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## Land Subsidence Policy in the Context of Good Governance Principles (Comparing Indonesia and Japan)

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**Abstract** *Land subsidence poses a significant environmental challenge globally, fueled mainly by anthropogenic activities such as excessive groundwater extraction, rampant overdevelopment, and alterations in soil geological structures. This issue has far-reaching consequences, including infrastructure deterioration, heightened flood vulnerabilities, and severe threats to both the environment and local communities. The city of Jakarta, Indonesia, has experienced a particularly pronounced impact from land*

*subsidence since the 1980s. This study delves into the governmental responses of Indonesia and Japan to address the complex problem of land subsidence, emphasizing their adherence to principles of good governance, including transparency, accountability, and community engagement. The analysis scrutinizes various aspects of policy development, stakeholder participation, funding mechanisms, technological innovations, and the overall efficacy of these measures in mitigating land subsidence. Through a comparative lens, the research seeks to unearth effective strategies and successful policy implementations in both nations. The methodology employed adopts a normative approach, scrutinizing concepts, norms, principles, legal frameworks, and ethical considerations associated with land subsidence policies within the context of good governance. This research contributes to a holistic comprehension of land subsidence management, providing valuable insights into the effectiveness of policies aimed at addressing this critical environmental challenge.*

**Keywords** *Good Governance, Land Subsidence Policy, Comparative Study*

## **1. Introduction**

Land subsidence is a critical environmental issue confronting various regions globally, exacerbated primarily by human activities such as excessive groundwater extraction, rampant development, and alterations in the geological composition of the land. The repercussions of land subsidence are far-reaching, encompassing infrastructure deterioration, heightened vulnerability to flooding, and profound risks to both the environment and society at large. Often observed in major urban centers situated atop sedimentary layers, land subsidence, also known as land sinking, has evolved into a

substantial apprehension, notably evident in Jakarta since the 1980s.<sup>1</sup> The city's susceptibility to this natural phenomenon underscores the urgency of addressing the root causes and implementing sustainable solutions to mitigate its adverse effects on the urban landscape and the well-being of its inhabitants.<sup>2</sup>

Land subsidence, the gradual sinking of land, is attributed to diverse factors such as excessive groundwater extraction, geological conditions, and urbanization. Its repercussions are substantial, encompassing heightened susceptibility to flooding, infrastructure impairment, and threats to community safety. Recognizing the shared challenge of land subsidence, both Indonesia and Japan acknowledge the necessity of implementing policies to alleviate its impact. Indonesia, with its extensive coastline and numerous low-lying urban areas, confronts pronounced land subsidence issues, particularly evident in its capital, Jakarta. In response, the Indonesian government has proactively introduced policies and strategies aimed at combating the adverse effects of land subsidence.<sup>3</sup> These efforts are based on sound governance principles emphasizing transparency, accountability, and community involvement. The policies range from regulating groundwater extraction to investing in critical infrastructure projects such as seawalls and drainage systems

Several factors cause land subsidence. First, natural subsidence is induced by geological processes such as volcanic and tectonic

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<sup>1</sup> Siti Wahyuningtyas Maulidiny, Parino Rahardjo, and Suryono Herlambang, "Rencana Adaptasi Pada Wilayah Rawan Penurunan Tanah, Kecamatan Cengkareng, Jakarta Barat," *Jurnal Sains, Teknologi, Urban, Perancangan, Arsitektur (Stupa)* 3, no. 2 (2022): 3217, <https://doi.org/10.24912/stupa.v3i2.12876>.

<sup>2</sup> Technology Reports, "Urban Space Planning an Approach to Minimize Land Subsidence in Jakarta," no. June (2023).

<sup>3</sup> Hayati Sari Hasibuan et al., "Policymaking and the Spatial Characteristics of Land Subsidence in North Jakarta," *City and Environment Interactions* 18, no. April (2023): 100103, <https://doi.org/10.1016/j.cacint.2023.100103>.

activity, geological changes, cavities below the ground surface, and similar factors. The second factor is land subsidence caused by exploiting liquid materials in the soil, such as groundwater or petroleum. Apart from that, land subsidence can also be caused by heavy loads above it, such as building structures, which cause the soil layers below to compact or consolidate. The latest land subsidence results from taking solid materials from the ground, such as mining activities. This phenomenon occurs in Jakarta due to the increasing population, which results in increased water consumption which must be met. Therefore, groundwater extraction in Jakarta tends to be excessive.<sup>4</sup>

The National Research and Innovation Agency emphasized that controlling the rate of land subsidence is a crucial step in protecting Jakarta from the risk of sinking. Mapping carried out by the Ministry of Energy and Mineral Resources (ESDM) in 2019 and other research shows that land subsidence must be stopped immediately because the potential for sea level rise will have a major impact on society.<sup>5</sup> The construction of buildings and large-scale extraction of groundwater can exacerbate land subsidence. This phenomenon also threatens areas with characteristics such as young soil, peat, or soft alluvial deposits. Currently, at least three cities in Indonesia are experiencing significant land subsidence, namely Pekalongan, Semarang, and DKI Jakarta. Therefore, groundwater management policies more oriented

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<sup>4</sup> Ria Erlani and Widyasari Her Nugrahandika, "Ketangguhan Kota Semarang Dalam Menghadapi Bencana Banjir Pasang Air Laut (Rob)," *Journal of Regional and Rural Development Planning* 3, no. 1 (2019): 47, <https://doi.org/10.29244/jp2wd.2019.3.1.47-63>.

<sup>5</sup> kementerian Energi dan Sumber Daya Mineral Republik Indonesia, "Pantau Penurunan Tanah, Badan Geologi Bangun 81 Sumur Pantau," Kementerian Energi dan Sumber Daya Mineral Republik Indonesia, 2023, <https://www.esdm.go.id/id/media-center/arsip-berita/pantau-penurunan-tanah-badan-geologi-bangun-81-sumur-pantau>.

toward preserving current groundwater reserves are needed. Apart from that, efforts to utilize space must also align with the principles of sustainable environmental maintenance.

