Disaster Mitigation.
 - iv. Having international collaboration with Kyoto University - Japan; San Diego State University (Faculty of Geology and Visualization Center); University of Hawaii – USA; California Geological Survey and California Safety Seismic Commission – USA; US Aid for conducting capacity development on disaster management; R3ADY Asia-Pacific) with the members from US Pacific Commander, US Chambers of Commerce, Rockefeller, US Aid, Caterpillar

Foundation); GNS Science – New Zealand, MFAT- NZAid, Japan International Cooperation Agency (JICA), the British Council, Network of Humanitarian Action (NOHA) and also supported by Multi-National Oil Companies (Chevron, Newmont, Pertamina), National Mining and Cement Companies (PT Freeport, PT Medco, PT Arutmin, PT INCO, PT Holchim), and other National Companies such as Indonesian Power.

9. Description of past activities related to risk reduction of landslides and other related earth system disasters (30 lines maximum)
 - a. Geological and geotechnical investigations combined with technical-social surveys and analyses had been carried out to decide the most appropriate types and mechanisms of early warning systems as well as the strategy for landslide mitigation in 32 provinces in Indonesia and Myanmar within a period of 2007 – now. All those simple and high-tech technical systems were integrated into a social system. This social system was also connected to the local Institutions for Disaster Management at the district, regency, and provincial levels.
 - b. Student Community Services for Disaster Mitigation conducted every summer time all over Indonesia, involving undergraduate students from multi-faculties.
 - c. Supporting the central and local government in establishing Task Forces and contingency plans for regular programs on landslide disaster risk reduction.
 - d. Providing training modules, documentary films, and pamphlets (poster, calendar, leaflet) for supporting public education in landslide and earthquake awareness.
 - e. Collaborative research on landslide mitigation also has been conducted with International Consortium on Landslides, Kyoto University, GNS Science New Zealand, ICGdR, etc. (2004 – now).
 - f. Joint supervision with Japanese University (Kyoto University, Hokkaido University, etc.) for master and doctoral students research works (which are integrated into collaborative research) in disaster mitigation of the ASEAN region.
 - g. Promoting Landslide Early Warning System as an international standard **ISO 22327:2018** Guideline for the implementation of community-based Landslide EWS: <https://www.iso.org/standard/50064.html>. At present, Universitas Gadjah Mada in cooperation with the Indonesian Disaster Management Authority is promoting **ISO 22328-1:2020**: Guideline for the implementation of multi-disaster EWS.

10. Planned future activities /Expected Results: (20 lines maximum; work phases and milestones)
 - a. Maintaining and enhancing of the existing socio-technical system to support the landslide disaster risk reduction strategy.
 - b. Extending and strengthening the linkage with industry and private sectors for landslide disaster risk

- reduction.
- c. As the extension of landslide early warning system, developing a community-based debris flood (laharic flows) early warning system at volcanic rivers and flood early warning system at prone areas in Indonesia.
 - d. Enhancing the existing program of student community service for disaster mitigation in every summer time.
 - e. Supporting the Indonesian Disaster Management Authority in Developing the National Master Plan for Landslide Disaster Risk Reduction 2024-2029.
 - f. Supporting the central and local government of disaster management authority for establishing Task Forces and action plans for regular programs on landslide disaster risk reduction.
 - g. Providing training modules, documentary films, and pamphlets (posters, calendars, leaflets) for supporting public education in landslide and earthquake awareness and preparedness.
 - h. Joint supervision for master and doctoral students research works (which is integrated into the collaborative research) in disaster mitigation of the ASEAN region
 - i. Collaborative research on the Development of Crowd Sourcing as the Integration of Instrumental and Human Sensors for Landslide Early Warning System, partnership with Asia Pacific Disaster Risk Reduction and Resiliency and the University of Hawaii.
 - j. Collaborative research on disaster mitigation with DPRI Kyoto University.
 - k. Promoting the importance of ethical concern in landslide research for disaster risk reduction.
 - l. Guiding the standardization of landslide early warning system implementation based on the international standard **ISO 22327:2018** Guideline for the implementation of community-based Landslide EWS. Whereas other disasters should comply with **ISO 22328-1:2020**: Guideline for the implementation of multi-disaster EWS.

11. Beneficiaries of WCoE: (5 lines maximum; who directly benefits from the work?)

- a. National Disaster Management Authority
- b. Local Agency for Disaster Management
- c. Indonesian Ministry of Research, Technology and Higher Education
- d. National and Local Development Planning Agency
- e. ASEAN researchers and students involved in the study, by providing them the opportunity for having experience and knowledge enhancement through this study, under the ASEAN University Network.

12. References: 10 lines maximum, i.e. relevant publications, international/regional/national recognition supporting items 9-10.