Land subsidence is an increasing environmental challenge and impacts many coastal areas globally, particularly severely impacting urban areas. Indonesia and Japan, as coastal countries, are both grappling with the negative impacts of land subsidence in their respective regions. In recent years, both countries have implemented government policies to address this problem, in line with the principles of good governance to ensure effective and sustainable solutions.

Land subsidence is an increasing environmental challenge and impacts many coastal areas globally, particularly severely impacting urban areas. Indonesia and Japan, as coastal countries, are both grappling with the negative impacts of land subsidence in their respective regions. In recent years, both countries have implemented government policies to address this problem, in line with the principles of good governance to ensure effective and sustainable solutions. Japan, a country prone to earthquakes and tsunamis, has also experienced land subsidence in several urban areas, especially Tokyo and Osaka. The Japanese government, known for its commitment to the principles of good governance, has implemented innovative and comprehensive policies to combat land subsidence. This policy involves advanced technology, such as land reclamation and underground water recharge systems. Additionally, Japan has integrated community participation and public-private partnerships into land subsidence mitigation strategies.<sup>6</sup>

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<sup>6</sup> cyntia, I Putu Pudja, "Analisis Penurunan Muka Tanah Dki Jakarta Dengan Metode Differential Interferometry Synthetic Aperture Radar (Dinsar)," *Jurnal Ilmu Dan Inovasi Fisika* 2, no. 2 (2018): 215–20, <https://doi.org/10.24198/jiif.v2i2.19712>.

The first research regarding policies for handling land subsidence was carried out by Hayati S. et al. with the title "Policymaking and the Spatial Characteristics of Land Subsidence in North Jakarta." This study initially noted that DKI Jakarta introduced the DKI Jakarta Provincial General Spatial Planning Plan No. 5 of 1984, which regulates the Regional Spatial Planning of Jakarta Province from 1985–2005.<sup>7</sup> This plan divides Jakarta into nine Development Areas (WP) which determine land development, especially land characteristics and environmental quality. However, this policy conflicts with industrial sector policies guided by the National Medium-Term Development Plan. The second study by Miguel et al. entitled "Adapting Ports to Sea-Level Rise: Empirical Lessons Based on Land Subsidence in Indonesia and Japan" examines how several selected ports have adapted to land subsidence in Japan and Indonesia. This provides insight into the possible impacts of sea level rise on critical transport infrastructure such as ports. The third research by Agni & Harsasto focuses on the Semarang City Government's efforts to overcome flood and tidal problems.<sup>8</sup> Policy steps include creating water storage ponds, developing pump stations, dredging drainage channels, and building coastal embankments. Even though there has been progress, there are still areas affected by floods and tidal waves because some control infrastructure has not been fully built. Performance evaluation shows that some channels cannot handle 5-year return floods, and monitoring land subsidence is essential in dealing with tidal floods in

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<sup>7</sup> Dwina Archenita et al., "Kajian Land Subsidence Untuk Perkuatan Tanah (Studi Kasus Sawahlunto)," *Rekayasa Sipil* XII, no. 2 (2023): 5, <http://syawal88.wordpress.com/2013/04/14/s>.

<sup>8</sup> Agni Musa Hakam, "Evaluasi Penanganan Banjir Rob Di Kota Semarang Oleh Pemerintah Kota Semarang "," *Journal of Politic and Government Studies* 8, no. 1 (2018): 281–90, <https://ejournal3.undip.ac.id/index.php/jpgs/article/view/22798>.

Semarang. The fourth research by Benedicta & Ririt highlights implementing the 100-0-100 program in Jakarta, which faces obstacles. Several areas, such as *Kampung Penyepatan* in North Jakarta, are still marginalized from the program, even though they qualify for clean water and decent housing assistance.<sup>9</sup> The fifth study by Rapti et al. observes that land subsidence is a complex phenomenon that has not received sufficient attention in urban governance in Southeast Asia. Uncertainty in dealing with land subsidence, a combination of natural factors and human influence, and disagreements in addressing land subsidence patterns at various levels, all influence policies regarding this issue. The novelty of this research is a comparison of policies by two countries with land subsidence problems so that they know several policies and produce effective policies to implement.<sup>10</sup>

This research will first discuss the policies of the Indonesian and Japanese governments in dealing with land subsidence so that these policies comply with the principles of good governance, including transparency, accountability, and community involvement. Implementation of these policies in the context of policy interests, stakeholder involvement, finance, application of innovative technology, and their overall impact on land subsidence. Second, regarding the solution of appropriate policies to be implemented in Indonesia per the principles of Good Governance to find the success of the policies of the Indonesian and Japanese governments in

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<sup>9</sup> Benedicta Felicia Andries, "Implementasi Kebijakan Program 100-0-100 di Jakarta Guna Peningkatan Kondisi Sosial Masyarakat dalam Rangka Ketahanan Nasional (Kajian dalam Perspektif Komunikasi Pembangunan)." *Jurnal Lemhannas RI* 9, no. 2 (2021): 48-72.

<sup>10</sup> Rapti Siriwardane De Zoysa et al., "The 'wickedness' of Governing Land Subsidence: Policy Perspectives from Urban Southeast Asia," *PLoS ONE* 16, no. 6 June (2021): 1–25, <https://doi.org/10.1371/journal.pone.0250208>.



overcoming the problem of land subsidence. This research aims to conduct a comparative analysis of the policies of the Indonesian and Japanese governments regarding land subsidence, focusing on aligning these policies with the principles of good governance. The main aspects that must be studied include policy formulation and implementation, stakeholder involvement, funding mechanisms, technological innovation, and the overall impact on land subsidence.

The novelty of the latest research lies in its comprehensive examination of policies in both countries, considering aspects such as policy formulation, stakeholder involvement, funding mechanisms, technological innovation, and overall impact on land subsidence. This approach aims to identify effective and sustainable solutions to the common problem faced by Indonesia and Japan, contributing to a more nuanced understanding of the policy landscape surrounding land subsidence.

## 2. Method

The method used in this research is a normative method that focuses on analyzing concepts, norms, principles, legal rules, and theories related to a problem or phenomenon. It focuses on analyzing the policies of the Indonesian and Japanese governments in overcoming land subsidence based on the principles of good governance. The principles of "good governance" are used to examine legal and ethical aspects in the context of good governance analyzing policies, regulations, or government actions by referring to the principles of good governance, which include transparency, accountability, participation, responsiveness, effectiveness, and rule of law.



### 3. Result & Discussion

#### A. Land Subsidence Policy: Comparing Indonesia & Japan

Land subsidence is a geological or geotechnical phenomenon where the land surface decreases slowly or suddenly, usually caused by several factors such as excessive groundwater mining, petroleum drilling, soil compaction, geological activities such as earthquakes or volcanic activity, etc. Land subsidence can have significant impacts, especially in urban areas, such as flooding, infrastructure damage, and environmental hazards. This is a severe concern in urban planning and natural resource management to prevent possible adverse impacts.

Land surface decline, also known as land subsidence, is a phenomenon of lowering of the land surface compared to a certain reference point. This phenomenon often occurs in coastal cities, coastal peat areas, and oil and gas exploitation areas in coastal areas. In Indonesia, at least 21 provinces and 132 districts/cities are currently experiencing land subsidence, especially on the North Coast of Java and the Coast of Sumatra. The impacts include the occurrence of tidal floods (Rob).<sup>11</sup> Calculation of losses which only includes adaptation costs for repairing roads, bridges, and settlements in the PANTURA area shows that potential losses due to land subsidence per year reach 619 trillion Rupiah. While potential losses due to land subsidence in peat areas are indicated to reach around 158 trillion Rupiah, this figure does not include other economic losses.

In Indonesia, at least 21 provinces and 132 districts/cities are currently indicated to be experiencing subsidence. Several locations on the North Coast of Java and the Coast of Sumatra were recorded

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<sup>11</sup> I Putu Pudja, "Analisis Penurunan Muka Tanah Dki Jakarta Dengan Metode Differential Interferometry Synthetic Aperture Radar (Dinsar)."

as experiencing land subsidence, resulting in tidal floods (Rob). Calculation of losses which only includes adaptation costs for repairing roads, bridges, and settlements in the northern coastline area shows that potential losses due to land subsidence per year reach 619 trillion Rupiah. Meanwhile, the potential loss of residential buildings in peat areas that are indicated to be experiencing subsidence reaches around 158 trillion Rupiah. This figure does not include other economic losses.

The average rate of land subsidence in Indonesia's coastal lowlands varies between 1 and 20 cm per year.<sup>12</sup> In several locations such as Rangsang Island and Riau, land subsidence is also related to the abrasion process at a speed of up to 30 meters per year. ITB monitoring results show that at least 16 cities/districts in the PANTURA region experienced subsidence with an affected area reaching 11,500 hectares. Apart from that, indications of subsidence also occur in the peat ecosystem covering an area of 2.6 million hectares.<sup>13</sup>

High levels of subsidence hamper conservation and rehabilitation efforts in coastal areas and have the potential to eliminate strategic economic areas, such as the North Coast of Java, as well as tropical peat ecosystems on the East Coast of Sumatra. Apart from that, in border locations and outer islands such as the Meran Islands, and Riau, this condition makes the country increasingly vulnerable to defense threats.

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<sup>12</sup> Melisa Ayu Azhara and Siti Ruhama Mardhatillah, "Partisipasi Publik Dalam Penyusunan Dokumen Analisis Dampak Lingkungan Pasca Berlakunya Undang-Undang/Perppu Cipta Kerja," *Jurnal Hukum Ius Quia Iustum* 30, no. 2 (2023): 256–76, <https://doi.org/10.20885/iustum.vol30.iss2.art2>.

<sup>13</sup> Alofsen Sianturi, "Degradasi Kewenangan Pemerintah Daerah Dalam Pengelolaan Dan Perlindungan Hukum Lingkungan Pasca Omnibus Law" 2, no. 8 (2023): 693–701.

To avoid more significant losses in the future, it is urgent to stop the subsidence rate, prevent it, and deal with the disasters caused by subsidence. Therefore, the Coordinating Ministry for Maritime Affairs, the Wetlands International Indonesia Foundation, the Bandung Institute of Technology, and the Road Map Compilation Working Group, jointly prepared a Road Map document for Land Subsidence Migration and Adaptation in the Coastal Lowlands. The Land Subsidence Migration and Adaptation Road Map was prepared as a reference and guide for implementing migration and adaptation programs involving all relevant stakeholders.

Potential losses caused by land subsidence in coastal areas, both peat and non-peat-based, include:

- 1) Increase in flood depth and frequency.
- 2) Loss of managed land.
- 3) Loss of coastal land.
- 4) Infrastructure damage.
- 5) Sea water intrusion.
- 6) Increased exposure to extreme waves and/or tsunami disasters.
- 7) Damage to the peatland ecosystem, which is integrated with the freshwater ecosystem, disrupts peat's regulatory function in naturally flowing freshwater to the surrounding river or swamp ecosystem.
- 8) Decreased environmental quality.
- 9) Greenhouse gas (GHG) emissions increase due to the loss of mangrove and/or coastal peat ecosystems.<sup>14</sup>

Apart from that, people also lose their livelihoods based on coastal land and/or peatlands. Potential costs arising from land subsidence include increased land processing and management costs,

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<sup>14</sup> Ahmad Robi, "Pengawasan Penyelenggaraan Asas Desentralisasi Dalam Pemerintah Daerah Berdasarkan Uu No 23 Tahun 2014 Tentang Pemerintahan Daerah," *Sosio Akademika* 13, no. 23 (2023): 1–68.

increased water use costs, as well as costs resulting from disaster events, such as economic losses, adaptation costs, and higher relocation costs.