- a. Fathani, T.F., Karnawati, D., Wilopo, W., Setiawan, H. (2023). Strengthening the Resilience by Implementing a Standard for Landslide Early Warning System. In: Sassa, K., Konagai, K., Tiwari, B., Arbanas, Ž., Sassa, S. (eds) Progress in Landslide Research and Technology, Volume 1 Issue 1, 2022. Progress in Landslide Research and Technology. Springer, Cham. https://doi.org/10.1007/978-3-031-16898-7_20
- b. Ajmera B, Ahari HE, Loi DH, Setiawan H, Dang K, Sassa K (2023) LS-RAPID manual with video tutorials. Progress in Landslide Research and Technology, Volume 1 Issue 1: 343-406. Springer, Cham. https://doi.org/10.1007/978-3-031-16898-7_26
- c. Bukhari, M.H., da Silva, P.F., Pilz, J., Istanbuluoglu, E., Gorum, T., Lee, J., Karamehic-Muratovic, A., Urmi, T., Soltani, A., Wilopo, W., Qureshi, J.A., Zekan, S., Koonisetty, K.S., Sheishenaly, U., Khan, L., Espinoza, J., Mendoza, E.P., Haque, U. Community perceptions of landslide risk and susceptibility: a multi-country study. *Landslides* (2023). <https://doi.org/10.1007/s10346-023-02027-5>
- d. Faris, F., & Fathani, T. F. (2022). The new digital infiltration profiler performance test on sandy soil. *Environmental Earth Sciences*, 81(23), 539.
- e. Faris, F., & Adi, A. D. (2022). Height reliability-based analysis of woven bamboo mat reinforced mechanically stabilized earth wall in temporary railway embankment. *ASEAN Engineering Journal*, 12(1), 189-196.
- f. Fathani, T. F., Wilopo, W., Amalina, A. N., & Pramaditya, A. (2022). Debris Flow Hazard Analysis Toward The Implementation of Mitigation Measures. *GEOMATE Journal*, 23(95), 45–56.
- g. Sekarlangit, N., Fathani T.F., W Wilopo, W. (2022). Landslide Susceptibility Mapping of Menoreh Mountain Using Logistic Regression, *Journal of Applied Geology* 7(2): 51-63
- h. Rifa'I A., Ramadhani, S., Wilopo, W. (2022). The geological structure effects on slopes stability and tunnels of metamorphic rocks at Poboya gold mine Palu, *Journal of Applied Engineering Science* 20 (1), 1-12
- i. Wilopo, W., Putra, D.P.E, Fathani, T.F., Widodo, S., Pratama, G.N.I.P., Nugroho, M.S., Prihadi, W.R. (2022) Identification of subsidence hazard zone by integrating engineering geological mapping and electrical resistivity tomography in Gunung Kidul karst area, Indonesia, *Journal of Degraded and Mining Lands Management* 9 (2), 3281-3291
- j. Jalil, A, Fathani T.F., Satyarno, I, Wilopo, W. (2021). Liquefaction in Palu: the cause of massive mudflows, *Geoenvironmental Disasters* 8 (1), 21.
- k. Wilopo, W. and Fathani, T.F. (2021). The mechanism of landslide-induced debris flow in geothermal area, Bukit Barisan mountains of Sumatra, Indonesia, *Journal of Applied EngScience* 19 (3), 688-697