The DKI Jakarta Provincial Government has designed several strategies to overcome land subsidence in the capital city. DKI Jakarta Development and Environment Assistant, Afan Adriansyah, revealed that this effort began regulating groundwater extraction by issuing Governor's Regulation (Pergub) Number 93 of 2021 concerning Groundwater-Free Zoning. This Gubernatorial Regulation stipulates that starting August 1, 2023, roads and areas served by piped water supplies are no longer permitted to extract or use groundwater. Afan explained that specific criteria will be applied to prohibit groundwater extraction.<sup>15</sup> For example, groundwater extraction may not be used for buildings with an area of more than 5,000 square meters and more than eight floors. Afan also highlighted the importance of increasing clean water coverage to 100 percent to mitigate land subsidence. Currently, clean water coverage in DKI Jakarta has only reached 68 percent, and the government is committed to achieving the target of 100 percent by 2030.<sup>16</sup> To achieve this goal, the DKI Jakarta Provincial Government has taken several steps, including developing domestic or local PAM, such as Forest SPAM

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<sup>15</sup> Jefferson Gerald Langkay, Ronald J. Mawuntu, and Dani R. Pinasang. "Kajian Hukum Pelampauan Batas Kewenangan Pejabat Administrasi Yang Bertentangan dengan Asas-Asas Umum Pemerintahan Yang Baik Berdasarkan Undang-Undang Nomor 30 Tahun 2014 Tentang Administrasi Pemerintahan." *Lex Administratum* 11, no. 4 (2023).

<sup>16</sup> Dedeng Dedeng et al., "Tata Kelola Pemerintahan Yang Baik Tentang Partisipasi Masyarakat dalam Pembuatan Peraturan Desa di Desa Sungai Pinang Kecamatan Rambutan Banyuwasin," *Jurnal Pengabdian Kolaborasi dan Inovasi IPTEKS* 1, no. 3 (2023): 224–31, <https://doi.org/10.59407/jpki2.v1i3.36>.

City with a capacity of 500 liters per second already operational.<sup>17</sup> Regional SPAM construction is also carried out with the central government, such as in the Jatiluhur Reservoir, Karian, and other locations. Apart from that, efforts are also being made to meet the water needs of residents living in slum settlements. Afan emphasized that these steps were all taken to achieve the target of 100 percent clean water coverage by 2030. He also noted that the Muara Baru area, Penjaringan District, North Jakarta, has the most severe land subsidence in Jakarta. This decline is caused by overexploitation of groundwater, resulting in land subsidence of around 7.5 centimeters yearly.<sup>18</sup>

Land subsidence is a pressing problem in many coastal cities worldwide, and Jakarta, Indonesia's capital, is no exception. This phenomenon occurs when the land slowly or suddenly sinks, mainly caused by excessive groundwater extraction, oil drilling, soil compaction, geological activities such as earthquakes or volcanic eruptions, etc. This problem has severe impacts in Jakarta, including flooding, infrastructure damage, and environmental hazards.

Good Governance is a concept that emphasizes the need for governments to manage public affairs efficiently, protect the rights of citizens, and prevent abuse of power. AUPB, or Principles of Good Governance in Public Administration, is a set of norms that provide the basis for good legal regulations. It includes ethical standards

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<sup>17</sup> Reports, "Urban Space Planning an Approach to Minimize Land Subsidence in Jakarta."

<sup>18</sup> Bosman Batubara, Michelle Kooy, and Margreet Zwarteveen, "Politicising Land Subsidence in Jakarta: How Land Subsidence Is the Outcome of Uneven Sociospatial and Socionatural Processes of Capitalist Urbanization," *Geoforum* 139, no. February (2023): 103689, <https://doi.org/10.1016/j.geoforum.2023.103689>.

about how government officials should behave and interact with the public.<sup>19</sup>

Jakarta is struggling with the consequences of land subsidence. It is estimated that at least 21 provinces and 132 districts or cities in Indonesia are currently experiencing land subsidence. The main causes in Jakarta are excessive groundwater extraction and oil drilling along its coast. The impacts are very worrying, including rising sea levels, increasingly severe flooding, land loss, infrastructure damage, and seawater intrusion into freshwater sources. As Jakarta continues to sink, its vulnerability to defense threats also increases.

Recognizing the seriousness of this situation, the Jakarta provincial government has designed a comprehensive strategy to address land subsidence, emphasizing the importance of AUPB principles. The government issued Governor Regulation Number 93 of 2021, designating groundwater-free zones starting August 1, 2023.<sup>20</sup> This regulation prohibits groundwater use in areas already served by piped water. The government established a legal framework to control and monitor groundwater extraction, ensuring fair and equitable access to this resource. Criteria for limiting groundwater use, such as limiting its use in buildings with an area of more than 5,000 square meters or eight floors, align with the principle of protecting residents' rights.<sup>21</sup> This ensures that all residents have

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<sup>19</sup> Dedeng et al., "Tata Kelola Pemerintahan Yang Baik Tentang Partisipasi Masyarakat dalam Pembuatan Peraturan Desa di Desa Sungai Pinang Kecamatan Rambutan Banyuasin."

<sup>20</sup> Langkay, Mawuntu, and Pinasang, "Kajian Hukum Pelampauan Batas Kewenangan Pejabat Administrasi Yang Bertentangan Dengan Asas-Asas Umum Pemerintahan Yang Baik Berdasarkan Undang-Undang Nomor 30 Tahun 2014 Tentang Administrasi Pemerintahan."

<sup>21</sup> Batubara, Kooy, and Zwarteveen, "Politicising Land Subsidence in Jakarta: How Land Subsidence Is the Outcome of Uneven Sociospatial and Socionatural Processes of Capitalist Urbanization."

access to clean water, protecting their rights to this vital resource. An essential aspect of AUPB is transparency and accountability in public administration. The government's approach to land subsidence is clear and openly communicated to the public. It includes regulations, criteria, and implementation schedules, promoting transparency and accountability in decision-making.<sup>22</sup> AUPB emphasizes preventing abuse of power by government officials. Controlling groundwater extraction helps prevent misuse of natural resources, ensuring that these resources are used for the common good and not for the benefit of individuals or companies. A central aspect of AUPB is promoting public welfare. Jakarta's efforts to address land subsidence, reduce flooding, and protect the city's infrastructure directly contribute to the welfare of its residents.<sup>23</sup>

The land has turned into an ocean, causing several areas and residential areas to be submerged in floods in various regions in Indonesia, where even villages and public cemeteries have been submerged by sea water.<sup>24</sup> This tragic event has left deep sorrow for the families whose houses were submerged by sea water, as well as for the families who have cemeteries in the area. This condition is contrary to the principles on which the Indonesian state is based and the highest legal provisions in Indonesia. All citizens have the basic right to live a decent life and live in a healthy environment, in

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<sup>22</sup> Atha Difa Saputri and Angel Maris Linda, "Kebijakan Pemerintah Dalam Menangani Dinamika Subsistensi Tanah Di Tambakrejo Semarang Government Policy in Handling the Dynamics of Land Subsidence in Tambakrejo Semarang," *Jurnal Hukum Lex Generalis* 4, no. 3 (2023): 234–50, <https://jhlgr.rewangrencang.com/>.

<sup>23</sup> Sriyanti, "Pengendalian Dan Pengelolaan Lingkungan Hidup," *Jurnal Bintang Pendidikan Indonesia (JUBPI)* 1, no. 2 (2023): 27–39.

<sup>24</sup> Agar Sugi Setyarini and Chararina Nurjati, "Analisa Pengaruh Penurunan Tanah (Land Subsidence) Terhadap Nilai Tanah," *Geoid* 4, no. 3 (2020): 8.



accordance with what is mandated in Article 28H of the 1945 Constitution of the Republic of Indonesia.<sup>25</sup>

The causes of land subsidence that occur in certain areas in Indonesia are often groundwater extraction due to natural consolidation of alluvial soil, excessive use of land by irresponsible parties regulated according to Law No. 4 of 1982 and Law No. 23 of 1997 concerning land subsidence caused by infrastructure development and construction loads on land.<sup>26</sup> Soil compaction in some aquifer systems accompanied by excessive groundwater pumping is the largest cause of land subsidence. In addition, there are other, less visible, slow problems that can be expected changes in the drainage system. Drainage fields and channels may sink due to higher water levels at river mouths. Soaking reduces drainage capacity and can cause waterlogging and salinization problems.

Jakarta's fight against land subsidence is an example of how the principles of Good Governance, especially those related to public administration, can be applied to address complex environmental challenges. By implementing a legal framework, protecting citizens' rights, promoting transparency, preventing abuse of power, and prioritizing public welfare, Jakarta is taking concrete steps to reduce land subsidence and its associated risks.<sup>27</sup> This approach not only protects city residents but also serves as an example for other cities

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<sup>25</sup> Muhammad Tanzil Aziz Rahimallah, "Azas-Azas Umum Pemerintahan Yang Baik (AUPB) dan Kaitannya Dengan Good Governance (GG)," *Lex Administratum* 2, no. 1 (2022): 1–10.

<sup>26</sup> Wahyu Cahyo Hadiyono, Yulia Kurniaty, and Dilli Trisna Noviasari, "Analisa Penerapan Asas Umum Pemerintahan Yang Baik Dalam Pelaksanaan Pelayanan Publik Berbasis Online Sebagai Inovasi Pelayanan Publik," *Borobudur Law and Society Journal* 2, no. 3 (2023): 118–27.

<sup>27</sup> Hajril A. Abdul, "Eksistensi Precautionary Principle Dalam Pengelolaan Lingkungan Hidup Berdasarkan Hukum Agraria Di Indonesia." *Journal of Comprehensive Science (JCS)* 2, no. 6 (2023): 1514-1520.

facing similar environmental threats. Ultimately, Jakarta's commitment to AUPB principles shows that responsible governance is an essential tool in facing complex and far-reaching challenges.<sup>28</sup>

The government has several alternative solutions that do not pay attention to the long term because the government is forcing the displacement of people by replacing residential areas unfit for habitation. The steps taken by the government in handling the land subsidence case in Tambakrejo are not proportional, there are no guarantees for human rights in the forced displacement of people.<sup>29</sup> Of course, the community rejects the government's efforts because there is no guarantee of the community's land ownership rights and there is no compensation.

The government has made a lot of effort. However, this can be in vain if you do not monitor factories that use groundwater, thereby slowly contributing to soil subsidence. The government's weak implementation of monitoring the running of activities in industrial factories, in this case, the prohibition on groundwater management has been included in Government Regulation No. 82 of 2001. As a result of this sine qua non condition and government negligence, people have lost their homes, and efforts to raise the house have cost them money. not a small amount of funds.<sup>30</sup>

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<sup>28</sup> Dyah Ayu Widowati et al., "Konsep Aupb Untuk Keamanan Data dalam Standardisasi dan Sistem Geocoding Alamat Perkotaan dan Perdesaan Indonesia," *Jurnal Refleksi Hukum* 7, no. 2 (2023): 229–47.

<sup>29</sup> Hany Mora Yuniavenda Simamora, Faza Rayhan Rizaldy, and Gilberth Abednego, "Analisis Faktor Pengaruh Asas-Asas Umum Pemerintahan Yang Baik Dalam Perkara Reklamasi Teluk Jakarta," *Jurnal Ilmiah Wahana Pendidikan* 9, no. June (2023): 762–74.

<sup>30</sup> Diki Surya Irawan et al., "System Dynamic Simulation to Determine the Effect of Water Consumption on Land Subsidence during Covid-19 Pandemic in Jakarta," *IOP Conference Series: Earth and Environmental Science* 3, no. 1 (2022): 1–12, <https://doi.org/10.1088/1755-1315/1065/1/012016>.