- l. Wilopo, W., Erzagian, E., Ratri, D., Fathani, T.F. (2021). Landslide Susceptibility Assessment in Trenggalek, East Java, Indonesia: A Geological Overview. In: Hazarika et al. (eds) *Advances in Sustainable Construction and Resource Management. Lecture Notes in Civil Engineering*, vol 144. Springer, Singapore.
 - m. Setiawan, H., Retnaningrum, E., Arrisaldi, T., Wilopo, W. (2021). Capacity Building and Community Preparedness Towards Landslide Disaster in Pagerharjo Village, Kulon Progo Regency of Yogyakarta, Indonesia. In: Sassa, K., Mikoš, M., Sassa, S., Bobrowsky, P.T., Takara, K., Dang, K. (eds) *Understanding and Reducing Landslide Disaster Risk*. WLF 2020.
 - n. Wilopo, W., Setiawan, H., Putra, D.P.E., Fathani, T.F. (2021). Identification of Sliding Surface and Crack Pattern in the Soil Creep, Case Study: Unika Soegijapranata Campus, Semarang, Central Java, Indonesia. In: Tiwari, B., Sassa, K., Bobrowsky, P.T., Takara, K. (eds) *Understanding and Reducing Landslide Disaster Risk*. WLF 2020.
 - o. Raharja B., Setianto A., Titisari A.D. (2021). Comparison of Different Multispectral Images to Map Hydrothermal Alteration Zones in Kokap, Kulon Progo. In *Journal of Applied Geology* 6 (2): 86-101.
 - p. Freski Y.R., Hecker C., Van der Meijde M., Setianto A. (2021). The effects of alteration degree, moisture and temperature on laser return intensity for mapping geothermal manifestations. In *Geothermics* (Vol. 97, p. 102250). Elsevier Ltd.
 - q. Setiawan H., Wilopo W., Wiyoso T., Fathani T.F., Karnawati D., 2019. Investigation and numerical simulation of the 22 February 2018 landslide-triggered long-traveling debris flow at Pasir Panjang Village, Brebes Regency of Central Java, Indonesia. *Journal Landslides* (2019) p 1-14. <https://doi.org/10.1007/s10346-019-01245-0>
 - r. ISO 22327:2018 Guideline for the implementation of community based landslide early warning system. <https://www.iso.org/standard/50064.html>
13. If your organization is an ongoing WCoE 2020-2023, please attach the articles reporting activities of WCoE, IPL project and ICL network published/contributed to either in *Landslides: Journal of International Consortium on Landslides* or/and the Fifth World Landslide Forum 2021.
- a. Bukhari, M.H., da Silva, P.F., Pilz, J., Istanbuluoglu, E., Gorum, T., Lee, J., Karamehic-Muratovic, A., Urmi, T., Soltani, A., Wilopo, W., Qureshi, J.A., Zekan, S., Koonisetty, K.S., Sheishenaly, U., Khan, L., Espinoza, J., Mendoza, E.P., Haque, U. Community perceptions of landslide risk and susceptibility: a multi-country study. *Landslides* (2023). <https://doi.org/10.1007/s10346-023-02027-5>
 - b. Fathani, T.F., Karnawati, D., Wilopo, W., Setiawan, H. (2023). Strengthening the Resilience by Implementing a Standard for Landslide Early Warning System. In: Sassa, K., Konagai, K., Tiwari, B., Arbanas, Ž., Sassa, S. (eds) *Progress in Landslide Research and Technology*, Volume 1 Issue 1, 2022.

Progress in Landslide Research and Technology. Springer, Cham. https://doi.org/10.1007/978-3-031-16898-7_20

- c. Setiawan, H., Retnaningrum, E., Arrisaldi, T., Wilopo, W. (2021). Capacity Building and Community Preparedness Towards Landslide Disaster in Pagerharjo Village, Kulon Progo Regency of Yogyakarta, Indonesia. In: Sassa, K., Mikoš, M., Sassa, S., Bobrowsky, P.T., Takara, K., Dang, K. (eds) Understanding and Reducing Landslide Disaster Risk. WLF 2020. https://doi.org/10.1007/978-3-030-60196-6_54
- d. Wilopo, W., Setiawan, H., Putra, D.P.E., Fathani, T.F. (2021). Identification of Sliding Surface and Crack Pattern in the Soil Creep, Case Study: Unika Soegijapranata Campus, Semarang, Central Java, Indonesia. In: Tiwari, B., Sassa, K., Bobrowsky, P.T., Takara, K. (eds) Understanding and Reducing Landslide Disaster Risk. WLF 2020. https://doi.org/10.1007/978-3-030-60706-7_48
- e. Setiawan H., Wilopo W., Wiyoso T., Fathani T.F., Karnawati D., 2019. Investigation and numerical simulation of the 22 February 2018 landslide-triggered long-traveling debris flow at Pasir Panjang Village, Brebes Regency of Central Java, Indonesia. *Journal Landslides* (2019) p 1-14. <https://doi.org/10.1007/s10346-019-01245-0>

14. List of published or planned reports of WCOE 2017-2020 in journal “Landslides” or “WLF5 books” for ongoing WCOE organization.

- a. Erzagian, E., Wilopo, W., Fathani, T.F. (2023) Landslide Susceptibility Mapping Using Frequency Ratio Method in Kulon Progo Mountains Area, Indonesia. *Progress in Landslide Research and Technology, Volume 2 Issue 2, 2023*
- b. Setiawan H., Wilopo W., Wiyoso T., Fathani T.F., Karnawati D., 2019. Investigation and numerical simulation of the 22 February 2018 landslide-triggered long-traveling debris flow at Pasir Panjang Village, Brebes Regency of Central Java, Indonesia. *Journal Landslides* (2019) p 1-14. <https://doi.org/10.1007/s10346-019-01245-0>
- c. Fathani T.F., Wilopo W., Setianto A., Faris F., Setiawan H., 2019. Landslide and debris flow mechanism at Sentani Papua, Indonesia. Recent landslide at *Journal Landslides*. (to be published)
- d. Fathani T.F., Wilopo W., Setianto A., Faris F., Setiawan H., 2020. The implementation of ISO 22327:2018 on Landslide Early Warning System at Developing Countries. *WLF-5 2020*. (to be published)

Note: Please fill and submit this form by 30 March 2023 to ICL secretariat <secretariat@iclhq.org>