There need to be repressive efforts to enforce environmental protection and management laws, for anyone who violates them must be punished based on Law Number 32 of 2009 concerning Environmental Protection and Management through administrative law enforcement, investigations into environmental crimes, and resolving disputes outside of court.<sup>31</sup>

Losses from reduced subsidence include the occurrence of health hazards or negative effects, immaterial, material losses (costs used to raise houses or destroyed houses), and the balance of nature not working as it should. The right to a healthy environment is one of the basic rights enshrined in Article 25 of the 1948 Universal Declaration of Human Rights and Article 11 of the International Covenant on Economic and Social Rights (1966).<sup>32</sup> The right to a good and healthy living environment is also confirmed in Article 28 H of the 1945 Constitution of the Republic of Indonesia. Some of the impacts that have been experienced have certainly disrupted their daily life activities, of course they need real action in combating the complex case of land subsidence. this is from the government. There needs to be a realization of the promises made by the government so that the impacts they feel are not more severe and can be handled.<sup>33</sup>

Land subsidence is a serious problem faced by various countries around the world, and Japan is no exception. This country, which is famous for its majestic mountains and natural scenery, is also facing

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<sup>31</sup> Revo Handhika Juang and Eki Tri Baranti, "Implementasi Asas-Asas Umum Pemerintahan Yang Baik Terhadap Surat Keputusan Gubernur Bali," *Hukum, Politik, Ilmu Sosial (JHPIS)* 2, no. 1 (2023): 33–38.

<sup>32</sup> B R Napitupulu, "Kebijakan Apbd Pemerintah Daerah Penanggulangan Pandemi Covid-19, Fokus Pada Otonomi dan Alokasi Anggaran Pembangunan," *Journal Central Publisher* 1, no. 4 (2023): 362–68.

<sup>33</sup> Jamalum Sinambela, "Optimalisasi Green Economy Melalui Penerapan Doktrin Res Ipsa Loquitur dalam Sengketa Lingkungan Hidup Green," *Jurnal Plaza Hukum Indonesia* 1, no. 1 (2023): 56–75.

the threat of land subsidence, especially in urban areas such as Tokyo and other metropolitan areas. Land subsidence, which is a phenomenon in which the land surface decreases compared to a certain reference point, can have significant impacts, including damage to infrastructure, risk of flooding, and harm to the environment. In this context, the Japanese government has taken various steps to address this problem.<sup>34</sup>

The Japanese government has taken initial steps by carrying out intensive investigations and monitoring of the level of land subsidence in various regions. By using geodetic technology such as GPS and geological measurements, they can better understand how and why land subsidence occurs. The data obtained from this monitoring becomes the basis for developing more effective mitigation strategies. One of the main factors contributing to land subsidence is excessive groundwater extraction. The Japanese government has regulated groundwater extraction more strictly, especially in areas that are vulnerable to land subsidence. By reducing excessive groundwater extraction, they hope to stop or slow the rate of land subsidence. In some areas that have experienced significant land subsidence, reclamation technology has been used to raise the land surface. This involves backfilling sunken areas with materials such as sand or soil. In addition, the government has invested in developing subsidence-resistant infrastructure. Buildings are designed to accommodate changes in ground level, so they remain functional and safe.

Improving urban drainage systems is also a focus in efforts to overcome land subsidence. A good drainage system can help reduce the risk of flooding and slow land subsidence. In addition, the

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<sup>34</sup> Ahmad Robi, "Pengawasan Penyelenggaraan Asas Desentralisasi Dalam Pemerintah Daerah Berdasarkan Uu No 23 Tahun 2014 Tentang Pemerintahan Daerah."

government has set wiser land use policies, including limiting development in areas that have a high risk of land subsidence. The importance of involving the community in efforts to prevent land subsidence cannot be ignored. The Japanese public was provided with information on how to reduce groundwater consumption and practices that can help minimize land subsidence. Awareness of this problem is the key to achieving success in overcoming land subsidence.<sup>35</sup>

In 1962, Japan implemented a law regulating water use in buildings and revised the law regulating water use by industry. At that time, the biggest challenge faced by the Japanese government was changing the mindset of society and industry to switch from using groundwater to alternative water sources. In addition to regulatory efforts, the Japanese government in 1964 began providing alternative water sources, including river water, for industrial use.<sup>36</sup> This step is part of a strategy to reduce pressure on groundwater sources that are vulnerable to decline.

The policy of limiting groundwater use has been in place since 1950 and was successfully implemented in its entirety in 1970. This is an extraordinary achievement considering the scale of the challenges faced. In a short time, namely 20 years, Tokyo succeeded in stopping significant land subsidence. Monitoring results show that in the 1970s,

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<sup>35</sup> Shofi Munawwir Effendi, I Gede Widhiana Suarda, and Fiska Maulidian Nugroho, "Formulasi Pidana Penutupan Korporasi Atas Delik Lingkungan Hidup," *Veritas et Justitia* 9, no. 1 (2023): 138–63, <https://doi.org/10.25123/vej.v9i1.6123>.

<sup>36</sup> Batubara, Kooy, and Zwarteveen, "Politicising Land Subsidence in Jakarta: How Land Subsidence Is the Outcome of Uneven Sociospatial and Socionatural Processes of Capitalist Urbanization."

land subsidence in Tokyo reached almost zero meters.<sup>37</sup> In an effort to overcome land subsidence in Tokyo, Japan, there is an interesting innovation in the use of rainwater. For example, a Sumo-wrestling arena in the city of Sumida uses an 8,400 m<sup>2</sup> roof as a surface catchment area for a rainwater utilization system. This system collects rainwater through channels and stores it in an underground tank of 1,000 m<sup>3</sup>. The collected rainwater is used to flush toilets and air conditioning in the arena. The implementation of this system has become an inspiration for other public facilities, including City Hall, which has also begun to introduce the use of rainwater. In addition, at the community level, there is a simple and unique rainwater utilization facility called "Rojison". This facility was established by local residents in Tokyo's Mukojima district to utilize rainwater collected from the roofs of private homes. This rainwater is used for various purposes, such as watering gardens, firefighting, and even as a drinking water reserve in emergencies. This innovation reflects Japan's commitment to developing sustainable solutions and efficiently utilizing natural resources to face the challenges of land subsidence. Since the 1920s, the Japanese government has had experience in dealing with land subsidence in Tokyo. Steps taken by Japan to overcome this problem include implementing regulations regarding securing alternative water sources for industry and controlling groundwater extraction. In addition, they conducted an in-depth study of various possible causes of land subsidence, such as movement of the earth's crust, consolidation by heavy buildings, shrinkage of soil layers, reduced air pressure in the ground, and reduced rain infiltration. Not only that, Japan also uses satellite technology to analyze land subsidence in Jakarta.

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<sup>37</sup> Suwarno Suwarno, "Bahaya Pemompaan Air Tanah Terhadap Land Subsidence Pada Lapisan Tanah Lunak," *Simposium II UNIID 2017* 2, no. 2 (2017): 422–28, <http://conference.unsri.ac.id/index.php/uniid/article/view/634>.

In the context of handling land subsidence in Jakarta, the DKI Jakarta Provincial Government has taken the right steps by collaborating with the Japan International Cooperation Agency (JICA) in 2017. They have signed a Record of Discussions (RoD) regarding Projects to Promote Efforts to Combat Land Subsidence in Jakarta.<sup>38</sup> However, it is unfortunate that the duration of this collaboration only lasts for 3 years and ends in January 2021. Japan's experience in dealing with land subsidence can be a valuable inspiration and guide for Jakarta in facing similar problems. The two countries can continue to collaborate to develop innovative solutions that can mitigate the risk of land subsidence and protect infrastructure and the quality of life of communities in the future. The extension of this cooperation will be a valuable investment in maintaining the sustainability and security of Jakarta's urban environment.<sup>39</sup>

The government supports research and innovation in the field of technology that can help overcome land subsidence. The development of soil engineering technology is an important part of this solution. Innovations in soil restoration and development of subsidence-resistant materials are also given attention. Land subsidence is a complex problem that requires cross-sectoral efforts and collaboration between government, research institutions and the community. The steps the Japanese government has taken reflect their commitment to addressing this threat and protecting infrastructure, the environment and people's quality of life. By continuing these efforts and continuing to develop innovative solutions, Japan can be an example for other countries in facing the increasingly pressing challenges of land subsidence in this era of climate change

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<sup>38</sup> Erlani and Nugrahandika, "Ketangguhan Kota Semarang dalam Menghadapi Bencana Banjir Pasang Air Laut (Rob)."

<sup>39</sup> Erlani and Nugrahandika.



## B. Land Subsidence Policy Solutions with Good Governance Principles

Land subsidence, or land subsidence, is a serious problem threatening coastal areas in various countries, including Indonesia. This land subsidence can result in flooding, infrastructure damage, and even threats to the environment. To overcome this challenge, implementing the General Principles of Good Governance (AUPB) is key to ensuring effective and sustainable handling.

In the context of handling land subsidence, transparency is a crucial first step. The government must provide clear information to the public about the causes of land subsidence, its impacts, and the actions taken to overcome this problem. Implementing AUPB involves the public in the decision-making process and gives them access to relevant information.<sup>40</sup> In addition, accountability is an important principle in dealing with land subsidence. Governments must be held accountable for their actions in addressing this problem. They must form an independent institution or body tasked with monitoring and evaluating efforts to deal with land subsidence. Regular reports on progress must be provided to the public, and if errors or omissions occur, the government must take corrective steps.

Justice is another principle that must be emphasized in dealing with land subsidence. The government must ensure that these handling efforts do not only benefit certain groups but also cover all citizens, especially those who are most vulnerable to the impacts of land subsidence. This includes protecting the rights of residents whose land is affected by land subsidence. Public participation is a

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<sup>40</sup> Firstnandiar Glica Aini Suniaprily and Suharno Suharno, "Pertanggungjawaban Diskresi Pemerintah dan Hubungannya dengan Asas Umum Pemerintahan Yang Baik (AUPB) Menurut Undang-Undang Nomor 30 Tahun 2014 Tentang Administrasi Pemerintahan," *Klausula (Hukum Tata Negara Administrasi dan Pidana)* 1, no. 1 (2022): 14–29.

critical element of AUPB that can help overcome land subsidence. Local communities must be invited to participate in the planning, monitoring, and evaluation process of response efforts. They have valuable knowledge about land conditions and the impact of land subsidence on their daily lives.<sup>41</sup>

The principle of efficiency in AUPB requires the government to use existing resources wisely. In dealing with land subsidence, this means that the government must plan and implement the most efficient solution in terms of costs and results. It also includes the use of the latest technology and innovation in monitoring and repair. Strong administrative and leadership skills are also very important. The government must have a skilled and high-quality team that can design, manage and implement land subsidence management programs well. Responsible and committed leaders are key to ensuring the success of this effort.<sup>42</sup>

AUPB also covers environmental protection and community welfare. In dealing with land subsidence, the government must ensure that the actions taken do not damage the local natural ecosystem and do not harm the community. This includes maintaining groundwater quality, managing waste properly, and minimizing ecological impacts.

Implementing General Principles of Good Governance (*Asas-Asas Umum Pemerintahan Yang Baik*, hereinafter as AUPB) is key in dealing with land subsidence. AUPB principles such as transparency, accountability, justice, public participation, efficiency, and environmental protection must guide designing and implementing successful land subsidence management programs. In this way,

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<sup>41</sup> Hasibuan et al., "Policymaking and the Spatial Characteristics of Land Subsidence in North Jakarta."

<sup>42</sup> Zoysa et al., "The 'wickedness' of Governing Land Subsidence: Policy Perspectives from Urban Southeast Asia."

AUPB helps ensure that these response efforts are not only effective but also sustainable, protecting the interests of society and the environment at the same time.

The government failed to implement the provisions of Article 28H paragraph (1) of the 1945 NRI Law which requires the state to provide constitutional rights to its citizens, namely the right to a good and healthy living environment. This right is also included in the human rights framework, where every individual has the right to a good and healthy living environment, as well as the right to live in a clean environment. However, ironically, people cannot enjoy these rights as mandated by law, as stated in the PPLH Law (UU No. 32 of 2009) Article 65 paragraph 1 and the Human Rights Law (UU No. 39 of 1999) Article 9 paragraph 3. Unfairness in granting these rights creates inequality that is detrimental to society.<sup>43</sup> Some individuals or groups may be able to enjoy a good and healthy living environment, while others do not have the same access to these rights. This is a form of injustice that needs to be addressed immediately by the government before more areas are affected by land subsidence or pollution due to poor handling of the environment, including the problem of accumulated waste. Justice must be the basis of the government's efforts to resolve this problem and ensure that the rights to a good and healthy environment can be accessed by all Indonesian citizens without discrimination.<sup>44</sup>

Article 3 of Law Number 6 of 1974 contains the main principles related to Social Welfare Regulations. This article explains that the

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<sup>43</sup> Juliadi Rusydi, Januri Januri, and Rika Santina, "Tanggungjawab Pemerintah dalam Penegakan Hukum Lingkungan Hidup Di Tinjau Dari Persepektif Hukum Administrasi Negara," *Audi Et AP: Jurnal Penelitian Hukum* 2, no. 01 (2023): 54–63, <https://doi.org/10.24967/jaeap.v2i01.2064>.

<sup>44</sup> Sianturi, "Degradasi Kewenangan Pemerintah Daerah Dalam Pengelolaan Dan Perlindungan Hukum Lingkungan Pasca Omnibus Law."

government, in its role as a policymaker, has the responsibility to determine the policies needed to safeguard, maintain, and improve the social welfare of society. Apart from that, through this policy, the government also aims to increase public awareness of their social responsibilities and carry out administrative functions to supervise the implementation of social work.

In this context, this article underlines the government's commitment to seeking the social welfare of society in various ways, including the formation and implementation of relevant policies. The government is expected to not only carry out an administrative role in supervising the implementation of social work, but also to be the main driver in increasing social awareness and creating conditions that support better social welfare for the entire community. Thus, this article reflects the Indonesian government's commitment to promoting social welfare and social responsibility in order to meet the needs and aspirations of the community.

Tidal floods, which often occur during the full moon due to rising tides, can be predicted with the help of students and authorities such as the Port and Meteorology, Climatology and Geophysics Agency (BMKG) which provides tide calendars. However, this calendar is only available upon request by citizens. In reality, the government should be more proactive in preventing tidal floods by providing regular tide calendars without residents having to ask for them.

The public's right of access to information, such as the tide calendar provided by the government, is in line with the regulations contained in Article 65 paragraphs (2) and (4) of the Environmental Protection and Management Law (UU PPLH). In this case, the public has the right to have easy and regular access to information relating to the environment, including information about the potential for tidal floods. The government, as a state administrator, has an

obligation to ensure that this right is fulfilled and that the community has the right to a healthy and good environment. Therefore, the government needs to increase transparency and openness in providing information about sea tides periodically to the public without having to wait for a special request. This action will help the community to be better prepared to face tidal floods and reduce the losses that can be caused by this phenomenon, in line with the principles of environmental protection regulated in law.

The Ministry of Public Works and Public Housing (PUPR) together with the Japan International Cooperation Agency (JICA) have established significant cooperation in efforts to overcome land subsidence that has occurred in Jakarta. This collaboration was stated in the signing of the Record of Discussion (RoD) on July 28 2017. Land subsidence in Jakarta, which reaches 5-12 cm per year, is a serious problem that can increase the risk of flooding, damage infrastructure, and reduce property values.

At the RoD signing ceremony, the Director General of Water Resources (SDA) of the PUPR Ministry, Imam Santoso, and the Senior Representative of the JICA Indonesia Office, Tetsuya Harada, played an important role. This agreement was also witnessed by Abdul Malik Sadat Idris, Director of Water and Irrigation from Bappenas, and Saefullah, Regional Secretary of DKI Jakarta Province. One of the reasons why the PUPR Ministry is collaborating with Japan is Japan's successful experience in dealing with land subsidence in Tokyo. The problem of land subsidence in Tokyo has existed since the 1920s but was stopped around 1970. Japan achieved this by implementing regulations governing the securing of alternative water sources for industry as well as regulations regarding the wiser use of groundwater. As a result, land subsidence in Tokyo City has almost reached zero. In Jakarta, land subsidence is mostly caused by excessive groundwater extraction and the construction of tall

buildings. Many Jakarta residents do not yet use PAM (Drinking Water Company) water, so they depend on the use of groundwater, which has an impact on significant land subsidence.

Based on monitoring in the Pluit area, North Jakarta, land surface subsidence reaches 5-12 cm per year. If this situation continues, within ten years, land subsidence is estimated to reach 1.2 meters. Apart from helping Jakarta, Japan has also succeeded in helping Bangkok overcome similar problems. Head of JICA Indonesia Office Representative, Tetsuya Harada, revealed that consultants and technical experts from Tokyo will come to Indonesia in September as part of this collaboration. This collaboration will last for three years with funding in the form of a grant from JICA for consultation and mentoring activities. In this collaboration, Japan will assist in reviewing the necessary regulations, monitoring areas experiencing severe land subsidence in Jakarta, and implementing appropriate technology. The results of this study will be the basis for decision making by the PUPR Ministry, related ministries/institutions, and the DKI Jakarta Provincial Government. Through this collaboration, Indonesia can take advantage of Japan's experience in overcoming the problem of land subsidence and implement effective solutions, thereby reducing the risk of flooding and infrastructure damage as well as improving the quality of the living environment in Jakarta.

#### **4. Conclusion**

Based on the discussion presented above, the following conclusions can be drawn. Land subsidence is a serious problem faced by many countries, including Japan and Indonesia. This phenomenon has significant impacts, such as flooding, infrastructure damage and environmental hazards. In overcoming this problem, the application

of the principles of Good Governance is very important. Principles such as transparency, accountability, justice, public participation, efficiency and environmental protection must be the basis for planning and implementing policies to address land subsidence. By implementing these principles, the government can ensure effective handling, involve the community fairly, and protect the environment and community welfare. Thus, the implementation of AUPB is an important basis for responding to the challenges of land subsidence in both countries.

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The authors state that there is no conflict of interest in the publication of this article.

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